नेपाल सरकार
सङ्घीय मामिला तथा सामान्य प्रशासन मन्त्रालय

स्थानीय विकास प्रशिक्षण प्रतिष्ठान
(स्थानीय विकास प्रशिक्षण प्रतिष्ठान ऐन, २०४९ द्वारा स्थापित)
Local Development Training Academy
(Established under the Local Development Training Academy Act, 2049)
"An Autonomous, Professional, Client Centered, Gender Responsive National Institute of Excellence in the area of Local Self Governance."
LDTA>>>

प्रशिक्षकका लागि

स्थानीय तहका लागि तयार पारिएको प्रशिक्षण सामग्री

परियोजना व्यवस्थापन

प्रशिक्षण सामग्रीको बनावट:

१. प्रशिक्षण मार्गदर्शन
२. प्रशिक्षण योजना
३. सत्र योजना (अभ्यास पत्र समेत)
४. प्रस्तुति सामग्री (पावरप्वाइन्ट स्लाइड)
५. सहभागीका लागि अध्ययन सामग्री
६. मूल्याङ्कनका औजारहरू

मोड्युल २९

नेपाल सरकार
सङ्घीय मामिला तथा सामान्य प्रशासन मन्त्रालय

स्थानीय विकास प्रशिक्षण प्रतिष्ठान
(स्थानीय विकास प्रशिक्षण प्रतिष्ठान सेवा, २०४९ द्वारा स्थापित)
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प्रशिक्षकका लागि

स्थानीय तहका लागि तयार पारिएको प्रशिक्षण सामग्री

परियोजना व्यवस्थापन

२०७८ असार

मोड्युल २९

प्रकाशक:

सर्वाधिकार:

प्रकाशन: २०७८ असार

प्रशिक्षण सामग्री निर्माणमा संलग्न सदस्यहरू

श्री पीतकुमार श्रेष्ठ, स्थानीय विकास प्रशिक्षण प्रतिष्ठान, ललितपुर

श्री जय कृष्ण श्रेष्ठ, स्थानीय विकास प्रशिक्षण प्रतिष्ठान, ललितपुर

श्री योग माया सापकोटा, स्थानीय विकास प्रशिक्षण प्रतिष्ठान, ललितपुर

लेखन तथा प्राविधिक सहयोग

डा. ध्रुर्व कुमार गौतम, परामर्शदाता

भाषा सम्पादन:

सम्पर्कका लागि:

मन्तव्य

दुई शब्द

परियोजना व्यवस्थापनमा विकास नतिजा निर्भर हुन्छ । विशेष गरेर स्थानीय तहरहरुमा साना देखि ठूला परियोजना सबैको प्रभावकारी व्यवस्थापन सीप विकासको आवश्यकता रहेकोले संघीय मामिला तथा सामान्य प्रशासन मन्त्रालय र प्रतिष्ठानवीचको समझदारीमा स्थानीय तहहरुका लागि यस विषयमा प्रशिक्षण मोड्यूल तयार गरिएको छ ।

यस प्रशिक्षण मोड्युलमा सार्वजनिक परियोजना पहिचान, सीमा र सफलताका तत्व, सार्वजनिक परियोजनाका सरोकारवालाको पहिचान, विश्लेषण र द्वन्द्व व्यवस्थापनको सहजीकरण, सार्वजनिक परियोजनाको गुणस्तर व्यवस्थापन, सार्वजनिक परियोजनाको गुण लागतको अर्थ, प्रकार र गुण नियन्त्रण औजार , सार्वजनिक परियोजना व्यवस्थापनका विभिन्न चरणहरू, आधारभूत कार्य खण्डीकरण, लागत व्यवस्थापन, क्षमता विकासको महत्व र मोडल, सार्वजनिक परियोजना कार्यान्वयन, मूल्याङ्कन, सार्वजनिक परियोजना कार्य प्रगति अनुगमनमा जस्ता विषयहरु समेटिएका छन् ।

यस प्रशिक्षण मोड्युलअनुसार हुने प्रशिक्षण कार्यक्रमले स्थानीय तहका कर्मचारीहरुलाई गाउँपालिका र नगरपालिकामा सार्वजनिक परियोजनाको पहिचान, कार्यान्वयन, अनुगमन र मूल्याङ्कन गरी प्रभावकारी रुपमा परियोजना व्यवस्थापन गर्न आवश्यक ज्ञान र सीपमा अभिवृद्धि भई अपेक्षित नतिजा प्राप्त हुने आशा र विश्वास लिएको छु । साथै यस प्रशिक्षण सामाग्रीहरुलाई संघ, प्रदेश र स्थानीय तहका पदाधिकारीहरु, कर्मचारीहरु, प्रशिक्षक, प्राज्ञिक क्षेत्र, सोधकर्ता, राष्ट्रिय तथा अन्तराष्ट्रिय सरकारी तथा गैरसरकारी संघसंस्थाहरुका साथै यस विषयमा सरोकार राख्ने सबैको लागि उपयोगी हुनेछ भन्ने विश्वास लिएको छु ।

अन्तमा, यो प्रशिक्षण मोड्युल तयारी कार्यमा मार्गनिर्देश गर्नुहुने संघीय मामिला तथा सामान्य प्रशासन मन्त्रालयलका श्रीमान सचिवज्यू तथा सहसचिवज्यू लगायतका कर्मचारीहरुमा हार्दिक कृतज्ञता व्यक्त गर्दछु । साथै यस कार्यमा संलग्न हुनु हुने प्रतिष्ठानका कर्मचारीहरु र विज्ञ डा. ध्रुर्व कुमार गौतममा प्रतिष्ठानको तर्फबाट हार्दिक धन्यवाद प्रदान गर्दछु ।

पीतकुमार श्रेष्ठ

कार्यकारी निर्देशक

विषयसूची

प्रशिक्षण मार्गदर्शन

प्रशिक्षण सामग्रीबारे

स्थानीय विकासको कार्यसँग सम्बन्धित स्थानीय तहहरूको प्रशासनिक एवं व्यवस्थापनसम्बन्धी दक्षता अभिवृद्धि गर्ने उद्देश्यले त्यस्ता निकायहरूमा संलग्न जनप्रतिनिधिहरू एवम् कार्यरत कर्मचारीहरूलाई योजनाबद्ध तरिकाले उच्चस्तरीय प्रशिक्षणको व्यवस्था गरी स्थानीय स्तरमा ती निकायहरूको संस्थागत विकासमा सघाउ पुऱ्याउन स्थानीय विकास प्रशिक्षण प्रतिष्ठान ऐन २०४९ अन्तर्गत वि.सं. २०५० सालमा स्थापना भएको यो एक स्वशासित र सङ्गठित संस्थाका रूपमा रहेको छ। प्रतिष्ठानको मुख्य उद्देश्य प्रशिक्षण स्थानीय विकास कार्यसँग सम्बन्धित स्थानीय तहका व्यक्तिहरूका लागि आवश्यक पर्ने प्रशिक्षणको व्यवस्था गर्ने, प्रशिक्षण केन्द्रद्वारा सञ्चालन गरिने प्रशिक्षण कार्यक्रमसम्बन्धी अनुसन्धान गर्ने र प्रशिक्षण केन्द्रद्वारा सञ्चालन गरिने प्रशिक्षण कार्यक्रमलाई बढी उपयोगी तुल्याउन तथा प्रशिक्षण सामग्री तयार गर्नका लागि समस्यामूलक अनुसन्धान, परामर्श सेवा तथा सूचना सेवासम्बन्धी कार्यक्रमहरू सञ्चालन गर्ने रहेको छ।

यो प्रशिक्षण सामग्री सङ्घीय मामिला तथा सामान्य प्रशासन मन्त्रालयको निर्देशनमा स्थानीय विकास प्रशिक्षण प्रतिष्ठानबाट तयार पारिएको हो। यस **छ दिने** प्रशिक्षण सामग्रीले **परियोजना व्यवस्थापन** प्रशिक्षणलाई प्रभावकारी बनाउन प्रशिक्षकहरूलाई महत्त्वपूर्ण मार्गदर्शन हुने अपेक्षा गरिएको छ।

प्रशिक्षण सामग्रीको उद्देश्य

यस प्रशिक्षण सामग्रीको उद्देश्य गाउँपालिका/नगरपालिकाहरूमा कार्यान्वयन गरिने **परियोजना व्यवस्थापन** प्रशिक्षण कार्यलाई प्रभावकारी र गुणस्तरीय बनाउनुका साथै प्रशिक्षण कार्यमा एकरूपता ल्याई प्रशिक्षणलाई सहभागितामूलक बनाउनु हो।

प्रशिक्षण सामग्रीको बनावट

यस प्रशिक्षण सामग्रीलाई चार खण्डमा विभाजन गरिएको छ। पहिलो खण्डमा प्रशिक्षण सामग्री र यसको प्रयोग गर्ने तरिका (Instsruction to user) उल्लेख गरिएको छ। दोस्रो खण्डमा प्रशिक्षण योजना, प्रशिक्षण तालिका समावेश गरिएको छ। तेस्रो खण्डमा प्रशिक्षणका प्रत्येक सत्रका विषयवस्तुहरूको पाठयोजना, पावरप्वाइन्ट स्लाइडहरू र विषयवस्तुसँग सम्बन्धित अध्ययन सामग्री समेटिएको छ भने अन्तिम खण्डमा प्रशिक्षण मूल्याङ्कनका औजारहरू समावेश गरिएको छ। यसका विषयवस्तुहरूलाई सङ्क्षिप्तमा तल उल्लेख गरिएको छ।

१. प्रशिक्षण सामग्रीको प्रयोग गर्ने तरिका (Instsruction to User)

यसमा प्रशिक्षण सामग्रीको पृष्ठभूमि, यसको उद्देश्य, प्रशिक्षण सामग्रीमा समावेश गरिएका विषयवस्तुहरू, प्रशिक्षण सामग्री प्रयोग गर्ने तरिका, प्रशिक्षणका विधिहरू र तिनको सञ्चालन प्रक्रिया, अध्ययन सामग्री, प्रशिक्षण मूल्याङ्कनका औजारहरू, प्रशिक्षणका प्रयोगकर्ता आदि समावेश गरिएको छ।

२. प्रशिक्षण योजना

प्रशिक्षण योजना प्रशिक्षण सञ्चालनका लागि तयार पारिएको प्रशिक्षणको समग्र खाका हो। यसमा प्रशिक्षणका साधारण र निर्दिष्ट उद्देश्य, प्रशिक्षणका विषयवस्तु, प्रशिक्षण सञ्चालन विधि र प्रशिक्षण सामग्री उल्लेख गरिएको छ।

३. प्रशिक्षण दैनिक तालिका

प्रशिक्षण दैनिक तालिकामा हरेक दिनका क्रियाकलाप र विषयवस्तु र तिनका लागि आवश्यक समय उल्लेख गरिएको छ।

४. पाठयोजना

पाठयोजना हरेक सत्र सञ्चालनका लागि मार्गदर्शन हो। यसमा सत्रका साधारण र निर्दिष्ट उद्देश्य, सत्रका विषयवस्तु, प्रशिक्षण क्रियाकलापको विस्तृत विवरण, प्रशिक्षण विधि, प्रशिक्षण सामग्री र आवश्यक समय उल्लेख गरिएको छ। यसमा सत्रका निर्दिष्ट उद्देश्य हासिल भए वा भएनन् थाहा पाउनका लागि सत्र मूल्याङ्कन विधिसमेत उल्लेख गरिएको छ।

५. पावरप्वाइन्ट स्लाइड

प्रशिक्षण सत्र सञ्चालनका लागि आवश्यक पावरप्वाइन्ट स्लाइडहरू यस सामग्रीमा क्रमबद्ध रूपमा समावेश गरिएका छन्। सत्रका साधारण र निर्दिष्ट उद्देश्य, सत्रका विषयवस्तुहरू, समूह कार्य वा अभ्यास र सो अभ्यास सञ्चालनका लागि गर्नुपर्ने क्रियाकलाप पनि पावरप्वाइन्ट स्लाइडमा उल्लेख गरिएको छ।

६. अध्ययन सामग्री

प्रशिक्षणका विषयवस्तु र प्रस्तुतीकरणसँग सम्बन्धित सामग्रीहरूको विस्तृत विवरण अध्ययनसामग्रीका रूपमा यस सामग्रीभित्र समावेश गरिएको छ। यी सामग्रीहरूलाई प्रशिक्षण सत्रका आधारमा छुट्याई क्रमबद्ध रूपमा व्यवस्थित गरिएको छ।

७. प्रशिक्षण मूल्याङ्कनका औजारहरू

प्रशिक्षणको प्रभावकारिता मापनका लागि निम्नलिखित औजारहरू समावेश गरिएका छन्।

(क) प्रशिक्षणपूर्व र प्रशिक्षणपश्चात् जानकारी

यसअन्तर्गत प्रशिक्षणका विषयवस्तुहरूमा सहभागीहरूको बुझाइको अवस्था थाहा पाउन प्रशिक्षणका विषयवस्तुहरूसँग सम्बन्धी प्रश्नहरू निर्धारण गरी प्रशिक्षणको सुरुमा पूर्व जानकारी र अन्तमा पश्चात् जानकारी लिइन्छ। यसले प्रशिक्षणका कारण सहभागीहरूको ज्ञान र सिपमा आएको परिवर्तन मापन गर्न सहयोग गर्दछ।

(ख) दैनिक पृष्ठपोषण फाराम

हरेक दिनको अन्तमा दिनभरि भएका छलफलहरूमा सहभागीहरूको सिकाइ थाहा पाउन दैनिक पृष्ठपोषण फारामको प्रयोग गरिन्छ। यसबाट सहभागीहरूले सिकेका र सिकेका कुरालाई कहाँ र कसरी प्रयोग गर्ने भन्ने बारेमा र प्रशिक्षणलाई अझ प्रभावकारी सुधार गर्नुपर्ने सुझाव पाउन सकिन्छ।

(ग) प्रशिक्षण सुधारका लागि प्रश्नावली

यो प्रश्नावली प्रशिक्षणको अन्त्यमा सहभागीलाई वितरण गरी उनीहरूको प्रतिक्रिया लिन प्रयोग गरिन्छ । यसबाट (१) प्रशिक्षणको समग्र मूल्याङ्कन, (२) सहजकर्ताप्रतिको दृष्टिकोण, (३) प्रशिक्षणमा उपलब्ध गराइएका पाठ्यसामग्रीको प्रभावकारिता, (४) प्रशिक्षणका विषयवस्तुको उपयुक्तता र (५) प्रशिक्षणमा प्रयोग भएका प्रशिक्षण विधिहरूको सान्दर्भिकता जाँच गरिन्छ ।

प्रशिक्षण कार्यक्रमको मूल्याङ्कन

प्रशिक्षण कार्यक्रमको प्रभावकारितालाई मुख्यतः चारवटा तहमा मूल्याङ्कन गरिनुपर्दछ । सहभागीहरूको प्रशिक्षणप्रतिको प्रतिक्रिया, उनीहरूको सिकाइको स्तर, प्रशिक्षण कार्यक्रमले सहभागीहरूको दैनिक व्यवहार र उनीहरूको दैनिक कार्यसम्पादनमा ल्याएको परिवर्तन र सो परिवर्तनको परिणामस्वरूप समग्र संस्थाको कार्यसम्पादनमा आएको परिवर्तनलाई प्रशिक्षण प्रभावकारिता मूल्याङ्कनका आधार बनाइनु पर्दछ ।

प्रशिक्षण सामग्रीको प्रयोग विधि

परियोजना व्यवस्थापन प्रशिक्षणको प्रस्तुतिलाई व्यवस्थित र पूर्ण गराउनका लागि पाठयोजनाको अनुसरण गर्नुपर्दछ । यस सामग्रीमा व्यवस्था गरिएको पाठयोजनालाई अनुसरण गरी सहज तरिकाले सत्र सञ्चालन गर्न क्रियाकलाप शीर्षकअन्तर्गत विषयवस्तुलाई विस्तृत रूपमा प्रस्तुत गरिएको छ । विषयप्रस्तुति अगाडि विषयप्रति रुची जगाउने, विषयको महत्त्व दर्साउने जस्ता कार्य प्रशिक्षक आफैले विकास गरी सत्र सञ्चालन गर्न सक्ने छन् । प्रशिक्षकले विषयवस्तुको अध्ययन सामग्री राम्रोसँग अध्ययन गरी विषयको प्रभावकारी प्रस्तुतीकरणका लागि आवश्यक दृश्य सामग्रीको तयारी/सङ्कलनसमेत गर्न सक्ने छन् । यसका साथै प्रशिक्षकले प्रशिक्षण सामग्रीमा उल्लेख गरिएका पावरप्वाइन्ट स्लाइड र अध्ययन सामग्रीमा समावेश गरिएका चित्र, चार्ट, ग्राफ आदिलाई आवश्यकताअनुसार तिनको आकार विस्तार गरी प्रस्तुत गर्न सक्ने छन् । सत्रहरूको प्रस्तुतीकरणका लागि सिलसिलेबार रूपमा पावरप्वाइन्ट स्लाइडहरू समावेश गरिएको छ । प्रशिक्षणको प्रभावकारिता र प्रशिक्षण प्रभावकारिताको मापनका लागि प्रशिक्षण मूल्याङ्कनका औजारहरूसमेत सामग्रीमा समावेश गरिएका छन् । तिनलाई उपयुक्त तरिकाले प्रयोग गरिनु आवश्यक छ ।

अध्ययन सामग्री

प्रस्तुत सामग्रीमा समावेश गरिएका अध्ययन सामग्रीहरू **परियोजना व्यवस्थापन** प्रशिक्षणसँग सम्बन्धित विभिन्न निकायहरूका प्रकाशन, प्रशिक्षण सामग्री, नेपाल सरकारले गरेका नीतिगत व्यवस्थाहरू आदिलाई आधार मानी तयार गरिएको छ । यी अध्ययन सामग्रीहरू केवल सन्दर्भ सामग्री मात्र हुन् । यिनलाई समय समयमा अद्यावधिक गराउनु पर्दछ ।

प्रशिक्षण सामग्रीको प्रयोगकर्ता

यो प्रशिक्षण सामग्री **परियोजना व्यवस्थापन** प्रशिक्षणमा रुचि राख्ने जोसुकैका लागि उपयोगी हुने छ। यो विशेष गरी **परियोजना व्यवस्थापन** प्रशिक्षण सहजकर्ताहरूलाई ध्यानमा राखी तयार पारिएको छ तर यस सामग्रीको उपयुक्तताको ठहर गर्ने जोसुकैले पनि यसको प्रयोग गर्न सक्ने छन्। यसका प्रयोगकर्ताले यसमा उल्लिखित विधि, प्रक्रिया, समय, सामग्री जस्ता पक्षहरूलाई हुबहु उतार्नुभन्दा यसमा उल्लिखित मार्गदर्शन र स्थानीय परिवेशअनुसार यसलाई सहयोगी सामग्रीका रूपमा बुझेर प्रयोग गर्नु उपयुक्त हुने छ। स्थानीय परिवेशअनुसार यस निर्देशिकाको मूल मर्मलाई ध्यानमा राखी सहजकर्ता/प्रशिक्षकले अन्य रचनात्मक गतिविधिसमेत अँगाल्न सक्ने छन्।

प्रशिक्षण विधि र प्रयोग तरिका

प्रशिक्षकको सहजीकरणलाई व्यवस्थित गर्नका लागि पाठयोजनामा प्रशिक्षण विधिहरू उल्लेख गरिएका छन्। प्रशिक्षण कार्यक्रमलाई सहभागितामूलक र प्रभावकारी बनाउन निम्न विधिहरू प्रयोग गर्न सकिने छ।

क) समूह छलफल

सहभागितामूलक प्रक्रियाबाट प्रशिक्षण सञ्चालन गर्नका लागि समूह छलफल एक महत्त्वपूर्ण विधि हो। समूह छलफलका लागि निम्न प्रक्रिया अपनाउनुपर्ने हुन्छः

- समूह विभाजन गर्दा सकभर सहभागी सङ्ख्या बराबर बनाउने, सहभागीको स्तरलाई ध्यान दिने।
- समूह छलफलका लागि विषयवस्तु किटानी गर्ने।
- छलफलको विषयअनुसार स्थान र समय निर्धारण गर्ने।
- सहजकर्ताले छलफल प्रक्रिया बताउने। जस्तैः
    - समूहमा संयोजक, प्रतिवेदक चयन गर्ने।
    - समूहमा सबैको भनाइ समेटिनुपर्ने।
    - समूहको निचोड ठुलो कागजमा तयार गर्ने।
    - संयोजकले समूहकार्य प्रस्तुत गर्ने आदि।
- समूहमा खुल्ला छलफल चलाउन प्रेरित गर्ने।
- सहजकर्ताले छलफलको सन्दर्भ र विषयवस्तुलाई आधार मानी आफ्नो निष्कर्ष दिने।

ख) खेल

खेल विधिले विषयवस्तुलाई सजिलै प्रस्ट पार्न सहयोग गर्दछ। खेल विधिबाट सिकेका सिकाइहरू चिरस्थायी हुन्छन्।

सञ्चालन प्रक्रिया

- खेलको प्रकृतिअनुसार सहभागी सङ्ख्या छनोट गर्ने। शारीरिक शक्ति प्रयोग गर्नुपर्ने खेल भए शारीरिक रूपमा अशक्त व्यक्तिलाई उसको अनुमतिमा बाहिर राख्ने।

- लैङ्गिक संवेदनशीलताका पक्षमा ध्यान दिने।
- समय निर्धारण गर्ने। खेललाई २० मिनेटभन्दा बढी समय दिनु उपयुक्त हुँदैन।
- खेलमा पालना गर्नुपर्ने नीतिनियम प्रस्ट पार्ने।
- खेलका लागि आवश्यक सामग्री तयार गर्ने।
- खेल सकिएपछि खेलबाट भएका सिकाइहरू छलफल गर्ने।
- खेलका लागि सबैलाई धन्यवाद दिने।

ग) प्रश्नोत्तर

कुनै विषयवस्तुबारे सहभागीहरूको बुझाइ थाहा पाउनका लागि प्रश्न गर्ने, उत्तर लिने र सोअनुसार सहजकर्ताले विषयवस्तु प्रस्ट पार्ने प्रक्रिया नै प्रश्नोत्तर विधि हो। यसले सहभागीहरूको ध्यान विषयवस्तुप्रति आकर्षित गर्न मदत गर्दछ। सहजकर्ताले प्रश्नोत्तर सिपमा विशेष ध्यान पुर्याउनु पर्दछ।

घ) साना समूह छलफल

यो विधि प्रशिक्षण कार्यका सन्दर्भमा छिट्टै छलफल गरी तत्कालै विषयवस्तुको निष्कर्षमा पुऱ्याउन उपयोगी हुन्छ। २/३ जना सहभागीबिच बसेकै स्थानमा आमनेसामने भई यो विधिमार्फत विषयवस्तुको निचोड निकाल्न सकिन्छ। यस विधिले सिकाइलाई मूर्त रूप दिन मदत गर्दछ।

सञ्चालन प्रक्रिया

- सहजकर्ताले छलफलको विषय र समय निर्धारण गर्ने।
- नजिकैका २/३ जना सहभागीलाई आमनेसामने बस्न भन्ने।
- छलफल गर्न लगाउने। छलफलका मुख्य कुरा टिपोट गर्न भन्ने।
- छलफलको निचोडलाई मेटाकार्ड दिई लेख्न लगाउने।
- छलफल सकिएपछि क्रमिक रूपमा सहभागी समूहलाई आफ्नो निचोड प्रस्तुत गर्न लगाउने, छलफल गर्ने, कार्ड सफ्ट बोर्डमा टास्ने।
- सहभागीको प्रस्तुतिपश्चात् सहजर्ताले विषयवस्तुको सन्दर्भ र तात्पर्य मिलाई निष्कर्ष निकाल्ने।

ङ) मस्तिष्क मन्थन

सहभागीले आफ्नो विचार मन्थन गरी विषयवस्तुलाई निर्णयमा पुऱ्याउने विधि नै मस्तिष्क मन्थन विधि (Brainstorming) हो।

सञ्चालन प्रक्रिया

- छलफलको विषय / प्रश्न प्रस्ट रूपमा राख्ने।
- सोच्नका लागि समय दिने।

- सहभागीहरूका विचारलाई सङ्गठित गर्दै टिपोट गर्ने, छलफल चलाउने।
- भनाइलाई निष्कर्षमा पुऱ्याउने।

च) अभ्यास

सहभागीको प्रत्यक्ष संलग्नतामा सिकाइ आर्जन गर्न यो विधि महत्त्वपूर्ण हुन्छ। यो विधि जीवन र जगतसँग सम्बन्धित घटनामा आधारित कुराहरू प्रस्ट पार्न प्रयोग गरिन्छ।

सञ्चालन प्रक्रिया

- सहजकर्ताले घटना वा सवाल समूहबिच राख्ने।
- विषयअनुसार समय निर्धारण गर्ने।
- सवालका निष्कर्ष निकाल्न लगाउने।
- अभ्यासबाट निकालिएको निष्कर्षलाई सहजकर्ताले छलफल चलाई अन्तिम निष्कर्ष निकाल्ने।

ज) लघु प्रवचन

यो प्रशिक्षणको सबैभन्दा महत्त्वपूर्ण विधि हो। यसमार्फत विषयवस्तुलाई सहभागीहरूसमक्ष सहज रूपमा प्रस्तुत गर्न सकिन्छ। नामअनुसार नै यो विधिमार्फत गरिने प्रस्तुतीकरण छोटो र सहभागितामूलक हुनु पर्दछ। प्रशिक्षकले एकोहोरो रूपमा लामो समयसम्म प्रस्तुतीकरण गर्नु हुँदैन। प्रस्तुतीकरणका सिलसिलामा सहभागीहरूलाई पनि संलग्न गराउँदै जानु पर्दछ।

प्रशिक्षकलाई प्रश्नः

१. सत्रका विषयवस्तुको राम्ररी अध्ययन गर्नुभएको छ ?
२. सत्र सञ्चालनका लागि पाठयोजनाको अध्ययन गर्नुभएको छ ?
३. सहभागीहरूको पृष्ठभूमि तथा स्तरका बारेमा सोच्नुभएको छ ?
४. सत्रका लागि चाहिने आवश्यक प्रशिक्षण सामग्रीहरू जुटाउनुभएको छ ?
५. प्रस्तुतीकरणका बुँदाहरूको राम्ररी अध्ययन गर्नुभएको छ ?
६. प्रस्तुतीकरणमा बढी महत्त्व दिनुपर्ने बुँदाहरूको निर्क्योल गर्नुभएको छ ?
७. प्रस्तुतीकरणमा विशेष जोड दिनका लागि आवश्यक उदाहरणहरूको चयन गर्नुभएको छ ?
८. प्रशिक्षण सारांशका बुँदाहरू तय गर्नुभएको छ ?
९. सत्रप्रति रुचि जगाउन तथा सहभागिता बढाउन आवश्यक पर्ने विधिहरूको चयन गर्नुभएको छ ?
१०. समयभित्र सत्र पूरा गर्न राम्ररी योजना गर्नुभएको छ ?
११. सत्र सञ्चालनका लागि आवश्यक पर्ने भौतिक सामग्रीहरू, जस्तैः सेतो पाटी, फ्लिपचार्ट, खैरो कागज, मेटाकार्ड, मार्कर, मास्किङ टेप, कागज, कलम, कैँची, चित्रहरूको व्यवस्था गर्नुभएको छ ?
१२. प्रशिक्षण हल, बसाइ व्यवस्थापन, कोठाको तापक्रम, हावा, प्रकाश इत्यादिका बारेमा सोच्नुभएको छ ?

प्रशिक्षण योजना

प्रशिक्षण योजना

मोड्युल/विषय	परियोजना व्यवस्थापन
मिति	
स्थान	नगरपालिका र गाँउपालिका
सहजकर्ता	

लक्षित सहभागीहरु:

- गाउँपालिका तथा नगरपालिकाका कर्मचारीहरु तथा सो सँग सम्वन्धित सरोकारवालाहरु

साधारण उद्देश्य

- गाउँपालिका र नगरपालिकामा सार्वजनिक परियोजनाको पहिचान कार्यान्वयन अनुगमन र मूल्याङ्कन गरी प्रभावकारी रुपमा परियोजना व्यवस्थापन गर्न सक्षम हुनेछ ।

निर्दिष्ट उद्देश्यहरु: यस प्रशिक्षणको अन्तमा सहभागीहरुले

- सार्वजनिक परियोजनाका सीमा, र सफलताका तत्व पहिचान गराउने हुनेछ ।
- सार्वजनिक परियोजना पहिचान, मूल्याङ्कन र छनोट गर्न सक्नेछ ।
- सार्वजनिक परियोजनाका सरोकारवालाको पहिचान, विश्लेषण र द्वन्द्व व्यवस्थापनको सहजीकरण गर्न सक्नेछन ।
- सार्वजनिक परियोजनाको गुणस्तर व्यवस्थापन सम्वन्धमा स्पष्ट हुनेछ ।
- सार्वजनिक परियोजनाको गुण लागतको अर्थ, प्रकार र गुण नियन्त्रण औजार बारेमा थप ज्ञान र सीपमा अभिवृद्धि हुनेछ ।
- सार्वजनिक परियोजनाको गुणस्तरका निम्ति गुण नेतृत्व सम्वन्धी स्पष्ट हुनेछ ।
- सार्वजनिक परियोजना व्यवस्थापनका विभिन्न चरण बारेमा थप स्पष्ट हुनेछ ।
- सार्वजनिक परियोजना व्यवस्थापन क्रमका गरिने आधारभूत कार्य खण्डीकरण गर्न सक्नेछ ।
- सार्वजनिक परियोजना व्यवस्थापनमा लागत व्यवस्थापन कसरी गर्ने भन्ने बारेमा स्पष्ट हुनेछ ।
- सार्वजनिक परियोजना व्यवस्थापनमा क्षमता विकासको महत्व र मोडल बारेमा जानकारी प्राप्त गर्नेछ ।
- सार्वजनिक परियोजना कार्यान्वयन, मूल्याङ्कन र यसका विभिन्न चरण सम्वन्धमा ज्ञान र सीपमा अभिवृद्धि हुनेछ ।
- सार्वजनिक परियोजना कार्य प्रगति अनुगमनमा गर्न सक्नेछ ।
- सार्वजनिक परियोजना समापन पश्चात गरिने मूल्याङ्कन गर्न सक्नेछ ।

विधि:

- मष्तिस्क मन्थन, समुह अभ्यास, लघुप्रवचन, प्रश्नोत्तर आदि । हरेक दिनको अन्तमा दिनभर छलफल भएका विषयवस्तुको संक्षेपीकरण गर्ने ।
- दोस्रो दिन पहिलो दिन संचालन भएका गतिविधिको पुनरावलोकनबाट सत्र शुरुवात गर्ने ।
- व्यवहारिक अभ्यासको लागि आवश्यक फाराम अभ्यास सिटहरु तयार गर्ने ।

आवश्यक समाग्री, उपकरण र स्रोत साधन:

- ल्यापटप, एलसिडी प्रोजेक्टर, ह्वाईट वोर्ड, स्क्रिन, प्वाइन्टर, पिन बोर्ड, क्यामरा, प्रिन्टर, फारामहरु, हाजिरी रजिष्टर

आवश्यक प्रशिक्षण सामाग्री:

१. सहभागीहरुको लागि आवश्यक सामाग्री

नोटबुक, डटपेन, रेकर्ड फाईल, पेन्सिल, कटर, अध्ययन सामाग्री

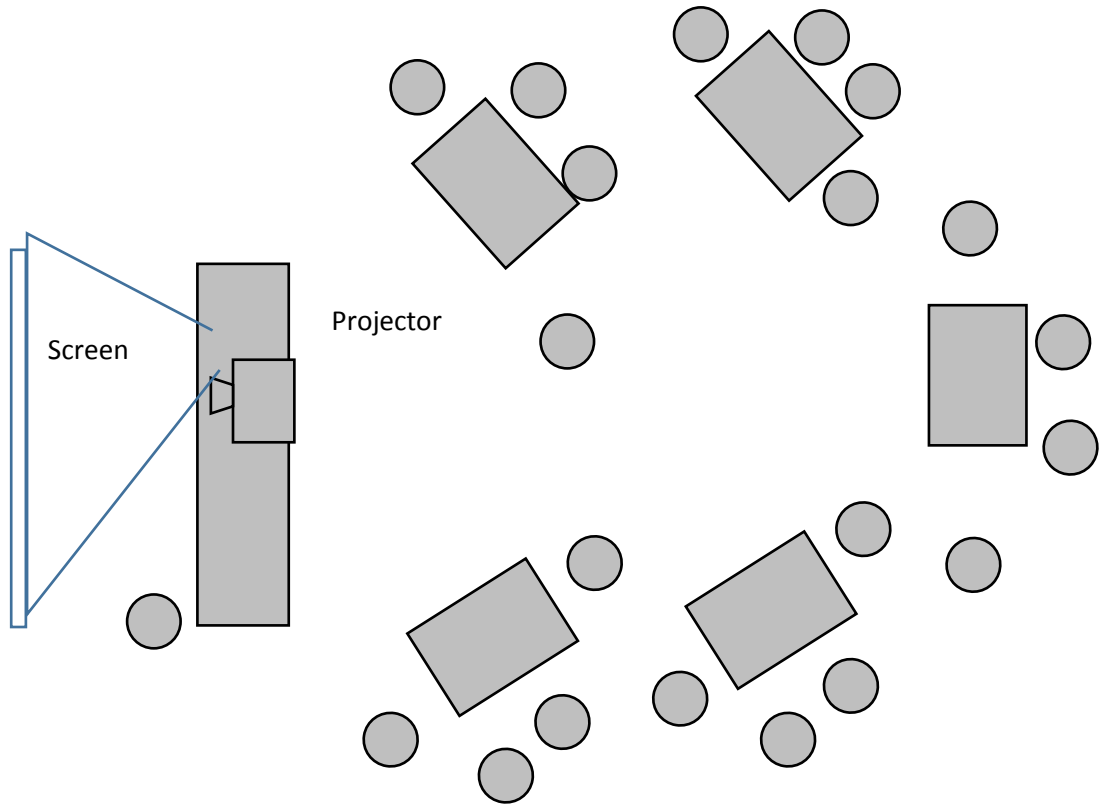
२. प्रशिक्षणका लागि आवश्यक सामाग्री

ब्राउनसिट, न्यूजप्रिन्ट, वोर्ड मार्कर, परमानेन्ट मार्कर, मेटा कार्ड, ग्लू, मास्किङ टेप, कैंची, स्केल, स्टापलर, पुस पिन, पेपर क्लीप, सादा कागज, चकलेट आदि।

३. अभ्यासका लागि आवश्यक सामाग्री

न्यूजप्रिन्ट, ब्राउनसिट, वोर्ड मार्कर, परमानेन्ट मार्कर, मेटा कार्ड, ग्लू, मास्किङ टेप, कैंची, स्केल, स्टापलर आदि।

सहभागिहरुको प्रशिक्षण हलमा वसाइ व्यवस्था(Training Hall Layout) :



कैफियत:

१. प्रभावकारी प्रशिक्षण संचालन गर्नका लागि आवश्यक सूचना संकलन तथा अन्य सम्पुर्ण कामको जिम्मेवारी आवश्यकता अनुसार निर्धारण गर्ने।

२. प्रशिक्षण हलको उपलब्धता र सहभागी संख्याको आधारमा सहभागीहरुको वसाई व्यवस्था मिलाउने। समूहकार्य गर्न सहज हुने गरी टेवलको व्यवस्थापन गर्ने।

३. प्रस्तुतीकरणसामग्रीहरू नेपाली र अंग्रेजी दुबै भाषामा हुन्छन्। सत्र सञ्चालनमा छलफल नेपाली भाषामा हुनेछ। व्याख्यान, अभ्यास र छलफल सञ्चालन गर्दा सहभागीहरूको पृष्ठभूमि र चासोलाई ध्यान दिइ संचालन गरिनेछ।

परियोजना व्यवस्थापन प्रशिक्षण

कार्यतालिका

समय मिति	पहिलो सत्र ०९०० – १०३०	१०३०– १०४५	दोश्रो सत्र १०४५ – १२१५	१२१५– १३१५	तेश्रो सत्र १३१५ – १४४५	१४४५– १५००	चौथो सत्र १५०० – १६३०
पहिलो दिन	▪ प्रशिक्षण कार्यक्रम शुभारम्भ, परिचय, उद्देश्य र विषयवस्तुको स्पष्टता, प्रशिक्षण विधि ▪ अपेक्षा संकलन, समूह मान्यता निर्धारण, पूर्व जानकारी	चिया	▪ परियोजना व्यवस्थापनको अर्थ र महत्व, सार्वजनिक परियोजनाका सीमा, र सफलताका तत्व	खाना	▪ सार्वजनिक परियोजना पहिचान र छनोट	चिया	▪ परियोजनाका सरोकारवालाको पहिचान र विश्लेषण ▪ द्वन्द्व व्यवस्थापन
दोस्रो दिन	▪ सार्वजनिक परियोजनामा समग्र गुण व्यवस्थापन अर्थ, महत्व र प्रभावपार्ने तत्वपहिचान ▪ समग्र गुण व्यवस्थापनका सिद्धान्त		▪ सार्वजनिक परियोजनामा गुण लागत नियन्त्रण औजार		▪ सार्वजनिक परियोजनामा गुण नेतृत्व		▪ सार्वजनिक परियोजनामा गुण वृत्त
तेस्रो दिन	▪ परियोजना व्यवस्थापनका चरण		▪ परियोजनामा कार्य खण्डीकरण, चरण र तत्व		▪ परियोजना लागत व्यवस्थापन		▪ पूँजी बजेट विधि

समय मिति	पहिलो सत्र ०९०० – १०३०	१०३०– १०४५	दोश्रो सत्र १०४५ – १२१५	१२१५– १३१५	तेश्रो सत्र १३१५ – १४४५	१४४५– १५००	तेश्रो सत्र १५०० – १६३०
चौथो दिन	▪ क्षमता विकासको महत्व र मोडल	चिया	▪ परियोजना कार्यान्वयन, मूल्याङ्कन र यसका चरण	खाना	▪ परियोजनाको कार्य प्रगति अनुगमन	चिया	▪ परियोजनाको मध्यावधि पुनरावलोकन
पाँचौ दिन	▪ परियोजना पुनरावृत्ति		▪ परियोजना समापन र मूल्याङ्कन		▪ परियोजना समापन पश्चातको मूल्याङ्कन र प्रतिवेदन		▪ परियोजना समापन रिपोर्ट र अभ्यास
छैठौं दिन	▪ परियोजना हस्तान्तरण		▪ परियोजना हस्तान्तरण र फरफारक		▪ कार्य योजना ▪ प्रशिक्षण मूल्याकंन ▪ पश्चात जानकारी र ▪ प्रशिक्षण समापन		

सत्र योजना

सत्र योजना

मोडुल: परियोजना व्यवस्थापन सत्रः १

समय ९० मिनेट

विषय: शुभारम्भ, परिचय, उद्देश्य, अपेक्षा सङ्कलन, समूह मान्यता, प्रशिक्षण पूर्व जानकारी

साधारण उद्देश्य: यस सत्रको अन्तमा सहभागीहरू प्रशिक्षणको उद्देश्यबारे प्रष्टहुनेछन्।

निर्दिष्ट उद्देश्य: सत्रको अन्तमा सहभागीहरू

- एक आपसमा परिचित हुनेछन्।
- प्रशिक्षण अवधिमा छलफल गरिने मुख्य विषयवस्तुको वारेमा जानकारी पाउनेछन्।
- विषयवस्तु वारेमा पूर्व जानकारीको अवस्था उपलब्ध हुनेछ।

सत्रका मुख्य विषयवस्तु:

- प्रशिक्षणको शुभारम्भ
- प्रशिक्षणको उद्देश्य
- परिचय
- अपेक्षा सङ्कलन
- प्रशिक्षणका विषयवस्तु, आधारभूत नियम, जिम्मेवारी आदि
- प्रशिक्षण पूर्व जानकारी

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप १ शुभारम्भ ▪ सहभागीहरु र अतिथिहरुको उपस्थितिसंगै राष्ट्रियगानका लागि अनुरोध गर्नुहोस् । ▪ स्वागतसहित कार्यक्रमको उद्देश्यबारे प्रकाश पार्नुहोस् । ▪ प्रमुख अतिथिबाट ब्यानर पढी कार्यक्रमको औपचारिक शुभारम्भ गर्नुहोस् । ▪ अतिथिहरुबाट कार्यक्रमको सफलताको शुभकामना मन्तव्यका लागि अनुरोध गनुहोस् । ▪ कार्यक्रमको अध्यक्षबाट शुभारम्भ मन्तव्यसहित सत्र विसर्जनका लागि अनुरोध गर्नुहोस् ।	२५	मेटाकार्ड, व्यानर,	अतिथिहरू र अतिथिहरूको मन्तव्य व्यवस्थापन अवश्यकता अनुसार गर्नुहोस् ।
क्रियाकलाप २ परिचय ▪ सबै सहभागी, सहजकर्ता (प्रशिक्षक) र अन्य उपस्थित व्यक्तिहरुलाई आफ्नो नाम, ठेगाना, पद, संक्षिप्त कार्य अनुभवसहित आफ्नो परिचय दिन लगाउनुहोस् ।	१५		
क्रियाकलाप ३ अपेक्षा सङ्कलन ▪ सहभागीहरूलाई प्रशिक्षणबाट गरिएको अपेक्षालाई मेटाकार्डमा लेख्न लगाउनुहोस् । ▪ मेटाकार्डहरुलाई एक एक गरी पढ्दै ब्राउन पेपर वा बोर्डमा टाँस्नुहोस् । ▪ आएका अपेक्षालाई एकै किसिमका आसय भएका कार्डलाई एकै ठाँउमा राख्नुहोस् । ▪ प्रशिक्षणको विषयवस्तु र सहभागीको अपेक्षा मिलान गर्नुहोस् । ▪ सहभागीहरुबाट आएका अपेक्षाहरु के कति हदसम्म यस प्रशिक्षणले सम्बोधन गर्न सक्छ भन्ने प्रष्ट पार्नुहोस ।	१५	मेटाकार्ड, मार्कर, पुस पिन, ग्लु स्टीक, मास्किङ टेप, ब्राउन पेपर	यदि सहभागीबाट विषयवस्तु भन्दा भिन्न अपेक्षाकार्ड आएमा अलग राख्नुहोस् ।
क्रियाकलाप ४ विषयवस्तुको जानकारी ▪ सहभागीहरुले ल्याएका अपेक्षाहरुलाई मिलान गर्दै प्रशिक्षणमा छलफल गरिने विषयवस्तुहरु जानकारी गराउनुहोस ।	५	ब्राउन पेपर, मार्कर, न्यूजप्रिन्ट पेपर	

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप ५ समुह मान्यता, जिम्मेवारी आदि ▪ प्रशिक्षण प्रभावकारीताको लागि हरेक दिनको प्रशिक्षण अवधिमा समूह मान्यतालाई सहभागीहरुसंग छलफल गरी न्यूज प्रिन्टमा लेख् िपालना गर्न लगाउनुहोस । ▪ आवश्यकता परेमा विभिन्न जिम्मेवारी बाँडफाँड (रिपोटिङ, समय व्यवस्थापक, मनोरञ्जनकर्ता आदि) गराउनुहोस् ।	५	ब्राउन पेपर, मार्कर, न्यूजप्रिन्ट पेपर, पावरप्वाइन्ट स्लाइड	
क्रियाकलाप ६ प्रशिक्षण पूर्व जानकारी ▪ सहभागीहरुलाई प्रशिक्षण पूर्व जानकारी फाराम वितरण गर्नुहोस् । ▪ उक्त फाराम कसरी भर्ने सबैलाई स्पष्ट पार्नुहोस् । ▪ सबै सहभागीहरुबाट फाराम संकलन गरी सकेपछि यसबाट आएको नतिजालाई हामी प्रशिक्षणको अन्तमा गरिने पश्चात जानकारीको नतिजासँग तुलना गर्नेछौं भन्नुहोस ।	१०	प्रशिक्षण पूर्व परीक्षण फाराम	
क्रियाकलाप ७ प्रशिक्षणको साधारण उद्देश्य, निर्दिष्ट उद्देश्यहरु, प्रशिक्षण विधि र प्रशिक्षण तालिका ▪ प्रशिक्षकले प्रशिक्षणको बारेमा फ्लीप चार्टमा तयार पारेको प्रशिक्षणको साधारण उद्देश्य, निर्दिष्ट उद्देश्यबारे बताउनुहोस् । ▪ प्रशिक्षणका विधिहरु जानकारी गराउनुहोस् । ▪ प्रशिक्षण तालिकाको जानकारी तथा तालिका वितरण गर्नुहोस् ।	१०	ब्राउन पेपर, फ्लीप चार्ट, प्रशिक्षण तालिका	
क्रियाकलाप ८ सत्र संक्षेपीकरण र अग्रसम्वन्ध ▪ समग्र प्रशिक्षण सहभागितामूलक ढंगबाट अगाडि बढ्ने कुराको अवगत गराउनुहोस् । ▪ दोश्रो सत्र सम्वन्धी जानकारी गराउनुहोस् ।	५		

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र:** २

समय: ९० मिनेट

विषय: परियोजना व्यवस्थापनको अर्थ र महत्व, सार्वजनिक परियोजनाका सीमा र सफलताका तत्व

साधारण उद्देश्य: सार्वजनिक परियोजनाका सीमा, र सफलताका तत्व पहिचान गराउने हुनेछ ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागीले परियोजना व्यवस्थापनको अर्थ र महत्वका बारेमा प्रष्ट हुनेछन् ।
- सहभागीले सार्वजनिक परियोजना व्यवस्थापनका चुनौती, सीमाका बारेमा स्पष्ट हुनेछन् ।
- सहभागीले सार्वजनिक परियोजना सफल बनाउन आवश्यक तत्वका बारेमा जानकारी लिनेछन् ।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजना व्यवस्थापनका विशेषता र सफल बनाउनका निम्ति आवश्यक तयारि र कौशलताको ज्ञान ।

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप १: परियोजना र परियोजना व्यवस्थापनको अर्थ		छलफल, पावर प्वाइन्ट स्लाइड	सहजकर्ताले पावर प्वाइन्ट स्लाइड बनाउने ।
क्रियाकलाप २: सार्वजनिक परियोजनाको अर्थ, विशेषता ।		मेटाकार्ड, पावर प्वाइन्ट स्लाइड	सहजकर्ताले पावर प्वाइन्ट स्लाइड तयार पार्ने, मेटाकार्ड छलफलका क्रममा तत्काल बनाएर बोर्डमा टाँस्दै जाने ।
क्रियाकलाप ३: औसत सार्वजनिक परियोजना किन असफल हुन्छन् ? भन्ने प्रश्नको जवाफ ।		अनुभव साटासाट, विभिन्न अनुसन्धानका परिणाम स्लाइड	सहजकर्ताले नोट गर्ने, स्लाइड पहिले नै तयार पार्ने ।
क्रियाकलाप ४: सार्वजनिक परियोजना सफल बनाउने तत्वको जानकारी ।		सहभागीको अनुभव जम्मा गर्ने, अनुसन्धान परिणामका स्लाइड ।	सहजकर्ताले नोट गर्ने, स्लाइड पहिले नै तयार पार्ने ।

सत्र योजना

मोडुल: परियोजना व्यवस्थापन

सत्र: ३

समय: ९० मिनेट

विषय: सार्वजनिक परियोजना पहिचान र छनोट

साधारण उद्देश्य: सार्वजनिक परियोजना पहिचान, मूल्याङ्कन र छनोट गर्न सक्नेछ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजना पहिचान गर्न सक्षम हुनेछन्।
- सहभागी सार्वजनिक परियोजना मूल्याङ्कन गर्ने विभिन्न तरिका जान्नेछन्।
- सहभागीले सार्वजनिक परियोजना छनोटमा को को सहभागी गराउनेमा प्रष्ट हुनेछन्।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजना पहिचान र छनोट।

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप १: सार्वजनिक परियोजना पहिचान, समस्या तथा विशिष्टीकरण अवसर	१५ मिनेट	छलफल, सहभागीहरुका समूह बनाएर परियोजना पहिचान गराउने, समस्या आँकलन गराउने तथा प्रस्तुतीकरण।	सहजकर्ताले सहयोग गर्ने।
क्रियाकलाप २: सार्वजनिक परियोजना मूल्याङ्कन आवश्यक र विधिको जानकारी।	५ मिनेट	मेटाकार्ड, पावर प्वाइन्ट स्लाइड	सहजकर्ताले पावर प्वाइन्ट स्लाइड तयार पार्ने, मेटाकार्ड छलफलका क्रममा तत्काल बनाएर बोर्डमा टाँस्दै जाने।
क्रियाकलाप ३: सार्वजनिक परियोजनाका फाइदा विश्लेषण विधि।	१५ मिनेट	हरेक समूहलाई उनीहरुले तयार पारेका परियोजनाका फाइदा खोज्न लगाउने।	सहभागी समूहलाई मेटा कार्ड तयार पार्न लगाउने।

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप ४: संभाव्यता अध्ययनको जानकारी र विधि जानकारी - प्राविधिक, वित्तिय, व्यवस्थापकिय)	२० मिनेट	पावर प्वाइन्ट स्लाइड ।	सहजकर्ताले स्लाइड पहिले नै तयार पार्ने ।
क्रियाकलाप ५: संभाव्यता अध्ययनको जानकारी र विधि जानकारी - अभ्यास)	१० मिनेट	समूहलाई उनले तयार पारेका परियोजनाको मूल्याङ्कन गर्न लगाउने ।	सहजकर्ताले स्लाइड पहिले नै तयार पार्ने ।
क्रियाकलाप ६: वातावरणीय प्रभावको जानकारी ।	५ मिनेट	पावर प्वाइन्ट स्लाइड	सहजकर्ताले स्लाइड पहिले नै तयार पार्ने ।
क्रियाकलाप ७: वातावरणीय प्रभाव मूल्याङ्कन अभ्यास ।	१० मिनेट	समूहले तयार पारेका परियोजनाका वातावरणीय प्रभाव आँकलन गर्न लगाउने	हरेक समूलाई मेटा कार्ड तयार पार्न लगाउने ।

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र:** ४

समय: ९० मिनेट

विषय: सार्वजनिक परियोजना सरोकारवालाको पहिचान, विश्लेषण र द्वन्द्व व्यवस्थापन

साधारण उद्देश्य: सार्वजनिक परियोजनाका सरोकारवालाको पहिचान, विश्लेषण र द्वन्द्व व्यवस्थापनको सहजीकरण गर्न सक्नेछन।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजनाका सरोकारवालाको परिभाषा गर्न र पहिचान गर्न सक्षम हुनेछन्।
- सार्वजनिक परियोजनाका सरोकारवालाको अपेक्षा र चासो पत्ता लगाउन जान्नेछन्।
- सहभागीले सार्वजनिक परियोजना छनोट र कार्यान्वयनमा हुन सक्ने संभावित द्वन्द्व व्यवस्थापन गर्न सक्षम हुनेछन्।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजनाका सरोकारवाला पहिचान र द्वन्द्व व्यवस्थापन।

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप १: सार्वजनिक परियोजना विभिन्न सरोकारवालाको पहिचान गर्ने।	१० मिनेट	छलफल, मेटा कार्ड।	सहजकर्ताले सहयोग गर्ने।
क्रियाकलाप २: सार्वजनिक परियोजनाका सरोकारवालाको अपेक्षा र चासो आँकलन गर्ने।	१५ मिनेट	मेटाकार्ड, पावर प्वाइन्ट स्लाइड	सहजकर्ताले पावर प्वाइन्ट स्लाइड तयार पार्ने, मेटाकार्ड छलफलका क्रममा तत्काल बनाएर बोर्डमा टाँस्दै जाने।
क्रियाकलाप ३: सार्वजनिक परियोजनामा द्वन्द्वका संभावित कारण पहिचान गर्ने।	१५ मिनेट	हरेक समूहलाई उनीहरुले तयार पारेका परियोजनामा हुन सक्ने द्वन्द्वका कारण खोज्न लगाउने।	सहभागी समूहलाई मेटा कार्ड तयार पार्न लगाउने।

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप ४: द्वन्द्व व्यवस्थापनको महत्व महशुस गराउने ।	१० मिनेट	पावर प्वाइन्ट स्लाइड ।	सहजकर्ताले स्लाइड पहिले नै तयार पार्ने ।
क्रियाकलाप ५: द्वन्द्व व्यवस्थापनमा विभिन्न निकायको भूमिका जानकारी गराउने	३० मिनेट	पावर प्वाइन्ट स्लाइड ।	सहजकर्ताले स्लाइड पहिले नै तयार पार्ने ।
क्रियाकलाप ६: पहिलो दिनको समिक्षा ।	१० मिनेट		सहजकर्ताले नोट गर्ने ।

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र:** ५

समय: ९० मिनेट

विषय: सार्वजनिक परियोजनामा समग्र गुण व्यवस्थापन अर्थ, महत्व र प्रभाव पार्ने तत्व पहिचान, समग्र गुण व्यवस्थापनका सिद्धान्त

साधारण उद्देश्य: सार्वजनिक परियोजनाको गुणस्तर व्यवस्थापन सम्वन्धमा स्पष्ट हुनेछ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजनामा समग्र गुण व्यवस्थापनको महत्व जान्न सक्षम हुनेछन्।
- सहभागी सार्वजनिक परियोजनाको समग्र गुण व्यवस्थापनमा प्रभाव पार्ने तत्व पहिचान गर्न सक्नेछन्।
- सहभागीले समग्र गुण व्यवस्थापनका सिद्धान्तका बारेमा जान्नेछन्।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजनाका समग्र गुण व्यवस्थापन।

प्रशिक्षण – सिकाई क्रियाकलाप	**अवधि**	**प्रशिक्षण – सिकाई सामाग्री**	**कैफियत**
क्रियाकलाप १: सार्वजनिक परियोजनामा समग्र गुण व्यवस्थापनको अर्थ र महत्वमा छलफल गर्ने।	२० मिनेट	छलफल, मेटा कार्ड।	सहजकर्ताले सहयोग गर्ने।
क्रियाकलाप २: सार्वजनिक परियोजनामा समग्र गुण व्यवस्थापनलाई प्रभाव पार्ने तत्व बारे छलफल गर्ने।	२० मिनेट	सहभागीका समूहलाई उनीहरुले तयार पारेका परियोजनामा समग्र गुण व्यवस्थापनमा छलफल गराउने, मेटाकार्ड तयार पार्ने, र प्रस्तुतीकरण गराउने ।	सहजकर्ताले छलफललाई सहजीकरण गर्ने।
क्रियाकलाप ३: सार्वजनिक परियोजनामा समग्र गुण व्यवस्थापनका सिद्धान्त छलफल गर्ने।	३० मिनेट	पावर प्वाइन्ट स्लाइड	सहजकर्ताले स्लाइड पहिले नै तयार पार्ने।

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र:** ६

समय: ९० मिनेट

विषय: सार्वजनिक परियोजनामा गुण लागत नियन्त्रण औजार

साधारण उद्देश्य: सार्वजनिक परियोजनाको गुण लागतको अर्थ, प्रकार र गुण नियन्त्रण औजार बारेमा थप ज्ञान र सीपमा अभिवृद्धि हुनेछ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजनामा गुण लागतको अर्थ र प्रकार जान्न सक्षम हुनेछन्।
- सहभागी सार्वजनिक परियोजनामा गुण लागत औजारको सामान्य परिचय र प्रयोग गर्न सक्नेछन्।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजनाका गुण लागत।

प्रशिक्षण – सिकाई क्रियाकलाप	**अवधि**	**प्रशिक्षण – सिकाई सामाग्री**	**कैफियत**
क्रियाकलाप १: सार्वजनिक परियोजनामा गुण लागतको अर्थ र महत्वमा छलफल गर्ने।	२० मिनेट	छलफल, मेटा कार्ड।	मेटाकार्ड छलफल गर्दै तयार पार्ने।
क्रियाकलाप २: सार्वजनिक परियोजनामा गुण लागतका प्रकार छलफल गर्ने।	२० मिनेट	पावर प्वाइन्ट स्लाइड	सहजकर्ताले स्लाइड पहिले नै तयार पार्ने।
क्रियाकलाप ३: सार्वजनिक परियोजनामा गुण लागत नियन्त्रण औजार छलफल गर्ने।	४० मिनेट	पावर प्वाइन्ट स्लाइड	सहजकर्ताले स्लाइड पहिले नै तयार पार्ने।

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र:** ७

समय: ९० मिनेट

विषय: सार्वजनिक परियोजनामा गुण नेतृत्व

साधारण उद्देश्य: सार्वजनिक परियोजनाको गुणस्तरका निम्ति गुण नेतृत्व सम्वन्धी स्पष्ट हुनेछ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजनामा गुण नेतृत्वको अर्थ जान्नेछन्।
- सहभागी सार्वजनिक परियोजनामा गुण नेतृत्वको विशेषता जान्नेछन्।
- सहभागीले सार्वजनिक परियोजनामा गुण नेतृत्वको भूमिका र चुनौतीमा स्पष्ट हुनेछन्।
- सहभागीले सार्वजनिक परियोजनामा गुण नेतृत्व स्थापना गर्न सहजीकरण गर्न सक्षम हुनेछन्।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजनामा गुण नेतृत्व।

प्रशिक्षण – सिकाई क्रियाकलाप	**अवधि मिनेट**	**प्रशिक्षण – सिकाई सामाग्री**	**कैफियत**
क्रियाकलाप १: सार्वजनिक परियोजनामा गुण नेतृत्वको अर्थ र महत्वमा छलफल गर्ने।	२० मिनेट	पावर प्वाइन्ट स्लाइड, छलफल।	स्लाइड पहिले नै तयार पार्ने।
क्रियाकलाप २: सार्वजनिक परियोजनामा गुण नेतृत्वका विशेषता।	१५ मिनेट	पावर प्वाइन्ट स्लाइड, छलफल	सहजकर्ताले स्लाइड पहिले नै तयार पार्ने।
क्रियाकलाप ३: सार्वजनिक परियोजनामा गुण नेतृत्वका चुनौती छलफल गर्ने।	१५ मिनेट	पावर प्वाइन्ट स्लाइड	सहजकर्ताले स्लाइड पहिले नै तयार पार्ने।

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि मिनेट	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप ४: सार्वजनिक परियोजनामा गुण नेतृत्वका चुनौती सामना गर्ने विधि र रणनीति छलफल गर्ने ।	३५ मिनेट	समूह छलफल गराउने र मेटा कार्ड तयार पारि प्रस्तुतीकरण	सहजकर्ताले स्लाइड पहिले नै तयार पार्ने ।

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र:** ८

समय: ९० मिनेट

विषय: सार्वजनिक परियोजनामा गुण वृत्त

साधारण उद्देश्य: सार्वजनिक परियोजनाको गुणस्तरका निम्ति गुण वृत्तमा सम्वन्धी स्पष्ट हुनेछ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजनामा गुण वृत्तको अर्थ जान्नेछन्।
- सहभागी सार्वजनिक परियोजनामा गुण वृत्तको विशेषता जान्नेछन्।
- सहभागीले सार्वजनिक परियोजनामा गुण वृत्तको भूमिकामा स्पष्ट हुनेछन्।
- सहभागीले सार्वजनिक परियोजनामा गुण वृत्त स्थापना गर्न सहजीकरण गर्न सक्षम हुनेछन्।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजनामा गुण वृत्त।

प्रशिक्षण – सिकाई क्रियाकलाप	**अवधि मिनेट**	**प्रशिक्षण – सिकाई सामाग्री**	**कैफियत**
क्रियाकलाप १: सार्वजनिक परियोजनामा गुण वृत्तको अर्थ र महत्वमा छलफल गर्ने।	२० मिनेट	पावर प्वाइन्ट स्लाइड, छलफल।	स्लाइड पहिले नै तयार पार्ने।
क्रियाकलाप २: सार्वजनिक परियोजनामा गुण वृत्तका विशेषता।	१५ मिनेट	पावर प्वाइन्ट स्लाइड, छलफल	सहजकर्ताले स्लाइड पहिले नै तयार पार्ने।
क्रियाकलाप ३: सार्वजनिक परियोजनामा गुण वृत्तका चुनौती छलफल गर्ने।	१५ मिनेट	पावर प्वाइन्ट स्लाइड	सहजकर्ताले स्लाइड पहिले नै तयार पार्ने।
क्रियाकलाप ४: सार्वजनिक परियोजनामा गुण वृत्तका चुनौती सामना गर्ने विधि र रणनीति छलफल गर्ने।	१० मिनेट	समूह छलफल गराउने र मेटा कार्ड तयार पारि प्रस्तुतीकरण	सहजकर्ताले स्लाइड पहिले नै तयार पार्ने।

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि मिनेट	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप ५: दोस्रो दिनको समिक्षा ।	१५ मिनेट		सहजकर्ताले सहजीकरण गर्ने ।

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र:** ९

समय: ९० मिनेट

विषय: सार्वजनिक परियोजना व्यवस्थापनका चरण

साधारण उद्देश्य: सार्वजनिक परियोजना व्यवस्थापनका विभिन्न चरण बारेमा थप स्पष्ट हुनेछ ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजना व्यवस्थापनका विभिन्न चरणका बारेमा जान्नेछन् ।
- सहभागीले परियोजना व्यवस्थापनका विभिन्न चरणको अन्तरसम्बन्ध र प्रमुख क्रियाकलापका बारेमा सैद्धान्तिक ज्ञान हासिल गर्नेछन् ।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजना व्यवस्थापनका चरण ।

प्रशिक्षण – सिकाई क्रियाकलाप	**अवधि मिनेट**	**प्रशिक्षण – सिकाई सामाग्री**	**कैफियत**
क्रियाकलाप १: सार्वजनिक परियोजना व्यवस्थापनका विविध चरणको जानकारी गराउने ।	३० मिनेट	पावर प्वाइन्ट स्लाइड, छलफल ।	स्लाइड पहिले नै तयार पार्ने ।
क्रियाकलाप २: सार्वजनिक परियोजना व्यवस्थापनका विविध चरणको अन्तरसम्बन्धको जानकारी गराउने ।	३० मिनेट	छलफल	
क्रियाकलाप ३: सार्वजनिक परियोजनामा चरण पत्ता लगाउने खेल ।	२० मिनेट	हरेक समूहलाई उनीहरुका परियोजनामा कुन कुन चरणमा के गरिन्छ होला भनेर क्रियाकलाप पत्ता लगाउने खेल खेलाउने ।	

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र:** १०

समय: ९० मिनेट

विषय: परियोजनामा कार्य खण्डीकरण, चरण र तत्व

साधारण उद्देश्य: सार्वजनिक परियोजना व्यवस्थापन क्रमका गरिने आधारभूत कार्य खण्डीकरण गर्न सक्नेछ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजना व्यवस्थापनमा कार्य खण्डीकरणको अर्थ र महत्व बुझ्नेछन्।
- सहभागीले कार्य खण्डीकरणका आवश्यक तत्वका बारेमा स्पष्ट हुनेछन्।
- सहभागीले कार्य खण्डीकरणका विभिन्न चरण बुझ्नेछन्।
- सहभागीले कार्य खण्डीकरणका विभिन्न चरण प्रयोग गरेर समूहले तयार पारेका परियोजनामा कार्य खण्डीकरण गर्न सक्षम हुनेछन्।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजना व्यवस्थापनमा कार्य खण्डीकरण

प्रशिक्षण – सिकाई क्रियाकलाप	**अवधि मिनेट**	**प्रशिक्षण – सिकाई सामाग्री**	**कैफियत**
क्रियाकलाप १: सार्वजनिक परियोजना व्यवस्थापनमा कार्य खण्डीकरणको अर्थ र महत्व पुनारवृत्ती।	२० मिनेट	पावर प्वाइन्ट स्लाइड, छलफल।	स्लाइड पहिले नै तयार पार्ने।
क्रियाकलाप २: कार्य खण्डीकरणका विभिन्न तत्वमा छलफल गराउने।	२० मिनेट	पावर प्वाइन्ट स्लाइड, छलफल।	स्लाइड पहिले नै तयार पार्ने।
क्रियाकलाप ३: कार्य खण्डीकरणका विभिन्न चरण छलफल गराउने।	३० मिनेट	पावर प्वाइन्ट स्लाइड, छलफल।	स्लाइड पहिले नै तयार पार्ने।

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि मिनेट	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप ४: **कार्य खण्डीकरणको अभ्यास गराउने ।**	२० मिनेट	हरेक समूहलाई उनीहरुका परियोजनामा कसरी कार्य खण्डीकरण गर्नुहुन्छ ? समूहमा छलफल गरि कार्य खण्डीकरण गरेर प्रस्तुतीकरण कार्य दिने ।	आवश्यकता अनुसार मेटा कार्ड बनाउन लगाउने ।

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र:** ११

समय: ९० मिनेट

विषय: परियोजना लागत व्यवस्थापन

साधारण उद्देश्य: सार्वजनिक परियोजना व्यवस्थापनमा लागत व्यवस्थापन कसरी गर्ने भन्ने बारेमा स्पष्ट हुनेछ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजना व्यवस्थापनमा लागत व्यवस्थापनको अर्थ र महत्व बुझ्नेछन्।
- सहभागी सार्वजनिक परियोजना व्यवस्थापनमा लागत व्यवस्थापनका चुनौतीमा स्पष्ट हुनेछन्।
- सहभागी लागत व्यवस्थापनका आवश्यक कार्य पहिचान गर्न सक्षम हुनेछन्।
- सहभागी लागत व्यवस्थापनका विभिन्न प्रयोगका बारेमा बुझ्नेछन्।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजना व्यवस्थापनमा लागत व्यवस्थापन.

प्रशिक्षण – सिकाई क्रियाकलाप	**अवधि मिनेट**	**प्रशिक्षण – सिकाई सामाग्री**	**कैफियत**
क्रियाकलाप १: सार्वजनिक परियोजना व्यवस्थापनमा लागत व्यवस्थापनको अर्थ र महत्व ।	२० मिनेट	पावर प्वाइन्ट स्लाइड, छलफल ।	स्लाइड पहिले नै तयार पार्ने ।
क्रियाकलाप २: लागत व्यवस्थापनका चुनौती पहिचान गर्ने ।	२० मिनेट	मेटा कार्ड ।	मेटा कार्ड पहिले नै तयार पार्ने ।
क्रियाकलाप ३: लागत व्यवस्थापनमा आवश्यक कार्य बुझाउने ।	१० मिनेट	पावर प्वाइन्ट स्लाइड, छलफल ।	स्लाइड पहिले नै तयार पार्ने ।
क्रियाकलाप ४: लागत व्यवस्थापनमा प्रयोग भएका विभिन्न विधि अवगत गराउने ।	२० मिनेट	पावर प्वाइन्ट स्लाइड	पावर प्वाइन्ट स्लाइड बनाउने ।

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि मिनेट	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप ५: लागत व्यवस्थापनमा प्रयोग भएका विभिन्न विधि अभ्यास गराउने ।	२० मिनेट	क्रियाकलाप ४ अनुसार समूहले पहिचान गरेका परियोजनामा लागत व्यवस्थापन अभ्यास गराउने ।	आवश्यकता अनुसार मेटा कार्ड बनाउन लगाउने ।

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र**: १२

समय: ९० मिनेट

विषय: परियोजनामा पूँजी बजेट विधि

साधारण उद्देश्य: सार्वजनिक परियोजना व्यवस्थापनमा पूँजी बजेटमा सम्वन्धमा थप स्पष्ट हुनेछ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजना व्यवस्थापनमा पूँजी बजेटको अर्थ र महत्व बुझ्नेछन्।
- सहभागीले विभिन्न प्रकारका पूँजी बजेट विधि प्रयोग गर्न सक्नेछन्।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजना व्यवस्थापनमा लागत व्यवस्थापन।.

प्रशिक्षण – सिकाई क्रियाकलाप	**अवधि मिनेट**	**प्रशिक्षण – सिकाई सामाग्री**	**कैफियत**
क्रियाकलाप १: सार्वजनिक परियोजना व्यवस्थापनमा पूँजी बजेट अर्थ र महत्व।	५ मिनेट	पावर प्वाइन्ट स्लाइड, छलफल।	स्लाइड पहिले नै तयार पार्ने।
क्रियाकलाप २: पूँजी बजेट विधिको सामान्य जानकारी गराउने।	५ मिनेट	मेटा कार्ड ।	मेटा कार्ड पहिले नै तयार पार्ने।
क्रियाकलाप ३: Pay back period प्रयोग गर्न सिकाउने।	१० मिनेट	पावर प्वाइन्ट स्लाइड, छलफल।	स्लाइड पहिले नै तयार पार्ने।
क्रियाकलाप ४: Average Rate of Return प्रयोग गर्न सिकाउने।	१० मिनेट	पावर प्वाइन्ट स्लाइड	पावर प्वाइन्ट स्लाइड बनाउने।
क्रियाकलाप ५: Net Present Value (NPV) प्रयोग गर्न सिकाउने।	२० मिनेट	पावर प्वाइन्ट स्लाइड	पावर प्वाइन्ट स्लाइड बनाउने।

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि मिनेट	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप ६: IRR प्रयोग गर्न सिकाउने ।	२० मिनेट	पावर प्वाइन्ट स्लाइड	पावर प्वाइन्ट स्लाइड बनाउने ।
क्रियाकलाप ७: Probability Index प्रयोग गर्न सिकाउने ।	१० मिनेट	पावर प्वाइन्ट स्लाइड	पावर प्वाइन्ट स्लाइड बनाउने ।
क्रियाकलाप ७: तेस्रो दिनको समिक्षा ।	१० मिनेट	पावर प्वाइन्ट स्लाइड	पावर प्वाइन्ट स्लाइड बनाउने ।

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र**: १३

समय: ९० मिनेट

विषय: क्षमता विकासको महत्व र मोडल

साधारण उद्देश्य: सार्वजनिक परियोजना व्यवस्थापनमा क्षमता विकासको महत्व र मोडल बारेमा जानकारी प्राप्त गर्नेछ ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजना व्यवस्थापनमा क्षमता विकासको अर्थ र महत्व बुझ्नेछन् ।
- सहभागीले क्षमता विकासका विभिन्न मोडल प्रयोग गर्ने सक्नेछन् ।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजना व्यवस्थापनमा क्षमता विकास.

प्रशिक्षण – सिकाई क्रियाकलाप	**अवधि मिनेट**	**प्रशिक्षण – सिकाई सामाग्री**	**कैफियत**
क्रियाकलाप १: सार्वजनिक परियोजना व्यवस्थापनमा क्षमता विकासको अर्थ र महत्व ।	२० मिनेट	पावर प्वाइन्ट स्लाइड, छलफल ।	स्लाइड पहिले नै तयार पार्ने ।
क्रियाकलाप २: परियोजना व्यवस्थापन क्षमता विकास फ्रेमवर्क (PMCD Framework) **को जानकारी गराउने ।**	२० मिनेट	पावर प्वाइन्ट स्लाइड ।	स्लाइड पहिले नै तयार पार्ने ।
क्रियाकलाप ३: परियोजना व्यवस्थापन क्षमता विकास (PMCD) **का चरण अवगत गराउने ।**	२० मिनेट	पावर प्वाइन्ट स्लाइड, छलफल ।	स्लाइड पहिले नै तयार पार्ने ।

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि मिनेट	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप ४: परियोजना व्यवस्थापन क्षमता विकास फ्रेमवर्क (PMCD Framework) **को प्रयोग गर्न सिकाउने ।**	२० मिनेट	पावर प्वाइन्ट स्लाइड, छलफल	पावर प्वाइन्ट स्लाइड बनाउने ।

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र**: १४

समय: ९० मिनेट

विषय: परियोजना कार्यान्वयन, मूल्याङकन र यसका चरण

साधारण उद्देश्य: सार्वजनिक परियोजना कार्यान्वयन, मूल्याङ्कन र यसका विभिन्न चरण सम्वन्धमा ज्ञान र सीपमा अभिवृद्धि हुनेछ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजना कार्यान्वयनका विभिन्न चरणका बारेमा बुझ्नेछन्।
- सहभागीले परियोजना मूल्याङ्कनको महत्व बुझ्न सक्नेछन्।
- सहभागीले परियोजना कार्य प्रगती विवरण र प्रतिवेदन तयार पार्न सक्नेछन्।
- परियोजना कार्य प्रगती प्रतिवेदनका आधारमा विभिन्न संसाधन तथा कार्य योजनामा संसोधन गर्न सक्षम हुनेछन्।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजना कार्यान्वयन, मूल्याङ्कन चरण.

प्रशिक्षण – सिकाई क्रियाकलाप	**अवधि मिनेट**	**प्रशिक्षण – सिकाई सामाग्री**	**कैफियत**
क्रियाकलाप १: सार्वजनिक परियोजना कार्यान्वयनका आधारभूत तत्व जानकारी गराउने।	२० मिनेट	पावर प्वाइन्ट स्लाइड, छलफल।	स्लाइड पहिले नै तयार पार्ने।
क्रियाकलाप २: सार्वजनिक परियोजना कार्यान्वयनमा प्रभाव पार्ने तत्वको पहिचान।	२० मिनेट	छलफल, मेटाकार्ड ।	

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि मिनेट	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप ३: सार्वजनिक परियोजना कार्यान्वयनमा संसाधनको समुचित प्रयोग ।	२० मिनेट	पावर प्वाइन्ट स्लाइड ।	स्लाइड पहिले नै तयार पार्ने ।
क्रियाकलाप ४: सार्वजनिक परियोजना कार्यान्वयनका चरण अवगत गराउने ।	३० मिनेट	पावर प्वाइन्ट स्लाइड, छलफल ।	स्लाइड पहिले नै तयार पार्ने ।

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र:** १५

समय: ९० मिनेट

विषय: परियोजनाको कार्य प्रगति अनुगमन

साधारण उद्देश्य: सार्वजनिक परियोजना कार्य प्रगति अनुगमनमा गर्न सक्नेछ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजनामा कार्य प्रगति अनुगमनको औचित्य पुष्टि गर्न सक्नेछन्।
- सहभागीले परियोजना कार्य प्रगती विवरण र प्रतिवेदन तयार पार्न सक्नेछन्।
- सहभागीले परियोजना सुचना विश्लेषणका निम्ति Earned Value Management (EVM) मोडलको प्रयोग गर्न सक्नेछन्।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजना कार्य प्रगति अनुगमन.

प्रशिक्षण – सिकाई क्रियाकलाप	**अवधि मिनेट**	**प्रशिक्षण – सिकाई सामाग्री**	**कैफियत**
क्रियाकलाप १: सार्वजनिक परियोजनाको कार्य प्रगति अनुगमनको अर्थ, औचित्य जानकारी गराउने।	१५ मिनेट	पावर प्वाइन्ट स्लाइड, छलफल।	स्लाइड पहिले नै तयार पार्ने।
क्रियाकलाप २: सार्वजनिक परियोजनाको कार्य प्रगति अनुगमनको दायित्व।	१० मिनेट	छलफल, मेटाकार्ड ।	
क्रियाकलाप ३: सार्वजनिक परियोजनाको कार्य प्रगति अनुगमनको खाका तयार पार्ने।	१५ मिनेट	समूहगत क्रियाकलाप।	
क्रियाकलाप ४: सार्वजनिक परियोजनाको कार्य प्रगति अनुगमन प्रतिवेदन तयार पार्ने।	१५ मिनेट	पावर प्वाइन्ट स्लाइड, छलफल।	स्लाइड पहिले नै तयार पार्ने।

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि मिनेट	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप ५: सार्वजनिक परियोजना सूचना विश्लेषणका निम्ति Earned Value Management (EVM) मोडलको प्रयोग गराउने ।	३० मिनेट	पावर प्वाइन्ट स्लाइड, छलफल ।	स्लाइड पहिले नै तयार पार्ने ।

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र:** १६

समय: ९० मिनेट

विषय: परियोजनाको परियोजनाको मध्यावधि पुनरावलोकन

साधारण उद्देश्य: सार्वजनिक परियोजनाको मध्यावधि पुनरावलोकन गर्न सक्नेछ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजनामा मध्यावधि पुनरावलोकनको औचित्य पुष्टि गर्न सक्नेछन्।
- सहभागीले परियोजना मध्यावधि पुनरावलोकन विवरण र प्रतिवेदन तयार पार्न सक्नेछन्।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजना कार्य प्रगति अनुगमन।

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि मिनेट	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप १: सार्वजनिक परियोजनाको मध्यावधि पुनरावलोकनको अर्थ, औचित्य स्पष्ट गराउने।	१५ मिनेट	पावर प्वाइन्ट स्लाइड, छलफल।	स्लाइड पहिले नै तयार पार्ने।
क्रियाकलाप २: सार्वजनिक परियोजनामा मध्यावधि पुनरावलोकनको दायित्व।	१० मिनेट	छलफल, मेटाकार्ड ।	
क्रियाकलाप ३: सार्वजनिक परियोजनाको मध्यावधि पुनरावलोकनको खाका तयार पार्ने।	१५ मिनेट	समूहगत क्रियाकलाप।	
क्रियाकलाप ४: सार्वजनिक परियोजनाको मध्यावधि पुनरावलोकन प्रतिवेदन तयार पार्ने।	२५ मिनेट	पावर प्वाइन्ट स्लाइड, छलफल।	स्लाइड पहिले नै तयार पार्ने।

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि मिनेट	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप ५: दिन ४ को समग्र समिक्षा ।	२० मिनेट	पावर प्वाइन्ट स्लाइड, छलफल ।	

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र:** १७

समय: ९० मिनेट

विषय: परियोजना पुनरावृत्ति

साधारण उद्देश्य: सार्वजनिक परियोजना समापन र पुनरावृत्तिमा जानकारी प्राप्त गर्नेछ ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजना पुनरावृत्तिको औचित्य पुष्टि गर्न सक्नेछन् ।
- सहभागीले परियोजना पुनरावृत्तिका आधार तय गर्न सक्नेछन् ।
- सहभागीले परियोजना संचालन परियोजना योजना मुताविक भएको कुराको ग्यारेण्टि गर्न सक्नेछन् ।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजना कार्य प्रगति अनुगमन.

प्रशिक्षण – सिकाई क्रियाकलाप	**अवधि मिनेट**	**प्रशिक्षण – सिकाई सामाग्री**	**कैफियत**
क्रियाकलाप १: सार्वजनिक परियोजनाको पुनरावृत्तिको अर्थ, औचित्य स्पष्ट गराउने ।	१५ मिनेट	पावर प्वाइन्ट स्लाइड, छलफल ।	स्लाइड पहिले नै तयार पार्ने ।
क्रियाकलाप २: सार्वजनिक परियोजना पुनरावृत्तिका आधार तय गर्ने ।	२० मिनेट	छलफल, मेटाकार्ड ।	
क्रियाकलाप ३: सार्वजनिक परियोजना पुनरावृत्तिमा सरोकारवालाको अपेक्षा समिक्षा ।	२५ मिनेट	पावर प्वाइन्ट स्लाइड ।	
क्रियाकलाप ४: सार्वजनिक परियोजना पुनरावृत्तिमा परियोजना योजनाको प्रयोग गराउने ।	३० मिनेट	समूहगत क्रियाकलाप ।	

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र:** १८

समय: ९० मिनेट

विषय: परियोजना समापन र मूल्याङ्कन

साधारण उद्देश्य: सार्वजनिक परियोजना समापन र मूल्याङ्कन गर्न सक्नेछ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजना समापन र मूल्याङ्कनको औचित्य पुष्टि गर्न सक्नेछन्।
- सहभागीले परियोजना मूल्याङ्कनका आधार तय गर्न सक्नेछन्।
- सहभागीले परियोजना मूल्याङ्कनका निम्ति विभिन्न औजार प्रयोग गर्न सक्नेछन्।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजनाको मूल्याङ्कनको अर्थ, औचित्य स्पष्ट गराउन
- सार्वजनिक परियोजना मूल्याङ्कनका आधार तय गर्ने
- सार्वजनिक परियोजना मूल्याङ्कनका औजारको प्रयोग

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि मिनेट	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप १: सार्वजनिक परियोजनाको मूल्याङ्कनको अर्थ, औचित्य स्पष्ट गराउने।	१५ मिनेट	पावर प्वाइन्ट स्लाइड, छलफल।	स्लाइड पहिले नै तयार पार्ने।
क्रियाकलाप २: सार्वजनिक परियोजना मूल्याङ्कनका आधार तय गर्ने।	२० मिनेट	छलफल, मेटाकार्ड ।	
क्रियाकलाप ३: सार्वजनिक परियोजना मूल्याङ्कनका औजारको प्रयोग।	२५ मिनेट	पावर प्वाइन्ट स्लाइड।	
क्रियाकलाप ४: सार्वजनिक परियोजना मूल्याङ्कनका औजारको प्रयोग अभ्यास।	३० मिनेट	समूहगत क्रियाकलाप।	

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र:** १९

समय: ९० मिनेट

विषय: परियोजना कार्यान्वयन पश्चातको मूल्याङकन र प्रतिवेदन

साधारण उद्देश्य: सार्वजनिक परियोजना समापन पश्चात गरिने मूल्याङ्कन गर्न सक्नेछ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजना समापन पश्चात पनि मूल्याङ्कन गर्नुपर्दछ भन्ने कुरामा स्पष्ट हुनेछन्।
- सहभागीले परियोजना कार्यान्वयन पश्चात गरिने मूल्याङ्कनका आधार तय गर्न सक्नेछन्।
- सहभागीले परियोजना कार्यान्वयन पश्चात गरिने मूल्याङ्कनमा अवलम्वन गरिने विभिन्न चरणको उपयोग गर्न सक्नेछन्।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजना कार्यान्वयन पश्चातको मूल्याङ्कन.

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि मिनेट	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप १: सार्वजनिक परियोजना कार्यान्वयन पश्चात गर्नुपर्ने मूल्याङ्कनको अर्थ, औचित्य स्पष्ट गराउने ।	१५ मिनेट	पावर प्वाइन्ट स्लाइड, छलफल ।	स्लाइड पहिले नै तयार पार्ने ।
क्रियाकलाप २: सार्वजनिक परियोजना कार्यान्वयन पश्चात गर्नुपर्ने मूल्याङ्कनका आधार तय गर्ने ।	२० मिनेट	छलफल, मेटाकार्ड ।	
क्रियाकलाप ३: सार्वजनिक परियोजना कार्यान्वयन पश्चात गर्नुपर्ने मूल्याङ्कनका चरणको जानकारी गराउने ।	२५ मिनेट	पावर प्वाइन्ट स्लाइड ।	

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि मिनेट	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप ४: सार्वजनिक परियोजना कार्यान्वयन पश्चात गर्नुपर्ने मूल्याङ्कनको रिपोर्ट तयार पार्ने ।	३० मिनेट	समूहगत क्रियाकलाप ।	

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र:** २०

समय: ९० मिनेट

विषय: परियोजना समापन रिपोर्ट र अभ्यास

साधारण उद्देश्य: यो सत्रको खास उद्देश्य सार्वजनिक परियोजना समापन रिपोर्टमा केन्द्रित हुनेछ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजना समापन रिपोर्टको अर्थ र औचित्यमा स्पष्ट हुनेछन्।
- सहभागीले परियोजना समापन रिपोर्टका लागी आवश्यक फ्रेमवर्कका बारेमा ज्ञान प्राप्त गर्नेछन्।
- सहभागीले परियोजना समापन रिपोर्ट तयार पार्दा ध्यान दिनुपर्ने कुरामा स्पष्ट हुनेछन्।
- सहभागीले परियोजना रिपोर्ट तयार पार्न सक्नेछन्।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजना कार्यान्वयन पश्चातको मूल्याङ्कन.

प्रशिक्षण – सिकाई क्रियाकलाप	**अवधि मिनेट**	**प्रशिक्षण – सिकाई सामाग्री**	**कैफियत**
क्रियाकलाप १: सार्वजनिक परियोजना समापन रिपोर्टको अर्थ र औचित्य स्पष्ट गराउने।	१५ मिनेट	पावर प्वाइन्ट स्लाइड, छलफल।	स्लाइड पहिले नै तयार पार्ने।
क्रियाकलाप २: सार्वजनिक परियोजना समापन रिपोर्ट तयार पार्दा ध्यान दिनुपर्ने कुरा छलफल गराउने।	२० मिनेट	छलफल, मेटाकार्ड ।	
क्रियाकलाप ३: सार्वजनिक परियोजना रिपोर्टको फ्रेमवर्कमा छलफल गराउने।	२० मिनेट	पावर प्वाइन्ट स्लाइड।	
क्रियाकलाप ४: सार्वजनिक परियोजना समापन रिपोर्ट तयार पार्ने।	३० मिनेट	समूहगत क्रियाकलाप।	

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि मिनेट	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप ५: समग्र दिनको समिक्षा ।			

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र:** २१

समय: ९० मिनेट

विषय: परियोजना हस्तान्तरण

साधारण उद्देश्य: यो सत्रको खास उद्देश्य सार्वजनिक परियोजना हस्तान्तरण र आवश्यक रिपोर्टमा केन्द्रित हुनेछ ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजना हस्तान्तरणको अर्थ र औचित्यमा स्पष्ट हुनेछन् ।
- सहभागीले परियोजना हस्तान्तरणमा अवलम्बन गर्नुपर्ने विभिन्न चरण पहिचान गर्न र प्रयोग गर्न सक्षम हुनेछन् ।
- सहभागीले परियोजना हस्तान्तरण गर्न आवश्यक कागजपत्र तयार गर्न सक्षम हुनेछन् ।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजना हस्तान्तरण र फरफारक.

प्रशिक्षण – सिकाई क्रियाकलाप	**अवधि मिनेट**	**प्रशिक्षण – सिकाई सामाग्री**	**कैफियत**
क्रियाकलाप १: सार्वजनिक परियोजना हस्तान्तरणको अर्थ र औचित्य स्पष्ट गराउने ।	१५ मिनेट	पावर प्वाइन्ट स्लाइड, छलफल ।	स्लाइड पहिले नै तयार पार्ने ।
क्रियाकलाप २: सार्वजनिक परियोजना हस्तान्तरणका निम्ति आवश्यक प्रक्रिया र चरण अभ्यास गराउने ।	३० मिनेट	छलफल, मेटाकार्ड ।	
क्रियाकलाप ३: परियोजना हस्तान्तरण गर्न आवश्यक कागजदात तयार पार्न अभ्यास गराउने ।	४० मिनेट	पावर प्वाइन्ट स्लाइड ।	

सत्र योजना

मोडुल: परियोजना व्यवस्थापन **सत्र**: २२

समय: ९० मिनेट

विषय: परियोजना हस्तान्तरण र फरफारक

साधारण उद्देश्य: यो सत्रको खास उद्देश्य सार्वजनिक परियोजनाको फरफारकका निम्ति आवश्यक रिपोर्टमा तयार पार्नेमा केन्द्रित हुनेछ।

निर्दिष्ट उद्देश्यहरु: यस सत्रको अन्त्यमा,

- सहभागी सार्वजनिक परियोजनाको फरफारकको औचित्यमा स्पष्ट हुनेछन्।
- सहभागीले परियोजनाको फरफारकका निम्ति अवलम्बन गर्नुपर्ने विभिन्न प्रक्रिया र कागजात तयार पार्न सक्षम हुनेछन्।

सत्रका मुख्य विषयवस्तु:

- सार्वजनिक परियोजनाको फरफारक

प्रशिक्षण – सिकाई क्रियाकलाप	**अवधि मिनेट**	**प्रशिक्षण – सिकाई सामाग्री**	**कैफियत**
क्रियाकलाप १: सार्वजनिक परियोजनाको फरफारकको अर्थ र औचित्य स्पष्ट गराउने।	१५ मिनेट	पावर प्वाइन्ट स्लाइड, छलफल।	स्लाइड पहिले नै तयार पार्ने।
क्रियाकलाप २: सार्वजनिक परियोजनाको फरफारकका निम्ति आवश्यक कागजातको जानकारी।	३० मिनेट	छलफल, मेटाकार्ड ।	
क्रियाकलाप ३: परियोजनाको फरफारक गर्न आवश्यक पर्ने कागजात तयार पार्न अभ्यास गराउने।	४० मिनेट	पावर प्वाइन्ट स्लाइड।	

सत्र योजना

मोड्युल: परियोजना व्यवस्थापन सत्रः २३

समयः ९० मिनेट

विषय: कार्य योजना, प्रशिक्षण मूल्याङ्कन तथा समापन

साधारण उद्देश्य: यस सत्रको अन्तमा सहभागीहरुले सिकेका कुरालाई आफ्नो कार्यक्षेत्रमा कसरी कार्यान्वयन गर्ने बारे कार्ययोजना तयार भएको हुनेछ।

निर्दिष्ट उद्देश्य: सत्रको अन्तमा सहभागीहरुले

- सिकाई कार्यान्वयन गर्ने बारे कार्ययोजना तय गर्न सक्नेछन्।
- समग्र प्रशिक्षणको सिकाई उपलब्धी मूल्याकङ्न गर्न सक्नेछन्।
- प्रशिक्षण कार्यक्रमको औपचारिक रुपमा समापन हुनेछ।

सत्रका मुख्य विषयवस्तु:

- कार्य योजना तयार
- प्रशिक्षण अपेक्षा पुनरावलोकन
- प्रशिक्षणको संक्षेपीकरण
- प्रशिक्षण पश्चात जानकारी
- प्रशिक्षण मूल्याङ्कन
- प्रशिक्षण समापन

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप १ सहभागीहरुको ध्यानाकर्षण ▪ सहभागीहरु सवैलाई उठ्न लगाउनुहोस् । ▪ सवैलाई ताली वजाउन लगाउनुहोस् र ध्यानाकर्षण गर्नुहोस् ।	५		
क्रियाकलाप २ सत्रको नाम, उद्देश्य र विषयवस्तु • सत्रको नाम, उद्देश्य, विषयवस्तु र समय अवधि वताउनुहोस् ।	५	स्लाइड प्रस्तुति	पावर प्वाइन्ट स्लाइड

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप ३ विषयवस्तु सम्बन्धी सहभागीहरुको बुझाई • सहभागीहरुलाई तपाईहरुले कार्य योजना तयार गर्नुभएको छ कि छैन भनी सोध्नुहोस् । • कार्य योजनामा के के राख्नुपर्छ भनी सोध्नुहोस् । • सहभागीहरुबाट आएका कुराहरुलाई मिलान गर्दै विषयवस्तु अगाडि बढाउनुहोस् ।	५	प्रश्न उत्तर	
क्रियाकलाप ४ कार्ययोजना तयारी ▪ सहभागीबाट आएको बुँदालाई समेट्दै अव हामी कार्य योजना वनाउंछौ भनी कार्य योजनाको फाराम प्रस्तुत गर्नुहोस् । ▪ प्रत्येक सहभागीले आ आफ्नो कार्ययोजना तयार गर्न लगाउने । ▪ कार्य योजना वनाउंदा कम्तिमा ६ महिनाको लागि गर्न सकिने योजना वनाउनुहोस भनी भन्नुहोस् । ▪ यस कार्य योजनाको अनुगमन हुने छ भनी वताउनुहोस् ।	१५	समूह छलफल	न्यूज प्रिन्ट, मार्कर, मास्किङ टेप, कार्ययोजना फाराम (अभ्यास पत्र)
क्रियाकलाप ५ कार्ययोजना प्रस्तुतिकरण • कार्ययोजना प्रस्तुत गर्न लगाउनुहोस् । • प्रस्तुतिकरणमा केही थपघट गर्नु पर्ने भए गर्न लगाउनुहोस् । • यो योजना लेख मात्र नभै कार्यान्वयन गर्नुपर्छ भनी वताउनुहोस् ।	१५	लघु प्रवचन	
क्रियाकला ६ सत्र संक्षेपीकरण • सहभागीहरुको केही जिज्ञासाहरु भए समेट्दै यस सत्रमा गरिएका कार्यहरुलाई समेट्दै संक्षेपीकरण गर्नुहोस् ।	५	लघु प्रवचन	
क्रियाकलाप ७ सत्र मूल्यांकन ▪ यस सत्रमा राखिएका निर्दिष्ट उद्देश्यहरु हासिल भए कि भएनन् भनेर थाहा पाउनको लागि सहभागीहरुलाई ▪ निम्न प्रश्नहरु गर्नुहोस् । ▪ कार्ययोजना भनेको के हो ▪ कार्ययोजनामा के के विषयहरु हुन्छन् ▪ अहिले तयार गरिएको कार्ययोजनामा के के क्रियाकलापहरु राखियो	५	लघु प्रवचन	

प्रशिक्षण – सिकाई क्रियाकलाप	अवधि	प्रशिक्षण – सिकाई सामाग्री	कैफियत
क्रियाकलाप ८ प्रक्षिणको पश्चात जानकारी र मूल्याङ्कन ▪ सहभागीहरुलाई प्रशिक्षण पश्चात्को फाराम वितरण गरी भर्न अनुरोध गर्नुहोस् । ▪ सहभागीहरुलाई प्रशिक्षणको मूल्याङ्कनको लागि तयार गरिएको प्रशिक्षण मुल्याङ्कन फाराम वितरण गरी भर्न लगाउनुहोस् । ▪ सहभागीहरुलाई आवश्यकता परेमा फारामहरु भर्न सहजीकरण गर्नुहोस् । **प्रक्षिणको संक्षेपीकरण र अग्रसम्वन्ध** ▪ प्रशिक्षकले प्रशिक्षण अवधिभर छलफल भएका विषयवस्तुहरुलाई संक्षिप्त रुपमा स्मरण गराउनुहोस् । ▪ सहभागीहरुबाट आएको अपेक्षाहरुको पुनरावलोकन गर्दै प्रशिक्षणमा समेटिएका र नसमेटिएका विषयवस्तुहरुको जानकारी गराउनुहोस् । ▪ सहभागीहरुलाई सक्रिय सहभागिताको लागि धन्यवाद दिदै प्राविधिक सत्रहरु समाप्त भएको भन्दै अव यस पछि समापन कार्यक्रम हुनेछ भनी सत्र अन्त्य गर्नुहोस्।	१५		फारामहरु
क्रियाकलाप ९ समापन कार्यक्रम ▪ अतिथिहरुलाई आसन ग्रहण गराई प्रशिक्षणको प्रभावकारीताको बारेमा बढीमा दुई जना (एक जना महिला, एक जना पुरुष) सहभागीहरुलाई आफ्नो विचार राख्न लगाउनुहोस् । ▪ अतिथिहरुबाट प्रशिक्षणको समापन मन्तव्य व्यक्त गर्दै प्रशिक्षण कार्यक्रम समापन भएको घोषणा गर्न लगाउनुहोस् ।	१५		

प्रस्तुति सामग्री (पावरप्वाइन्ट स्लाइड)

स्थानीय विकास प्रशिक्षण प्रतिष्ठान (स्थानीय विकास प्रशिक्षण प्रतिष्ठान ऐन, २०४९ द्वारा स्थापित)
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स्थानीय विकास प्रशिक्षण प्रतिष्ठान (स्थानीय विकास प्रशिक्षण प्रतिष्ठान ऐन, २०४९ द्वारा स्थापित)
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LDTA>>>
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MoFAGA

प्रशिक्षण औपचारिकता

- परिचय
- नाम:
- ठाउँ/ना:
- पद:
- कार्य अनुभव:

LDTA>>>
>>> Learning-Researching-Networking
MoFAGA

साधारण उद्देश्य

- गाउँपालिका र नगरपालिकामा सार्वजनिक परियोजनाको पहिचान कार्यान्वयन अनुगमन र मूल्याङ्कन गरी प्रभावकारी रुपमा परियोजना व्यवस्थापन गर्न सक्षम हुनेछ ।

LDTA>>>
>>> Learning-Researching-Networking
MoFAGA

निर्दिष्ट उद्देश्यहरु

यस प्रशिक्षणको अन्तमा सहभागीहरुले

- सार्वजनिक परियोजनाका सीमा, र सफलताका तत्व पहिचान गराउने हुनेछ।
- सार्वजनिक परियोजना पहिचान, मूल्याङ्कन र छनोट गर्न सक्नेछ।
- सार्वजनिक परियोजनाका सरोकारवालाको पहिचान, विश्लेषण र द्वन्द्व व्यवस्थापनको सहजीकरण गर्न सक्नेछन।
- सार्वजनिक परियोजनाको गुणस्तर व्यवस्थापन सम्वन्धमा स्पष्ट हुनेछ।
- सार्वजनिक परियोजनाको गुण लागतको अर्थ, प्रकार र गुण नियन्त्रण औजार बारेमा थप ज्ञान र सीपमा अभिवृद्धि हुनेछ।

निर्दिष्ट उद्देश्यहरु

यस प्रशिक्षणको अन्तमा सहभागीहरुले

- सार्वजनिक परियोजनाको गुणस्तरका निम्ति गुण नेतृत्व सम्वन्धी स्पष्ट हुनेछ।
- सार्वजनिक परियोजना व्यवस्थापनका विभिन्न चरण बारेमा थप स्पष्ट हुनेछ।
- सार्वजनिक परियोजना व्यवस्थापन क्रमका गरिने आधारभूत कार्य खण्डीकरण गर्न सक्नेछ।
- सार्वजनिक परियोजना व्यवस्थापनमा लागत व्यवस्थापन कसरी गर्ने भन्ने बारेमा स्पष्ट हुनेछ।

निर्दिष्ट उद्देश्यहरु

यस प्रशिक्षणको अन्तमा सहभागीहरुले

- सार्वजनिक परियोजना व्यवस्थापनमा क्षमता विकासको महत्व र मोडल बारेमा जानकारी प्राप्त गर्नेछ।
- सार्वजनिक परियोजना कार्यान्वयन, मूल्याङ्कन र यसका विभिन्न चरण सम्वन्धमा ज्ञान र सीपमा अभिवृद्धि हुनेछ।
- सार्वजनिक परियोजना कार्य प्रगति अनुगमनमा गर्न सक्नेछ।
- सार्वजनिक परियोजना समापन पश्चात गरिने मूल्याङ्कन गर्न सक्नेछ।

अपेक्षा संकलन

प्रशिक्षणका विषयवस्तु

- परियोजना व्यवस्थापनको अर्थ र महत्व, सार्वजनिक परियोजनाका सीमा, र सफलताका तत्व
- सार्वजनिक परियोजना पहिचान र छनोट
- परियोजनाका सरोकारवालाको पहिचान र विश्लेषण तथा द्वन्द्व व्यवस्थापन
- सार्वजनिक परियोजनामा समग्र गुण व्यवस्थापन अर्थ, महत्व र प्रभावपार्ने तत्वपहिचान
- समग्र गुण व्यवस्थापनका सिद्धान्त
- सार्वजनिक परियोजनामा गुण लागत नियन्त्रण औजार

प्रशिक्षणका विषयवस्तु

- सार्वजनिक परियोजनामा गुण नेतृत्व
- सार्वजनिक परियोजनामा गुण वृत्त
- परियोजना व्यवस्थापनका चरण
- परियोजनामा कार्य खण्डीकरण, चरण र तत्व
- परियोजना लागत व्यवस्थापन
- पूँजी बजेट विधि
- क्षमता विकासको महत्व र मोडल
- परियोजना कार्यान्वयन, मूल्याङकन र यसका चरण

प्रशिक्षणका विषयवस्तु

- परियोजनाको कार्य प्रगति अनुगमन
- परियोजनाको मध्यावधि पुनरावलोकन
- परियोजना पुनरावृत्ति
- परियोजना समापन र मूल्याङ्कन
- परियोजना कार्यान्वयन पश्चातको मूल्याङकन र प्रतिवेदन
- परियोजना समापन रिपोर्ट र अभ्यास
- परियोजना हस्तान्तरण र फरफारक

समय तालिका

०७३० – ०८३०	१ घण्टा	चिया र नास्ता
०८३० – ०९००	३० मि	अधिल्लो दिनको पुनरावलोकन
०९०० – ११००	२ घण्टा	पहिलो सत्र
११०० – १२००	१ घण्टा	दिवा भोजन विश्राम
१२०० – १४००	२ घण्टा	दोश्रो सत्र
१४०० – १४३०	३० मि	चिया विश्राम
१४३० – १६३०	२ घण्टा	तेश्रो सत्र

समूह मान्यता

- समय तालिकाको पालना गर्ने
- मोबाइल साइलेन्ट मोडमा राख्ने
- आवश्यकता अनुसार छलफलमा संलग्न हुने
- आवश्यकता अनुसार समूह कार्य गर्ने
- .....

परियोजना व्यवस्थापनको ज्ञान समिक्षा

- Evaluation of project management knowledge
- **Training Modality: छलफल**

पूर्व जानकारी

धन्यवाद

स्थानीय विकास प्रशिक्षण प्रतिष्ठान
(स्थानीय विकास प्रशिक्षण प्रतिष्ठान ऐन, २०५९ द्वारा स्थापित)
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परियोजना व्यवस्थापनको अर्थ र महत्व, सार्वजनिक परियोजनाका सीमा र सफलताका तत्व

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परियोजना व्यवस्थापनको अर्थ र महत्व
(Meaning and importance of project management)

- परियोजनाको अर्थ
- परियोजनाका तत्व
- सार्वजनिक परियोजना किन असफल हुन्छन ?
- परियोजना व्यवस्थापनको अर्थ
- परियोजना व्यवस्थापनको महत्व

सार्वजनिक परियोजनाका उदाहरण
(Examples of public sector projects)

- Construction of drinking water supply
- Building a water treatment plant
- Construction of health post, school, ….
- Replacing a roof on a building
- Repaving a street
- Implementing a software system
- Training to development representatives
- ….

सार्वजनिक क्षेत्रका परियोजनाका सीमा
(Major constraints of public sector project)

किन सार्वजनिक परियोजना फरक ?

- राजनीतिक परिदृश्य
- सिमित लगानी कोष
- कानुनी प्रावधान र सीमा
- सार्वजनिक सरोकार र पहुँच
- उत्तरदायित्व र जवाफदेहिता

सार्वजनिक परियोजना सफलताका तत्व
(Success factors of public sector project)

- छलफल
- अनुसन्धान साराशं

धन्यवाद

स्थानीय विकास प्रशिक्षण प्रतिष्ठान
(स्थानीय विकास प्रशिक्षण ऐन, २०४९ द्वारा स्थापित)
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सार्वजनिक परियोजना पहिचान र छनोट

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परियोजनाको पहिचान र छनोट
(Project identification and selection)

परियोजनाको पहिचान .... छलफल

- समस्या,
- आवश्यकता
- विशिष्टीकरण अवसर
- अनुभुती वा अनुसन्धान ???

परियोजना छनोट .... छलफल

परियोजना छनोट (Project selection)

परियोजना छनोट ....विधि

१. परियोजनाबाट अपेक्षित फाइदा

२. संभाव्यता अध्ययन (प्राविधिक, आर्थिक, व्यवस्थापकीय)

३. वातावरणमा असर मूल्याङ्कन

परियोजना छनोटमा को सहभागी हुने ??????

१. परियोजनाका अपेक्षित फाइदा

- सार्वजनिक जीवनस्तरमा बृद्धि,
- सार्वजनिक समस्या पहिचान र समाधान
- सार्वजनिक संसाधनको सार्वजनिक प्रयोजन
- सामाजिक समन्वय र सदभाव कायम
- स्व पहिचान र स्व निर्भरता

२. संभाव्यता अध्ययन

- संभाव्यता अध्ययनको अर्थ
- संभाव्यता अध्ययनको औचित्य
- संभाव्यता अध्ययनका चरण
- संभाव्यता अध्ययन गर्ने विधि (प्राविधिक, आर्थिक, व्यवस्थापकीय विश्लेषण)

संभाव्यता अध्ययनका चरण

- परियोजनाको प्रारम्भिक विश्लेषण गर्ने,
- परियोजनाको प्राविधिक विश्लेषण गर्ने,
- परियोजनाको वित्तिय विश्लेषण गर्ने,
- परियोजनाको वातावरणीय असर विश्लेषण गर्ने,
- परियोजनाको व्यवस्थापकीय क्षमता विश्लेषण गर्ने,
- परियोजना संभाव्यता अध्ययन रिपोर्ट तयार पार्ने ।

संभाव्यता अध्ययनका निम्ति प्राविधिक विश्लेषण

- आयोजनाका प्राविधिक पक्ष पहिचान
- भौगोलिक अवस्थिती,
- प्राविधिक संसाधनको आवश्यकता र उपलब्धता
- प्राविधिक व्यक्तिको उपलब्धता
- प्राविधिक चुनौती
- प्राविधिक तवरबाट परियोजना कार्यान्वयनको संभावना

संभाव्यता अध्ययनका निम्ति आर्थिक विश्लेषण

- आयोजनाको कुल लागत अनुमान गर्ने
- लगानीका स्रोत पहिचान गर्ने
- परियोजनाबाट अपेक्षित आर्थिक उपार्जन
- लागत लाभ विश्लेषण
- आर्थिक विश्लेषण रिपोर्ट ।

संभाव्यता अध्ययनका निम्ति व्यवस्थापकीय विश्लेषण

- आयोजना कार्यान्वयन र संचालनका निम्ति आवश्यक पर्ने व्यवस्थापकीय सीप र ज्ञान पहिचान गर्ने ।
- आवश्यक सीप र ज्ञान भएका व्यक्तिको संभाव्यता र पहिचान,
- परियोजना संरचना
- व्यवस्थापकीय तवरबाट परियोजना कार्यान्वयनको संभावना विश्लेषण
- व्यवस्थापकीय संभाव्यता अध्ययनको रिपोर्ट ।

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स्थानीय विकास प्रशिक्षण प्रतिष्ठान
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परियोजनाका सरोकारवालाको पहिचान र विश्लेषण र द्वन्द्व व्यवस्थापन

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परियोजनाका सरोकारवालाको पहिचान र विश्लेषण (Stakeholder identification and analysis)

१. परियोजनाले प्रत्यक्ष फाइदा हुने वा नोक्सान पुग्ने व्यक्ति र समुदाय -वातावरणीय, संसाधन दोहन, सामाजिक साँस्कृतिक मान्यता, ...
२. पूँजी लगानी गर्ने संस्था वा निकाय
३. परियोजना परिचालन गर्ने संस्था, निकाय वा व्यक्ति
४.प्राविधिक र व्यवस्थापकीय परामर्शदाता
५. स्थानिय वा संघिय सरकार

परियोजना चयन तथा कार्यान्वयनमा द्वन्द व्यवस्थापन (Conflict settlement in project selection & implementation)

द्वन्दका कारक तत्वको पहिचान र असर विश्लेषण गर्ने ।
समाधानका निम्ति,
१. उपभोक्ता समितिको भूमिका,
२. परियोजनाका विज्ञको भूमिका,
३. राजनीतिक तथा संचारमाध्यमको भूमिका,

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स्थानीय विकास प्रशिक्षण प्रतिष्ठान
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सार्वजनिक परियोजनामा समग्र गुण व्यवस्थापन अर्थ, महत्व र प्रभाव पार्ने तत्व पहिचान र समग्र गुण व्यवस्थापनका सिद्धान्त

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परियोजनामा समग्र गुण व्यवस्थापन (Total Quality Management in Project Management)

- समग्र गुण व्यवस्थापनको अर्थ ।
- समग्र गुण व्यवस्थापनको महत्व ।
- परियोजनाको गुणस्तरमा प्रभाव पार्ने तत्व ।

समग्र गुण व्यवस्थापनको महत्व

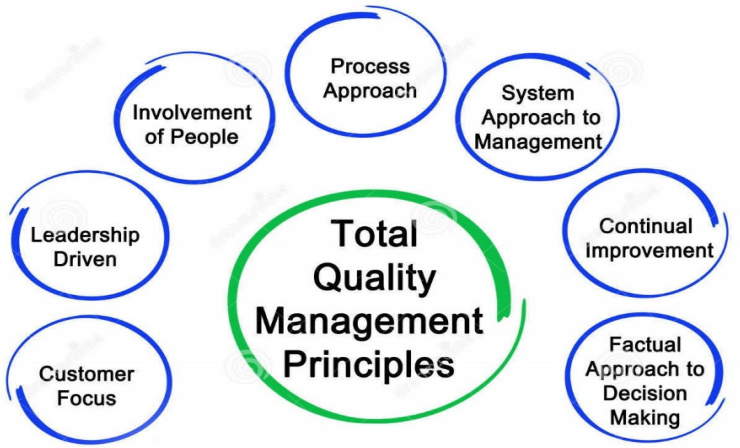
- सेवाग्राहिको सन्तुष्टी
- संसाधनको अधिकतम उपयोग
- अपनत्व विकास
- कम लागत
- मर्मत संभारको आवश्यकतामा कमी
- निर्दिष्ट समयमा नै परियोजना सम्पन्न
- जोखिम न्यूनीकरण ।

परियोजनाको गुणस्तरमा प्रभाव पार्ने तत्व

परियोजनाको गुणस्तर परियोजनाको प्रकृतिमा निर्भर हुन्छ ।
समग्रतामा :

- व्यवस्थापन
- संसाधन
- परियोजना नेतृत्व
- अनुगमन, निरिक्षण र पृष्ठपोषण
- स्वामित्व ग्रहण
- परियोजना योजना

समग्र गुण व्यवस्थापनका सिद्धान्त
(Principles of Total Quality Management)



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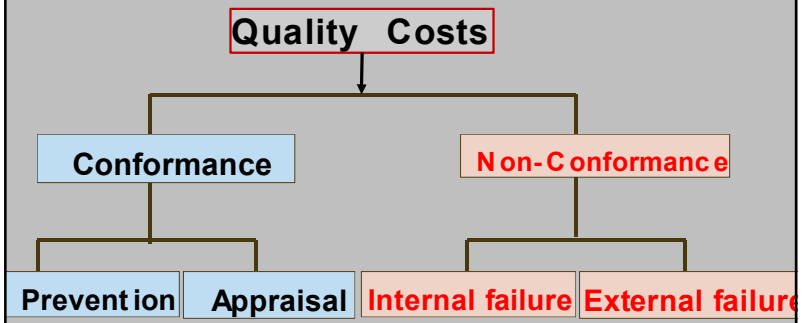
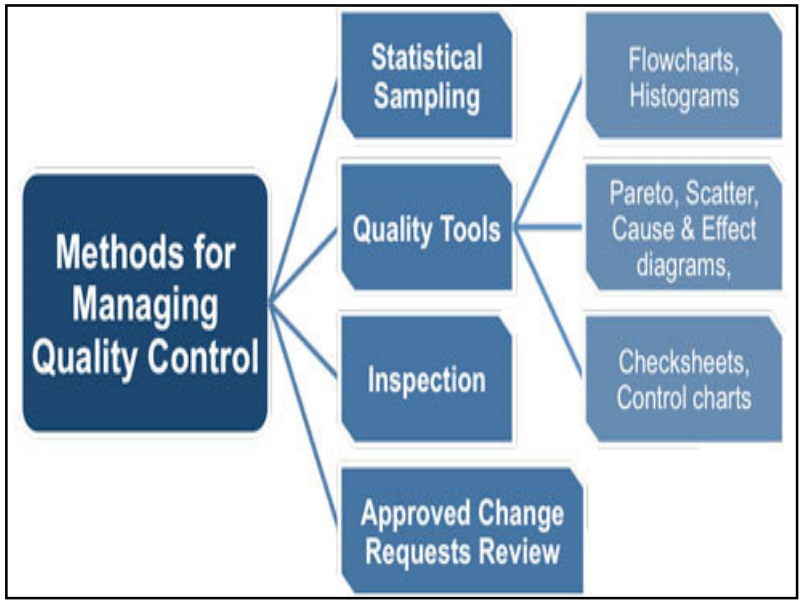


गुण लागत नियन्त्रण औजार
(Quality Control Tools)



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गुणस्तरिण परियोजनाका निम्ति गुण नेतृत्व
(Quality Leadership for quality project)

सामूहिक छलफल
(Group discussion)

परियोजना नेतृत्वका गुण

- ***Convey the big picture***
- ***Build the project team***
- ***Superior communication skills***
- ***Lead by example***
- ***Focus for finding solutions***
- ***Delegate, delegate and delegate***
- ***Optimistic approach***
- ***Raise to full potential***
- ***Caring attitude***
- ***Compassionate***

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गुणस्तरिय परियोजनाका निम्ति गुण वृत्त
(Quality Circle for quality project)

गुण वृत्तको अवधारणा, उद्देश्य र फाइदा

- छलफल

गुण वृत्त व्यवस्थापनका निम्ति व्यवस्थापकले ध्यान दिनुपर्ने कुरा

- Organizational diagnosis for need of QC
- Limiting expectations from QC
- Passionate for result of intervention
- Size of QCs for financial and managerial cost
- Effectiveness of QCs
- Autonomy of QCs

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परियोजना व्यवस्थापनका चरण

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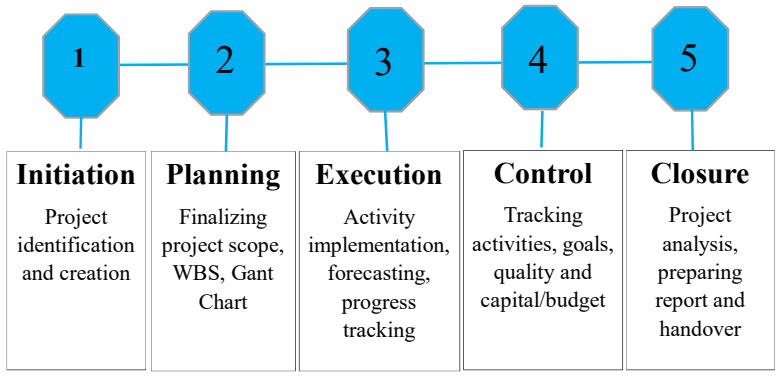
परियोजना व्यवस्थापन चरण
(Steps in Project Management)



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परियोजनामा कार्य खण्डीकरण, चरण र तत्व

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परियोजनामा कार्य खण्डीकरण (Work Breakdown Structure)

परियोजनाका कार्यलाई व्यवस्थित र कार्यसम्पादन योग्य बनाउन गरिने कार्य विभाजन ।

कार्य विशिष्टीकरणको आधार

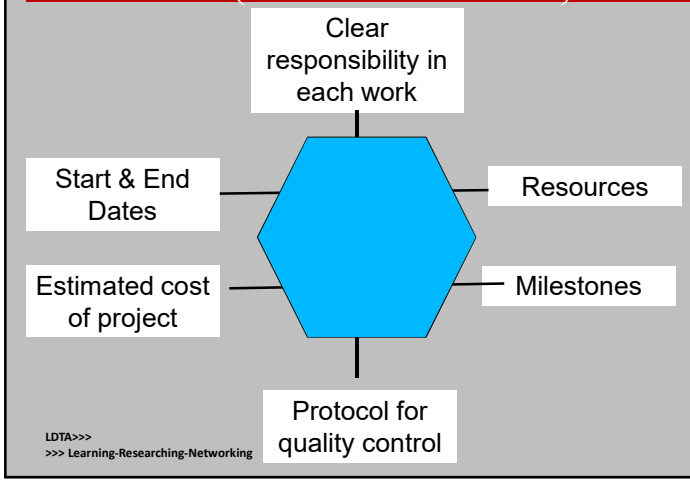
कार्य तालिका तथा संसाधन व्यवस्थापनको आधार

उत्तरदायित्व र अख्तियार सन्तुलन

संभावित जोखिम व्यवस्थापन

परियोजना टोली व्यवस्थापनको मार्ग निर्देशक

परियोजनामा कार्य खण्डीकरणका तत्व (Elements in WBS)



परियोजनामा कार्य खण्डीकरणका चरण (Steps in WBS)

चरण १: परियोजनाका अन्तिम लक्ष्य, परिणामको पहिचान ।

चरण २: परियोजनाका मुख्य क्षेत्र पहिचान ।

चरण ३: हरेक कार्यलाई विशिष्टताका आधारमा विभाजन ।

चरण ४: क्रियाकलापमा समन्वय कायम गर्ने ।

चरण ५: जिम्मेवारी सुम्पिने ।

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परियोजनाको लागत व्यवस्थापन (Project cost management)

सार्वजनिक परियोजना लागत व्यवस्थापनका चुनौती ...

बहस

सार्वजनिक परियोजना लागत व्यवस्थापनका चुनौती ...

अनुसन्धानका परिणाम

चुस्त परियोजना लागत व्यवस्थापनका आवश्यक कार्य

सार्वजनिक परियोजना लागत व्यवस्थापनमा उत्तम अभ्यास

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पूँजी बजेट विधि
(Capital budgeting techniques)

- **Pay-back period, Average Rate of Return, Discounted cash flow (NPV, IRR, probability index,)**

Pay-back period

- Pay-back period को अर्थ, अवधारणा
- Pay-back period निकाल्ने तरिका प्रयोग गर्न
- Pay-back period का फाइदा तथा यसका सीमा
- सार्वजनिक परियोजनामा Pay-back period को प्रयोग

Average rate of return

- Average rate of return को अर्थ, अवधारणा
- Average rate of return निकाल्ने तरिका प्रयोग गर्न
- Average rate of return का फाइदा तथा यसका सीमा
- सार्वजनिक परियोजनामा Average rate of return को प्रयोग

Net Present Value (NPV)

- NPV को अर्थ, अवधारणा
- NPV निकाल्ने तरिका प्रयोग गर्न
- NPV का फाइदा तथा यसका सीमा
- सार्वजनिक परियोजनामा NPV को प्रयोग

Internal Rate of Return (IRR)

- IRR को अर्थ, अवधारणा
- IRR निकाल्ने तरिका प्रयोग गर्न
- IRR का फाइदा तथा यसका सीमा
- सार्वजनिक परियोजनामा IRR को प्रयोग

Probability Index

- Probability index को अर्थ, अवधारणा
- Probability index निकाल्ने तरिका प्रयोग गर्न
- Probability index का फाइदा तथा यसका सीमा
- सार्वजनिक परियोजनामा Probability index को प्रयोग ।

पूँजी बजेट विधि (Capital budgeting techniques)

विभिन्न **Capital Budgeting Techniques** हरुको तुलनात्मक समिक्षा गर्ने ।

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क्षमता विकासको महत्व र मोडल

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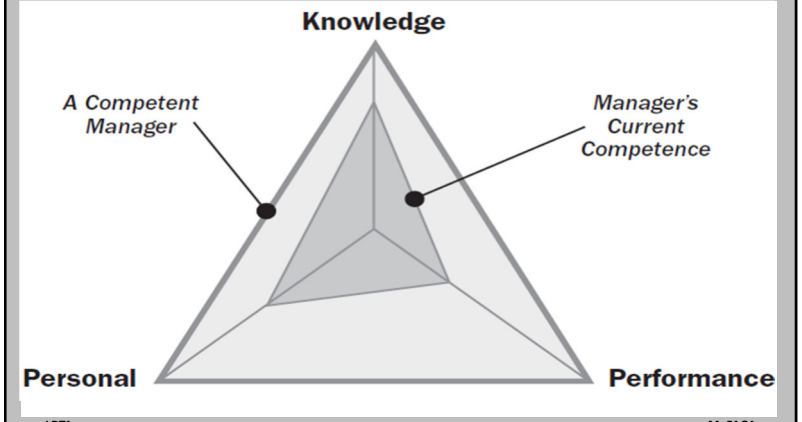
क्षमता विकास
(Competency development)

सार्वजनिक परियोजनाको सफलताका निम्ति क्षमता विकासको आवश्यकता
Project Management Competence Development (PMCD) Framework को अवधारणा र डिजाइन ।

PMCD Framework Dimensions of Competence



सार्वजनिक परियोजनाको सफलताका निम्ति क्षमता विकासको Project Management Competence Development (PMCD) Framework को संरचना

- Portfolio/Program/Project Manager Competence
- Units of Competence
- Elements
- Performance Criteria
- Sources of Evidence
- Portfolio/Program/Project Manager Expectations
- Indicative Minimum Competence Level Required

- International Project Management Association (IPMA) Model
- Global Alliance on Project Performance Standards (GAPPS)

धन्यवाद

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परियोजना कार्यान्वयन, मूल्याङ्कन र यसका चरण

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परियोजना कार्यान्वयन र मूल्याङ्कन (Project implementation and evaluation)

सार्वजनिक परियोजना कार्यान्वयन

संसाधनको उचित प्रयोग

कार्य प्रगती अवलोकन तथा प्रतिवेदन तयार पार्ने

आवश्यक संसाधन, कार्य योजना तथा कार्यविधिमा संसोधन गर्ने ।

सुधारात्मक कार्य ।

परियोजना मूल्याङ्कन योजना चरण
(Steps in project implementation plan)

परियोजना परिणामको सूची पार्ने ।

परियोजनाको जिम्मेवारी तथा अख्तियार प्रत्यायोजन गर्ने

परियोजना परिणाम ग्यारेण्टी गर्न कार्य सूची पार्ने ।

भूमिका, बजेट तथा जवाफदेहिता स्थापित गर्ने ।

परियोजना कार्य प्रगती अवलोकन गर्ने ।

परियोजना व्यवस्थापन विधि पार्ने ।

आवधिक पुनरावृत्तिको निम्ति तालिका तयार पार्ने ।

धन्यवाद

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परियोजनाको कार्य प्रगति अनुगमन
(Progress monitoring)

तालिका र बजेट पूर्वानुमानका आधारमा परियोजनाको कार्य प्रगति अनुगमन गर्ने ।

परियोजना योजना अनुसार कार्य सम्पादन भएका र नभएका कार्यको सूची तयार पार्ने ।

परियोजनाको कार्य प्रगति अद्यावधिक गर्ने ।

परियोजना सुचना विश्लेषणका निम्ति **Earned Value Management (EVM)** मोडलको प्रयोग गर्ने ।

परियोजनाको कार्य प्रगति अनुगमन (Progress monitoring)

विशिष्ट EVM मापनका तत्व :

- The Budgeted Cost of Work Scheduled (BCWS
- The Budgeted Cost of Work Performed (BCWP)
- The Actual Cost of Work Performed (ACWP)
- The Budgeted Actual Cost (BAC) and the Estimated cost at Completion (EAC)
- The Budgeted Actual Cost (BAC) and the Estimated cost at Completion (EAC)

धन्यवाद

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परियोजनाको मध्यावधी पुनरावलोलन (Midterm review)

- परियोजनाको मध्यावधी पुनरावलोकनको अर्थ र महत्व :
- छलफल ।

परियोजनाको मध्यावधी पुनरावलोलन (Midterm review)

परियोजनाको मध्यावधी पुनरावलोकनका लागी मापदण्ड (Criteria)

परियोजनाको मध्यावधी पुनरावलोकनको लागी प्रश्न (Questions)

परियोजनाको मध्यावधी पुनरावलोलन (Midterm review)

- परियोजनाको मध्यावधी पुनरावलोकन रिपोर्टको नमूना (Sample)

धन्यवाद

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परियोजना पुनरावृत्ति
(Project review)

परियोजनाका हरेक क्रियाकलाप निरिक्षण भए त ?

के WBS राम्रोसँग पुनरावृत्ति गरियो ? कुनै कार्य त छुटेन ?

परियोजनाका सिमा (Limitations) टिपोट भयो त ?

परियोजनाका लक्ष्य हासिल भए त ?

परियोजनाका रिपोर्ट तयार पार्न आवश्यक सबै तथ्य र सुचनाको टिपोट गरियो त ?

प्रमुख सरोकारवालासँग परामर्श गरियो त ?

परियोजना पुनरावृत्ति
(Project review)

के परियोजनाका निर्गत (Output) र प्राप्ति (Outcomes) मूल्याङ्कन गरियो त ?

के परियोजनाका निर्गत (Output) र प्राप्ति (Outcomes) ले सरोकारवालाको अपेक्षा र आवश्यकता पूरा गर्छ त ?

परियोजना योजना (PMP) अनुसार कार्य सम्पन्न भयो त ?

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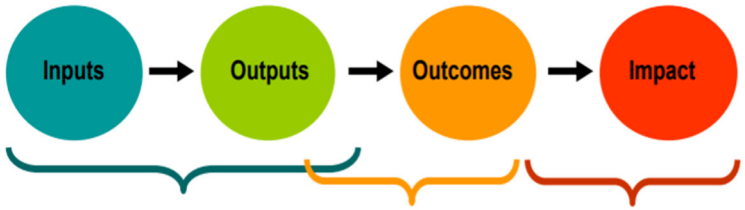
परियोजना समापन र मूल्याङ्कन – आगत, निगत, उपज र असर मोडल (Project completion and appraisal – Inputs, outcomes, outcomes, impact model)



Monitoring: What has been invested, done and produced, and how are we supporting partners to achieve the objectives?

Evaluation and review: What progress has the project made towards achieving its objectives?

Impact assessment: What long-term, sustainable changes have occurred and how did our interventions contribute to these?

परियोजना समापनमा घोषणा अघि ध्यान दिनुपर्ने कुरा (Considerations before completion declaration)

परियोजना समापन घोषणा गर्नु अघि ध्यान दिनु पर्ने कुरा

परियोजना मूल्याङ्कनका आधार र प्रक्रिया (Basis for project evaluation and Process)

परियोजना मूल्याङ्कनका आधार

परियोजना मूल्याङ्कनका प्रक्रिया

- परियोजना मूल्याङ्कन योजना : उद्देश्य पुनरावलोकन, डाटा संकलन र मूल्याङ्कन कार्य योजना
- परियोजना मूल्याङ्कनका कार्यान्वयन : डाटा संकलन, डाटा विश्लेषण र व्याख्या
- परियोजना मूल्याङ्कन रिपोर्ट तयार पार्ने ।

परियोजना मूल्याङ्कन गर्नका निम्ति प्रयोग गरिने औजार (Tools)

- **Balance Score Card Review**
- **Scope and Financial Audit – to determine gap**

धन्यवाद

स्थानीय विकास प्रशिक्षण प्रतिष्ठान
(स्थानीय विकास प्रशिक्षण प्रतिष्ठान ऐन, २०५९ द्वारा स्थापित)
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परियोजना समापन पश्चातको मूल्याङ्कन (Post Project Evaluation)

- परियोजना समापन पश्चातको मूल्याङ्कनको अर्थ र औचित्य
- परियोजना समापन पश्चातको मूल्याङ्कनका चरण
- परियोजना समापन पश्चातको मूल्याङ्कन रिपोर्ट

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परियोजना समापन रिपोर्ट
(Project completion report)

General Content of Completion Report

- Background of the study
- Representative and Contact details
- Name of project
- Region covered and Stakeholders
- Duration of project
- Summary of project

परियोजना समापन रिपोर्ट
(Project completion report)

General Content of Completion Report

- Objectives of the project
- Major achievement (Output level & Outcome level)
- Activities carried out
- Impact of the project
- Financial report (Fund received, Expenditure, plan for left over fund if any,)
- Conclusion
- Photo gallery

धन्यवाद

स्थानीय विकास प्रशिक्षण प्रतिष्ठान
(स्थानीय विकास प्रशिक्षण प्रतिष्ठान ऐन, २०५६ द्वारा स्थापित)
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परियोजना हस्तान्तरण (Project handover)

परियोजना हस्तान्तरणको अर्थ र महत्व

परियोजना हस्तान्तरणका चरण

परियोजना हस्तान्तरणको उद्देश्य तय गर्ने ।

परियोजना सरोकारवालालाई परियोजना सम्पन्न भएको अद्यावधिक गर्ने ।

परियोजना हस्तान्तरणका निम्ति पुनारावृत्ति र समापन बैठक गर्ने ।

परियोजना हस्तान्तरण (Project handover)

- परियोजना हस्तान्तरण पछि हुन सक्ने समस्या समाधानका निम्ति सरोकारवालालाई तालिम तथा संचालन संरचना तयार पार्ने ।
- परियोजना हस्तान्तरण संचालनमा हुन सक्ने समस्या समाधानका निम्ति प्राविधिक सहयोग संरचना तयार पार्ने ।

धन्यवाद

स्थानीय विकास प्रशिक्षण प्रतिष्ठान
(स्थानीय विकास प्रशिक्षण प्रतिष्ठान ऐन, २०४९ द्वारा स्थापित)
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परियोजना प्रतिवेदन हस्तान्तरण र फर्स्यौट (Report handover and settlement)

- परियोजना प्रतिवेदनको अर्थ र प्रयोग ।
- परियोजना प्रतिवेदनको खाका ।
- परियोजना प्रतिवेदन तयार पार्ने **Template** ।

परियोजना प्रतिवेदन हस्तान्तरण र फर्स्यौट (Report handover and settlement)

- परियोजना फर्स्यौट प्रक्रिया र आवश्यक कागजात ।

धन्यवाद

स्थानीय विकास प्रशिक्षण प्रतिष्ठान
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नमुना कार्य योजना

क्र स	क्रियाकलापहरु	कहिल गर्ने	जिम्मेवारी कसको	सहयोगी निकाय	कसरी गर्ने
१					
२					
३					

पश्चात जानकारी

मूल्याङ्कन

समापन

धन्यवाद

सहभागीका लागि अध्ययन सामग्री
(प्रशिक्षण प्रयोजनका लागि)

Day 1 Session 2

Source: Project management: a systems approach to planning, scheduling, and controlling / Harold Kerzner/ John Wiley & Sons,

UNDERSTANDING PROJECT MANAGEMENT

In order to understand project management, one must begin with thedefinition of a project. A project can be considered to be any series of activities and tasks that:

- Have a specific objective, with a focus on the creation ofbusiness value, to be completed within certain specifications
- Have defined start and end dates
- Have funding limits (if applicable)
- Consume human and nonhuman resources (i.e., money, people, equipment)
- Are multifunctional (i.e., cut across several functional lines)

The result or outcome of the project can be unique or repetitive, and must be achievedwithin a finite period of time. Because companies have very limited resources, care must be taken that the right mix of projects is approved. Given this, another outcome of a projectis that it provides business value to the company as opposed to being a "pet" project for thepersonal whims of one person.

Project management is the application of knowledge, skills, and tools necessary to achieve the project's requirements. The knowledge, skills, and tools are usually grouped into activities or processes. PMI's *PMBOK® Guide* identifies five process groups. Some ofthe activities within these groups include:

- Project initiation
  - Selection of the best project given resource limits
  - Recognizing the benefits of the project
  - Preparation of the documents to sanction the project
  - Assigning of the project manager
- Project planning
  - Definition of the work requirements
  - Definition of the quality and quantity of work
  - Definition of the resources needed
  - Scheduling the activities
  - Evaluation of the various risks
- Project execution
  - Negotiating for the project team members
  - Directing and managing the work
  - Working with the team members to help them improve
- Project monitoring and control
  - Tracking progress
  - Comparing actual outcome to predicted outcome
  - Analyzing variances and impacts

  - Making adjustments
- Project closure
  - Verifying that all of the work has been accomplished
  - Contractual closure of the contract
  - Financial closure of the charge numbers
  - Administrative closure of the paperwork

Successful project management can then be defined as achieving a continuous stream of project objectives within time, within cost, at the desired performance/technology level, while utilizing the assigned resources effectively and efficiently, and having the results accepted by the customer and/or stakeholders. Because each project is inherently different and each customer can have different requirements, the activities included within the process groups may change from project to project. The *PMBOK® Guide* identifies industry-accepted activity regarded as best practices for each process group and these best practices can be structured to create a project management methodology that can be applied and customized to a variety of projects.

The potential benefits from effective project management are:

- Clear identification of functional responsibilities to ensure that all activities are accounted for, regardless of personnel turnover
- Minimizing the need for continuous reporting
- Identification of time limits for scheduling
- Identification of a methodology for trade-off analysis
- Measurement of accomplishment against plans
- Early identification of problems so that corrective action may follow
- Improved estimating capability for future planning
- Knowing when objectives cannot be met or will be exceeded

Unfortunately, the benefits cannot be achieved without overcoming obstacles such as project complexity, customer's special requirements and scope changes, organizational restructuring, project risks, changes in technology, and forward planning and pricing.

Project management is designed to make better use of existing resources by getting work to flow horizontally as well as vertically within the company. This approach does not really destroy the vertical, bureaucratic flow of work but simply requires that line organizations talk to one another horizontally so that horizontal and vertical work flow will be accomplished more smoothly throughout the organization and in a concurrent manner. The vertical flow of work is still the responsibility of the line managers. The horizontal flow of work is the responsibility of the project managers, and their primary effort is to communicate and coordinate activities horizontally between the line organizations.

Figure 1–1 shows how many companies are structured. There are always "class or prestige" gaps between various levels of management. There are also functional gaps between working units of the organization. If we superimpose the management gaps on top of

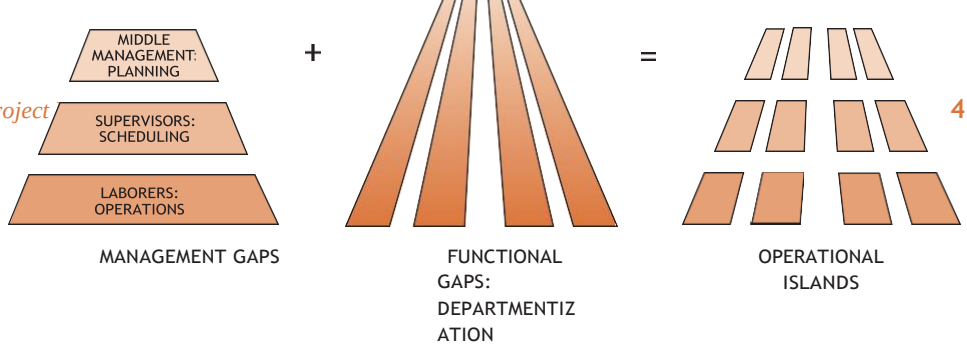
the functional gaps, we find that companies are made up of small operational islands that refuse to communicate with one another for fear that giving up information may strengthen their opponents. The project manager's responsibility is to get these islands to communicate cross-functionally toward common goals and objectives.

The project manager may require a difference set of skills when working with each of the islands. The *PMBOK® Guide* identifies a talent triangle composed of technical project management, leadership and strategic and business management skills. In today's environment, strategic and business

management skills are getting more attention because projectmanagers are seen as managing part of a business rather than merely a project and, as such,are expected to make both project and business decisions.

The following is an overview definition of project management:

Project management is the planning, organizing, directing, and controlling of company resources for a relatively short-term objective that has been established to complete specific goals and objectives. Furthermore, project management utilizes the systems approach to management by having functional personnel (the vertical hierarchy) assigned to a specificproject (the horizontal hierarchy).



MANAGEMENT GAPS

FUNCTIONAL GAPS: DEPARTMENTIZATION

OPERATIONAL ISLANDS

FIGURE 1–1. Organizational gaps.

The preceding definition requires further comment. Classicalmanagement is usually considered to have five functions or principles:

- Planning
- Organizing
- Staffing
- Controlling
- Directing

You will notice that, in the definition, the staffing function has been omitted. This was intentional because the project manager does not staff the project. Staffing is a line responsibility. The project manager has the right to request specific resources, but the finaldecision as to what resources will be committed rests with the line managers.

We should also comment on what is meant by a "relatively" short-term project. Not all industries have the same definition for a short-term project. In engineering, the project might be for six months or two years; in construction, three to five years; in nuclear components, ten years; and in insurance, two weeks. Long-term projects, which consume resources full-time, are usually set up as a separate division (if large enough) or simply asa line organization.

Figure 1–2 is a pictorial representation of traditional project management the wayit was understood in the past. The objective of the figure is to show that project management is designed to manage or control company resources on a given activity, within time,within cost, and within performance. Time, cost, and performance were considered as the

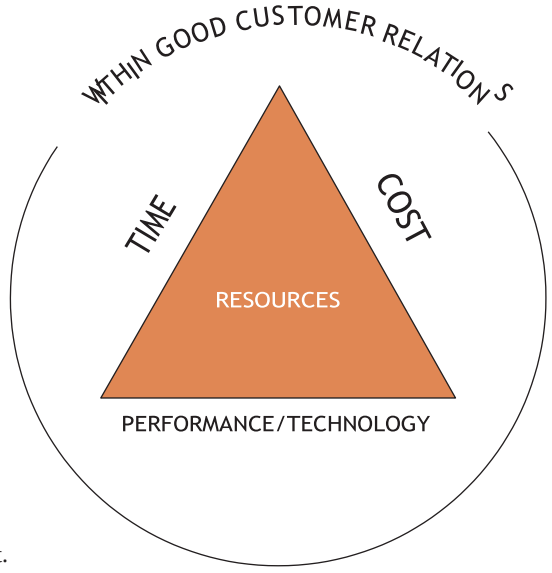


FIGURE 1–2. Overview of project management.

only constraints on the project. If the project is to be accomplished for an outside customer,then the project had a fourth constraint: good customer relations. Customers can be internal or external to the parent organization. The reader should immediately realize that it is possible to manage a project within time, cost, and performance and then also alienate thecustomer to such a degree that no further business will be forthcoming. Executives often select project managers based on who the customer is and what kind of customer relationswill be necessary.

Projects exist to produce deliverables. The person ultimately assigned as the project manager may very well be assigned based upon the size, nature, and scope of the deliverables. Deliverables are outputs, or the end result of either the completion of the project or the end of a life-cycle phase of the project. Deliverables are measurable, tangible outputs and can take such form as:

- **Hardware Deliverables**: These are hardware items, such as a table, a prototype, or a piece of equipment.
- **Software Deliverables**: These items are similar to hardware deliverables butare usually paper products, such as reports, studies, handouts, or documentation. Some companies do not differentiate between hardware and software deliverables.
- **Interim Deliverables**: These items can be either hardware or software deliverables and progressively evolve as the project proceeds. An example is a series of interim reports leading up to the final report.

1.1 DEFINING PROJECT SUCCESS

In the previous section, we defined project success as the completion ofan activity within the constraints of time, cost, and performance. This wasthe definition used for the past thirty to forty years or so. More recently,the definition of project success has been modified to include completion:

- Within the allocated time period
- Within the budgeted cost
- At the proper performance or specification level
- With acceptance by the customer/user
- With minimum or mutually agreed upon scope changes
- Without disturbing the main work flow of the organization
- Without changing the corporate culture

The last three elements require further explanation. Very few projects are completed within the original scope of the project. Scope changes are inevitable and have the potentialto destroy not only the morale on a project, but the entire project. Scope changes *must* be held to a minimum and those that are required *must* be approved by both the project man-ager and the customer/user.

Project managers must be willing to manage (and make concessions/trade-offs, if necessary) such that the company's main work flow is not altered. Most project managers view themselves as self-employed entrepreneurs after project go-ahead and would liketo divorce their project from the operations of the parent organization. This is not always possible. The project manager must be willing to manage within the guidelines, policies, procedures, rules, and directives of the parent organization.

All corporations have corporate cultures, and even though each project may beinherently different, the project manager should not expect his assigned personnel to deviate from cultural norms. If the company has a standard of openness and honestywhen dealing with customers, then this cultural value should remain in place for all projects, regardless of who the customer/user is or how strong the project manager's desire for success is.

Excellence in project management is defined as a continuous stream of successfully managed projects. Any project can be driven to success through formal authority and strongexecutive meddling. But in order for a continuous stream of successful projects to occur, there must exist a strong corporate commitment to project management, and this commitment *must be visible.*

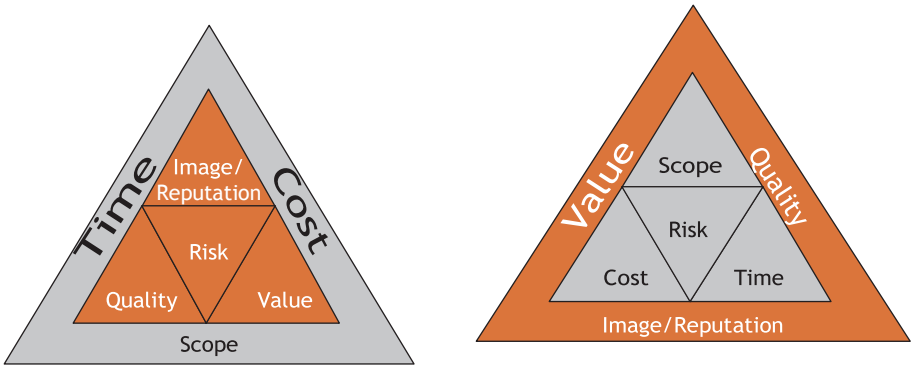
1.2 TRADE-OFFS AND COMPETING CONSTRAINTS

Although many projects are completed successfully, at least in the eyes of the stakeholders, the final criteria from which success is measured may be different from the initial criteria because of trade-offs. Trade-offs are situations where one aspect of a project may be sacrificed to gain an advantage with another aspect. As an example, additional timeand money may be needed to make further improvements in the quality of the project's deliverables.

The first triangle shown in Figure 1–2 is referred to as the triple constraints on a project, namely time, cost, and performance, where performance can be scope, quality, or technology. These are considered to be the primary constraints and are often considered tobe the criteria for a project against which success is measured.

Today, we realize that there can be multiple constraints on a project and, rather than use the terminology of the triple constraints, we focus our attention on competing constraints. Sometimes the constraints are referred to as primary and secondary constraints. There may be secondary factors such as risk, customer relations, image, and reputation thatmay cause us to deviate from our original success criteria of time, cost, and performance. These changes can occur any time during the life of a project and can then cause trade-offsin the triple constraints, thus requiring that changes be made to the success criteria. In an ideal situation, we would perform trade-offs on any or all of the competing constraints suchthat acceptable success criteria would still be met.

As an example, let's assume that a project was initiated using the success criteria of the triple constraints as shown in Figure 1–3. For simplicity's sake, a triangle was usedfor the competing constraints in Figure 1–3. However, there can be significantly more than three competing constraints in which some geometric shape other than a triangle might work best. Partway through the project, the environment changes, a new senior management team is brought in with their own agenda, or a corporate crisis occurs such



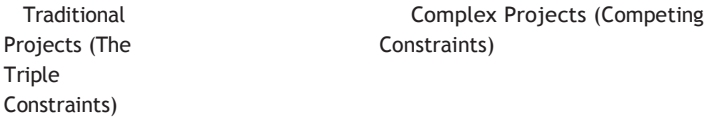


FIGURE 1–3. Competing constraints

that the credibility of the corporation is at stake. In such a case, the competing constraints shown on the right in Figure 1–3 can be more important than the original triple constraints.

Secondary factors are also considered to be constraints and may be more important than the primary constraints. For example, years ago, in Disneyland and Disneyworld, theproject managers designing and building the attractions at the theme parks had six constraints: time, cost, scope, safety, aesthetic value, and quality.

At Disney, the last three constraints of safety, aesthetic value, and quality were considered locked-in constraints that could not be altered during trade-offs. All trade-offs were made on time, cost, and scope. Some constraints simply cannot change while others may have flexibility.

Not all constraints are equal in importance. For example, in the initiation phase of a project, scope may be the critical factor and all trade-offs are made on time and cost. During the execution phase of the project, time and cost may become more important and thentrade-offs will be made on scope. A more detailed discussion of trade-offs can be found inChapter 16.

When managing a project according to the triple constraints of time, cost, and scope, we perform a juggling act and often find a way to meet all three constraints, each of whichusually carries an equal degree of importance. When the number of constraints increases to five or six constraints, it may be difficult, if not impossible, to meet all of the constraintsand a prioritization of constraints may be necessary.

The prioritization of constraints can change over the life of the project based upon theneeds of the project manager, the client, and the stakeholders. Changing the priorities of theconstraints can lead to scope changes and play havoc with the requirements and baselines. There must be a valid reason for changing the prioritization of the constraints after project go-ahead.

2.0 CAUSES OF PROJECT FAILURE

There are numerous causes of project failure, whether a partial or complete failure, and most failures are a result of more than one cause. Some cause may directly or indirectly lead to other causes. For example, business case failure can lead to planning and execution failure. For simplicity sake, project failures can be broken down into the following categories:

Planning/execution failures:

- Business case deterioration
- Business case requirements changed significantly over the life of the project
- Technical obsolescence has occurred
- Technologically unrealistic requirements
- Lack of a clear vision
- Plan asks for too much in too little time
- Poor estimates, especially financial
- Unclear or unrealistic expectations
- Assumptions, if they exist at all, are unrealistic
- Plans are based upon insufficient data
- No systemization of the planning process
- Planning is performed by a planning group
- Inadequate or incomplete requirements
- Lack of resources
- Assigned resources lack experience or the necessary skills
- Resources lack focus or motivation
- Staffing requirements are not fully known
- Constantly changing resources
- Poor overall project planning

- Established milestones are not measurable
- Established milestones are too far apart
- The environmental factors have changes causing outdated scope
- Missed deadlines and no recovery plan
- Budgets are exceeded and out of control
- Lack of replanning on a regular basis
- Lack of attention provided to the human and organizational aspects of the project
- Project estimates are best guesses and not based upon history or standards
- Not enough time provided for estimating
- No one knows the exact major milestone dates or due dates for reporting
- Team members working with conflicting requirements
- People are shuffled in and out of the project with little regard for the schedule
- Poor or fragmented cost control
- Weak project and stakeholder communications
- Poor assessment of risks if done at all
- Wrong type of contract
- Poor project management; team members possess a poor understanding of projectmanagement, especially virtual team members
- Technical objectives are more important than business objectives
- Assigning critically skilled workers, including the project manager, on a part-timebasis
- Poor performance tracking metrics
- Poor risk management practices
- Insufficient organizational process assets

Governance/stakeholder failures:

- End-use stakeholders not involved throughout the project
- Minimal or no stakeholder backing; lack of ownership
- New executive team in place with different visions and goals
- Constantly changing stakeholders
- Corporate goals and/or vision not understood at the lower organizational levels

- Unclear stakeholder requirements
- Passive user stakeholder involvement after handoff
- Each stakeholder uses different organizational process assets, which may beincompatible with each other
- Weak project and stakeholder communications
- Inability of stakeholders to come to an agreement

Political failures:

- New elections resulting in a change of power
- Changes in the host country's fiscal policy, procurement policy and labor policy
- Nationalization or unlawful seizure of project assets and/or intellectual property
- Civil unrest resulting from a coup, acts of terrorism, kidnapping, ransom, assassinations, civil war and insurrection
- Significant inflation rate changes resulting in unfavorable monetary conversionpolicies
- Contractual failure such as license cancellation and payment failure

Failures can also be industry-specific such as IT failure or construction failure. Somefailures can be corrected while other failures can lead to bankruptcy.

2.1 DEGREES OF SUCCESS AND FAILURE

Projects get terminated for one of two basic reasons; project success or project failure. Project success is considered as a natural cause for termination and is achieved when we meetthe success criteria established at the onset of the project. Project failure is often the resultof unnatural causes such as a sudden change in the business base, loss of critical resources,or inability to meet certain critical constraints. Previously we listed the numerous reasons why a project can get terminated. Canceling a project is a critical business decision and can have a serious impact on people, processes, materials, and money within the company.Depending on when it's canceled, it can also impact customer and partner relationships.

In an ideal situation, the business case for a project would contain a section identifyingthe criteria for success and also for termination. Identifying a cancellation criteria is important because too many times a project that should be cancelled on just linger on and wastesprecious resources that could be assigned to other more value-driven projects.

There are degrees of project success and failure. For example, a project can come in two weeks late and still be considered as a success. A project over budget by $100,000 canalso be considered as a success if the end results provide value to the client and the client accepts the deliverables. Projects can also be partial successes and partial failures. One possible way of classifying project results can be:

- *Complete success*: The project met the success criteria, value was created and allconstraints were adhered to.

- *Partial success*: The project met the success criteria, the client accepted the deliverables and value was created, although one or more of the success constraints were not met.
- *Partial failure*: The project was not completed as expected and may have been canceled early on in the life cycle. However, knowledge and/or intellectual propertywas created that may be used on future projects.
- *Complete failure*: The project was abandoned and nothing was learned from the project.

In the future, we can expect to have more than three constraints on our projects. It is important to understand that it may not be possible to meet all of the competing constraintsand therefore partial success may become the norm.

THE DISTINGUISHING CHARACTERISTICSOF THE PUBLIC SECTOR

Before embarking on a study of public-sector project management, in-cluding its unique characteristics, we should first identify how the public sector differs from the private sector. More differences exist between private-sector organizations and public-sector organizations than just their approach to earning and distributing revenue.

Of course, there are differences among public-sector agencies as well. Some public-sector organizations can be defined as public enterprises that are charged with the provision of services on a self-supporting basis. Theseinclude municipal utilities that provide water, wastewater, sewer, and other services. Other public-sector organizations can arguably be de- scribed as only quasi-public. Examples of these organizations are state- supported universities, which receive an increasingly lower percentage oftheir operating funds from the states they are in.

Some public-sector organizations provide direct services to the public, although those services are increasingly being outsourced as well. A goodexample is the provision of mental health services by state institutions. Until the 1970s, state institutions were one of the primary modes of service provision to people with mental illnesses or mental retardation. Since then, those institutions have largely been closed, and service provision has moved to private hospitals.

Other public-sector agencies set standards for the industries or perform economic regulation. Public service commissions at the federal and state levels set rates for gas, electricity, and telecommunications providers. In the past decade, some of those services have been deregulated, and market mechanisms are allowed to set rates. Nonetheless, public service commis-sions still retain general oversight of the quality of services and the maintenance of effective markets.

Some public-sector organizations are also responsible for ensuring that other agencies comply with the myriad of laws, rules, and processrequirements that have been levied on public-sector agencies. Those organizations exercise formal and informal supervision of other agencies and may set requirements for agency operations. Budget agencies not only prepare the budget for the jurisdiction (e.g., the city, the state, thenation) but also are responsible for ensuring that the agencies comply with budget requirements and conform to appropriated limits. These agencies create or enforce many of the constraints that impact public- sector projects.

Despite this array of types of public-sector organizations, they havesome shared characteristics, particularly with regard to the management of their projects. Descriptions of those shared characteristics follow.

The Public-Service Purpose

Although they sometimes provide services to distinct populations (like issuing hunting and fishing licenses), all public-sector organizations operate to serve the larger public. That service to the public complicates the management of public agencies and public-sector projects, because it makes identifying objectives much more complex. Not only do a variety of opinions attend the best way to serve that public, but the public itselfis difficult to define. For example, what is the goal of a public-sector program designed to revitalize neighborhoods? And who is the public to be served by that program? Is the goal of the program to encourage new investment and development in the neighborhood, which might draw new residents to the neighborhood and consequently drive out current low-income residents? Or is the goal to make housing affordable to current residents? The answers to those tough questions are not withoutcontroversy and can substantially impact the direction of the program and the projects within it.

In general, public-sector agencies lack the simple measures of performance, like return

on investment (ROI), that private-sector organizationsenjoy. Although simple project outcomes, like on-budget performance and timeliness, can be measured, larger outcomes, like the impact on publicwelfare, are more difficult to measure.

THE CHALLENGES OF PUBLIC-SECTORPROJECT MANAGEMENT

Private-sector project managers like to assume that their work is moredemanding than projects in the public sector. They assume that their projects are more complex, subject to tougher management oversight, andmandated to move at faster speeds. Although private-sector projects can be tough, in many cases, it is easier to accomplish results in the privatesector than in the public sector.

Public-sector projects can be more difficult than many private-sector projects because they:

- Operate in an environment of often-conflicting goals and outcomes
- Involve many layers of stakeholders with varied interests
- Must placate political interests and operate under media scrutiny
- Are allowed little tolerance for failure
- Operate in organizations that often have a difficult time identifyingoutcome measures and missions
- Are required to be performed under constraints imposed by admin-istrative rules and often-cumbersome policies and processes that can delay projects and consume project resources
- Require the cooperation and performance of agencies outside of the project team for purchasing, hiring, and other functions
- Must make do with existing staff resources more often than private- sector projects because of civil-service protections and hiring systems
- Are performed in organizations that may not be comfortable or usedto directed action and project success
- Are performed in an environment that may include political adversaries

If these challenges were not tough enough, because of their ability to push the burden of paying for projects to future generations, public-sectorprojects have a reach deep into the future.[1] That introduces the challengesof serving the needs of stakeholders who are not yet ‘‘at the table’’ andwhose interests might be difficult to identify. Some also cite the relative lack of project management maturity in public organizations as a challenge of public-sector projects.

In addition to these complications, public projects are often more complex than those in the private sector. For some projects, the outcome can be defined at the beginning of the project. Construction projects are one example. For other projects, the desired outcome can only be defined as the project progresses. Examples of those are organizational change projects and complex information technology projects. Although the first type of project can be difficult and require detailed planning and implementation, the second type, those whose outcomes are determinedover the course of the project, are regarded as more challenging. They require more interaction with stakeholders and more openness to factors outside of the control of the project team.

Because of the multiple stakeholders involved in public-sector projects,the types of projects the public sector engages in, and the difficulty of identifying measurable outcomes in the public sector, more public-sector projects are likely to be of the latter variety and more difficult. Project complexity and tools for managing complexity and chaos will be discussedlater in this book.

As a result of the distinguishing characteristics of public-sector orga- nizations, public-sector projects require the management, not only of the project team, but of an entire community. Little is accomplished in thepublic sector by lone individuals or even by teams working in isolation. Instead, public-sector projects engage broad groups of stakeholders who not only have a stake in the project but also have a voice

and an opportunity to influence outcomes. In public-sector projects, even thoughthe project manager may be ultimately accountable, governance of the project and credit for successes must be shared.

The good news for public-sector project managers is that the community of stakeholders, which may seem to be a burden, can also be an opportunity and a source of resources and support. Many of those stake-holders stand ready to provide help to the project manager as he or sheattempts to navigate the constraints affecting the project. Others can beenlisted to support the project, and their authority can make the difference between project success and failure.

THE COMING STORM

In addition to the existing challenges of public-sector projects listed previously, some factors will place soon more stress on public-sector organizations and demand even more emphasis on solid project management. Some of the emerging challenges for public-sector organi-zations will include:

- Modest or stagnant economic growth
- Globalization and the loss of the industrial revenue base and, increasingly, the service-sector revenue base
- A decline in real wages and pressures for tax reform
- Private-sector practices that pass the corporate safety net back to individuals, who may then look to government for such essential security mechanisms as health coverage
- Difficulty in passing on the need for government revenue to tax- payers and a general loss of confidence in government
- Structural limitations on revenue generation, such as Proposition13 and property tax indexing
- The redirection of scarce public revenues to homeland security anddefense without the imposition of war taxes
- The erosion of public-sector income as entitlement programs drainrevenues in response to an aging population
- An age imbalance, with fewer workers in the workforce to support anexpanding number of retirees and children
- Longer life expectancy, which further burdens entitlement andhealth programs
- Increasing costs of health care well beyond the level of inflation
- Long-delayed investments in our national infrastructure, includingroads, bridges, and water systems

In combination, these factors constitute a looming storm that will require us to question our assumptions about government operations and services. Doing far more with much less will require new thinking about how government performs its work. It will require more innovation than the development of new services. It will take radical rethinking of what government does and how it goes about getting it done. It will take recognition that the temporary budget reductions required in these tough financial times for government are, in fact, permanent.

Private-sector organizations have already experienced similar stressors, in response to economic concerns and a chaotic environment. Those private-sector organizations are focused on the demands of the competitive market, which requires lean, fast-moving structures and cost reductions. Free flows of capital and the demands for measurable financial performance in the short term, consumer choices, universally available electronic communications, and worldwide labor and capital markets have changed the economic climate for companies. As a result, most private-sector organizations are adopting a short-term planning horizon, embracing the need to shift asset risk to others, and recognizing the need to maintain lean organizational

infrastructures.
As private-sector organizations move toward these highly competitive models of operations, they are moving away from traditional operating models. That movement is reflected in the end of the lifetime employment guarantee, reduced employee benefits, and the use of temporary staff and vendors instead of long-term employees. Similarly, highly competitive private-sector organizations are attempting to reduce theirreliance on careful processes and procedures. Instead, they are pushingresponsibility for decision making to staff at the interface betweenthe organization and the customer.
Newspapers are full of evidence of private-sector organizational transitions. Some of that evidence in the media includes:

- The movement of manufacturing to Central America, Asia, and now Eastern Europe
- Announced layoffs in all industries
- The creation of two-tiered employment strategies (maintenance ofpay and benefits for existing employees but lower pay and benefitsfor new ones)
- The shifting of health-care costs to employees
- Outsourcing administrative functions like IT, accounting, and human resources

These changes have created a set of new organizational strategies, which include:

- Outsourcing
- Cost cutting and downsizing
- The creation of organizations that operate with minimal fixed assets and shifting partnerships with others to exploit network models oforganization

The end of the lifetime employment social contract

- The termination of company-provided benefits and shifting risk backto individuals
- The greater use of temporary and part-time employees

In short, life in the private sector has become less collaborative and more competitive and less controlled and more chaotic. Ask almost any worker in a modern U.S. private-sector organization, and they can tell thesame story in vivid detail.
As noted, many of the same pressures that have driven private-sector organizations to adopt the listed strategies will soon impact government and the public sector. Agencies will need to compete for ever-decreasing amounts of revenue, governments will try to create lean government as a means of competing with other jurisdictions for jobs, and demands on government will increase as the social safety net erodes. In short, public-sector organizations will need to adopt some of the same strategies that private-sector organizations have already made as those public-sector organizations face increasing resource constraints and new demands for services. Those changes will be difficult for the public sector.
For decades, public-sector organizations have emphasized organizational models that value stable processes and an aversion to risk. In addition, public-sector compensation systems have valued longevity, and retirement systems have provided great benefits in the future in return for less compensation in the short run. As a result, public-sector organizations have not been structured to be flexible and innovative, two requirements of organizations in the new economy. Whether government agencies want to make the transitions demanded by the coming economic storm, environmental conditions are certain to push them there.

NEW TOOLS FOR PUBLIC-SECTOR MANAGERSIN THE NEW ECONOMY

As public-sector agencies make the necessary transitions to cope with thedemands of the new economy and the impact of the factors described earlier, public-sector managers at all levels of government will face an array of daunting challenges. Some of those are:

- Motivating employees who are coping with increasing demands butless pay and security
- Dealing with a multigenerational workplace (According to some observers, there is a wider age range among employees in the work-place now than at any time in history.)
- Managing for short-term results with limited resources
- Managing employees who are not in the same geographic location
- Managing vendors who may be performing critical organizationalfunctions
- Building organizational loyalty without the trade-off of a guaranteeof long-term employment
- Managing in an environment of constant change
- Coping with the unique constraints of public-sector organizations, which include political systems, organizational stovepipes, and limited technology
- Coping with the loss of organizational knowledge as the baby boomgeneration retires

WHY DO PUBLIC-SECTOR PROJECTS FAIL?

Project-sector projects fail for all of the normal reasons that any project fails. Projects in all sectors of the economy fail because they:

- Fail to identify the needs of customers or users of the product or theproject
- Create overly optimistic schedules and fail to anticipate the impactof late deliverables
- Do not get the resources necessary to complete the project
- Do not devote enough time to project planning
- Are subject to changing management priorities
- Employ technology that does not work as expected
- Do not get good performance from vendors
- Get overwhelmed by competing projects and do not apply solidproject prioritization
- Do not adequately identify, analyze, and address project risks
- Make assumptions that are not validated and agreed to
- Dissolve in the face of conflict among stakeholders
- Get overtaken by unexpected events (More will be said in Chapter 14about the challenges of managing uncertainty and chaos.)
- Do not apply solid and repeatable project management methods
- Do not have the benefit of an experienced project manager
- Do not engage and involve stakeholders throughout the project
- Do not identify lessons learned from prior projects
- Define an overly broad project scope that cannot be well-defined

In addition, public-sector projects can fail for a set of reasons related tothe unique character of public-sector projects. In that regard, they:

- Run afoul of political processes

- Lack the necessary resources because of requirements to use existingstaff rather than to contract for the right expertise
- Are constrained by civil-service rules that limit assignment of activi-ties to project staff
- Lose budget authorization
- Lose support at the change of administration due to electoral cycles
- Are overwhelmed by administrative rules and required processes for purchasing and hiring
- Fail to satisfy oversight agencies
- Adopt overly conservative approaches due to the contentious nature of the project environment
- Are victimized by suboptimal vendors who have been selected by purchasing processes that are overly focused on costs or that can be influenced by factors that are not relevant to performance
- Are compromised by the bias of public-sector managers and staff toward compliance over performance
- Fail to identify project goals given the wide array of project stake- holders in the public sector and the challenges of identifying public-sector goals and metrics for success

If this all sounds daunting, it should. Doing projects right in the public sector requires more than knowledge of project management methods. It requires creativity, communications, organization, conflict management, and hard work. It requires management of the unique constraints im- posed by public-sector organizations, which will be discussed at length later As projects get more complex and as the number of people impactedby the projects grows, those projects will become even more challenging.Fortunately, there is hope.

THE CRITICAL SUCCESS FACTORS FORPUBLIC-SECTOR PROJECTS

Best practices can increase the probability of project success. Somegeneral project critical success factors for public-sector projects include:

- A project management methodology built specifically for the needs of the projects of the organization that is scalable based on projectrisk
- An interactive dialogue among stakeholders that continues through- out the process
- A detailed process for identifying user and supplementary requirements
- Management support of the project management process
- Capable project managers with both hard and soft skills who havethe ability to:
  - Envision the project as a community endeavor and enlist a broadgroup in problem resolution
  - Share credit for success
  - Manage complex processes that may be required by law or administrative rule
  - Respond quickly and positively to adversity, which is a constant ofpublic-sector projects
  - Manage conflict among stakeholders and to recognize the interestsof even those who might oppose the project
  - Deal with the press when necessary

In later chapters, best practices for management of each of the project management knowledge areas will be identified.

THE NECESSARY SKILLS FOR PUBLIC-SECTORPROJECT MANAGERS

Project managers in either the private sector or the public sector require abroad array of skills in order to manage their projects in complex businessenvironments. Some of those skill sets include:

- Hard skills, like scheduling, budgeting, performance management,and quality control
- Soft skills, like team building, conflict management, negotiations,motivating team members, and managing stakeholder expectations

Project managers in the public sector, however, require a more sophis-ticated skill set that also includes:

- Understanding of government processes
- Political awareness and sensitivity (Though project managers in the private sector are required to understand organizational politics, they do not operate in an environment that so frequently contains adirect opposition party that measures its success and ability to getelected, in part, based on the failure of the party in power.)
- Managing employees without the ability to provide the types of incentives (and disincentives) available to the public sector
- Operating among a vast array of stakeholders, including the public, administration officials, and legislatures
- Understanding the press and operating in an environment of high visibility with little organizational tolerance for failure and mediaready to exploit that failure
- Managing conflict with internal and external stakeholders to an extent beyond that required of private-sector project managers

As a result, public-sector project managers have to be more adept at managing the context of the project and its environment than mostprivate-sector project managers. They have to have the ability to focus on the project and its internal management *and* the external environ- ment, which may be hostile to the project. (Remember that only the publicsector has built-in opposition in the form of the ''other'' party.)

As noted earlier, public-sector project managers need to develop the habit of sharing successes and not placing blame for failures. They need tobe able to work with disparate groups, maintain their perspective and a

sense of humor, recover quickly from adversity, manage conflict, and be relentless in their pursuit of successful projects but diplomatic and sensitive to the needs of others.

Unfortunately, these skill sets are more difficult to transfer than the more concrete project management skills. Later, some methods by which public-sector project managers can manage the complexity and chaos that can accompany public projects will be identified. Management of project uncertainty requires relentless communication and constant attention to and involvement of project stakeholders.

1.3 PUBLIC-SECTOR PROJECT MANAGEMENT

For several decades, public-sector projects were managed by contractors whose primary objective was a profit motive. Many times, contractors would make trade-offs and accompanying decisions just to support the profit motive. At the end of the project, the contractor would provide the public-sector agency with a deliverable, but the contractor would walk away with the project management best practices and lessons learned.

Today, public-sector agencies are requesting the contractor to share with them all project management intellectual property accumulated during the course of the project. Also,more agencies are becoming experienced in project management to the point where the projects are managed with internal personnel rather than contractors.

As more and more government agencies adopt the project management approach, wediscover that public-sector projects can be more complex than private-sector projects and more difficult to manage.

THE CHALLENGES OF PUBLIC-SECTOR PROJECT MANAGEMENT

Private-sector project managers like to assume that their work is more demanding thanprojects in the public sector. They assume that their projects are more complex, subject to tougher management oversight, and mandated to move at faster speeds. Although private-sector projects can be tough, in many cases, it is easier to accomplish results inthe private sector than in the public sector.

Public-sector projects can be more difficult than many private-sector projects because they:

- Operate in an environment of often-conflicting goals and outcome
- Involve many layers of stakeholders with varied interests
- Must placate political interests and operate under media scrutiny
- Are allowed little tolerance for failure
- Operate in organizations that often have a difficult time identifying outcome measures and missions
- Are required to be performed under constraints imposed by administrative rules and often-cumbersome policies and processes that can delay projects and consume project resources
- Require the cooperation and performance of agencies outside of the project team for purchasing, hiring, and other functions
- Must make do with existing staff resources more often than private-sector projects because of civil-service protections and hiring systems
- Are performed in organizations that may not be comfortable or used to directed action and project success
- Are performed in an environment that may include political adversaries

If these challenges were not tough enough, because of their ability to push the burden of paying

for projects to future generations, public-sector projects have a reach deep into the future.[1] That introduces the challenges of serving the needs of stakeholders who are not yet "at the table" and whose interests might be difficult to identify. Some also cite the relative lack of project management maturity in public organizations as a challenge of public-sector projects.

In addition to these complications, public projects are often more complex than those in the private sector. For some projects, the outcome can be defined at the beginning of the project. Construction projects are one example. For other projects, the desired outcome can only be defined as the project progresses. Examples of those are organizational change projects and complex information technology projects. Although the first type of project can be difficult and require detailed planning and implementation, the second type, those whose outcomes are determined over the course of the project, are regarded as more challenging. They require more interaction with stakeholders and more openness to factors outside of the control of the project team.

Because of the multiple stakeholders involved in public-sector projects, the types of projects the public sector engages in, and the difficulty of identifying measurable outcomes in the public sector, more public-sector projects are likely to be of the latter variety and more difficult. As a result of the distinguishing characteristics of public- sector organizations, public-sector projects require the management not only of the project team but of an entire community. Little is accomplished in the public sector by lone individuals or even by teams working in isolation. Instead, public-sector projects engage broad groups of stakeholders who not only have a stake in the project but also have a voice and an opportunity to influence outcomes. In public-sector projects, even though the project manager may be ultimately accountable, governance of the project and credit for successes must be shared.

The good news for public-sector project managers is that the community of stake-holders, which may seem to be a burden, can also be an opportunity and a source of resources and support. Many of those stakeholders stand ready to provide help to the project manager as he or she attempts to navigate the constraints affecting the project. Others can be enlisted to support the project, and their authority can make the difference between project success and failure.

THE COMING STORM

In addition to the existing challenges of public-sector projects listed previously, some factors will place soon more stress on public-sector organizations and demand even more emphasis on solid project management. Some of the emerging challenges for public-sector organizations will include:

- Modest or stagnant economic growth
- Globalization and the loss of the industrial revenue base and, increasingly, the service-sector revenue base
- A decline in real wages and pressures for tax reform

- Private-sector practices that pass the corporate safety net back to individuals, who may then look to government for such essential security mechanisms as health coverage
- Difficulty in passing on the need for government revenue to taxpayers and a general loss of confidence in government
- Structural limitations on revenue generation, such as Proposition 13 and property tax indexing
- The redirection of scarce public revenues to homeland security and defense without the imposition of war taxes
- The erosion of public-sector income as entitlement programs drain revenues in response to an aging population
- An age imbalance, with fewer workers in the workforce to support an expanding number of retirees and children
- Longer life expectancy, which further burdens entitlement and health programs
- Increasing costs of health care well beyond the level of inflation
- Long-delayed investments in our national infrastructure, including roads, bridges and water systems

In combination, these factors constitute a looming storm that will require us to question our assumptions about government operations and services. Doing far more with much less will require new thinking about how government performs its work. It will require more innovation than the development of new services. It will take radical rethinking of what government does and how it goes about getting it done.

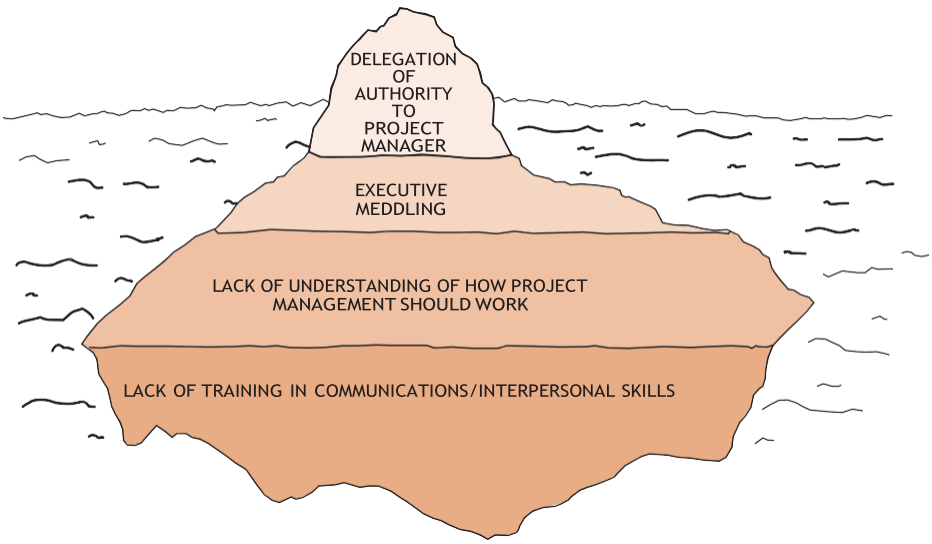
WHY DO PUBLIC-SECTOR PROJECTS FAIL?

Public-sector projects can fail for a set of reasons related to the unique character of public-sector projects. In that regard, they:

- Run afoul of political processes
- Lack the necessary resources because of requirements to use existing staff rather than to contract for the right expertise
- Are constrained by civil-service rules that limit assignment of activities to project staff
- Lose budget authorization
- Lose support at the change of administration due to electoral cycles
- Are overwhelmed by administrative rules and required processes for purchasing and hiring

- Fail to satisfy oversight agencies
- Adopt overly conservative approaches due to the contentious nature of the project environment
- Are victimized by suboptimal vendors who have been selected by purchasing processes that are overly focused on costs or that can be influenced by factors that are not relevant to performance
- Are compromised by the bias of public-sector managers and staff toward compliance over performance
- Fail to identify project goals given the wide array of project stakeholders in the public sector and the challenges of identifying public-sector goals and metrics for success

Figure below shows the tip-of-the-iceberg syndrome, which can occur in all types of organizations but is most common in non–project-driven organizations. On the surface, all we see is a lack of authority for the project manager. But beneath the surface we see the causes: there is excessive meddling due to lack of understanding of project management, which, in turn, resulted from an inability to recognize the need for proper training.



PUBLIC-SECTOR PROJECT MANAGEMENT
MEETING THE CHALLENGES AND ACHIEVING RESULTS

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This book is dedicated to Ellen and Katherine, two people who make a difference in the world, and to those who serve the public interest. There is no higher calling.

Contents

Preface

What do the Great Pyramid of Giza and the Marshall Plan have in common? Both are examples of public-sector projects that had—as do many public-sector projects—an impact on their societies. The Great Pyramid of Giza took 20 years to complete, involved up to 200,000 salaried workers, was constructed to an accuracy of .05 percent, and for 3,800 years was the tallest man-made structure in the world. The Marshall Plan was created in 1947 to rebuild Western Europe after World War II. In its four years of operation, it distributed $13 billion in economic and technical assistance. By the time the Plan was terminated, the economies of every participating nation, except Germany, had grown to prewar levels.

Not every public project impacts society in the same way that these two projects did. But every public project has the capability to improve the lives of citizens or the effectiveness and efficiency of government. Those who manage public-sector projects participate in a proud tradition of projects that created results for society.

Managing projects is always a challenge, especially when those projects involve multiple stakeholders, new or unproven technology, shifting or unclear project requirements, and constrained resources. Those project challenges multiply in the public sector, which depends on successful projects to make the changes necessary to cope with a fast-changing world.

Compounding the challenges of public-sector projects is the shortage of good project managers in the public sector. As the public sector is increasingly challenged to do more with less, it will need the talents of thousands of solid project managers, something public-sector organizations are just now coming to grips with. At the national, regional, state, and local levels, governments are seeking ways to increase the number of project managers at their disposal and build the skills of those they have, so they can manage the complex projects on the public agenda. Other governments are outsourcing the management of projects to private-sector project

managers, who will need a deep understanding of public-sector processes and constraints.

That new economy that we hear so much about is the driving force behind the need for better project management. Government across the world is, in fact, facing a perfect storm of increasing demands for services with a decreasing ability to raise revenues. Today's public-sector managers will be required to compete in world markets that will demand much of them and provide them with fewer resources than they need. They will be forced to make their way in an economic environment that is much tougher than that of just a few years ago. The next chapter examines the ways private-sector organizations have tried to respond to this new and challenging environment in an attempt to gather clues as to how public-sector organizations can also thrive.

Project management is one of the best tools for those who work in government or with government and public-sector projects. Although project management is not a magic bullet for success, I would not want to attempt to survive in the new economy or try to deliver results in the public sector without that bullet in my gun. Solid project management skills will not guarantee that public-sector managers will accomplish great and wonderful things, but having those skills will increase the probability that they will.

OBJECTIVES

This book has been designed to address the particular and daunting challenges of managing public-sector projects and increasing project management skills in the public sector. It introduces project management methods and tools that have proven useful in both public-sector and private-sector organizations and identifies both the difficulties of public-sector projects and best practices for dealing with them.

Ultimately, this book is designed to enable public-sector project managers to guide the crucial dialogues necessary for successful projects. It is also intended to help them organize and inspire public organizations to take the actions necessary to create project deliverables that meet organizational needs. It provides those project managers with the hard and soft skills necessary for success in the public sector.

This book follows and attempts to be compliant with the project management methods established by the Project Management Institute (PMI®), the world's largest and most respected association of project

managers. It attempts to avoid conflicts with both *A Guide to the Project Management Body of Knowledge (PMBOK® Guide*—Fourth Edition) and the *Government Extension to the PMBOK® Guide Third Edition*, which is also a PMI publication.

This book is for public-sector project managers who want to optimize project outcomes and make a positive contribution to their agencies and organizations. It is for those who have worried about meeting a deadline for a project or getting the support of their stakeholders. It is for those who have wondered about whether they knew what was being requested of them by their managers or stakeholders. It is for those who did not get the results they wanted or who are concerned about new demands and challenges in a high-speed and very demanding environment.

This book is also for those private-sector project managers who are performing projects under contract with the public sector or whose projects interface with public-sector processes or programs. As those private-sector project managers attempt to achieve project results, they may become frustrated with the size of the community of project stakeholders that needs to be satisfied and with public organizations that seem to value rigorous attention to the many constraints that affect public-sector projects over the attainment of business objectives. As will be discussed later, that focus on constraints over results is simply the result of the inherent structure of public-sector programs, which find their roots in statutes, rules, and processes. That focus may also be the result of the fact that penalties for nonconformance outweigh the benefits of attaining results in most public-sector organizations.

No matter what the cause, public-sector projects must be managed differently than most private-sector projects and are subject to additional challenges. The good news, however, is that most public-sector employees are competent and want to achieve outcomes that benefit their organizations and the public. With an understanding of public processes and constraints, private-sector and public-sector project managers can optimize the outcomes of their government projects.

The skills that are embedded in modern project management are survival skills for the future that can be applied in virtually any endeavor. If those skills can be mastered, success will be more likely. In addition, project management skills can be taken from government into the private sector. In fact, one of the principles governing this book is that public projects are tough, and that, if you can manage them, you can manage any projects.

The objectives of this book are to:

- Increase the capability of public-sector managers and private-sector project managers working under government contracts to successfully manage projects
- Create recognition of the importance of good project management in the public sector
- Improve the work products created by public-sector project managers and increase stakeholder satisfaction
- Provide public-sector project management guidance that is consistent with project management best practices, many of which are articulated in the *PMBOK® Guide*—Fourth Edition
- Emphasize the role of planning in order to manage customer, manager, and project team expectations
- Link participants to the traditions of public service and public-sector projects that have had an impact on our world

In order to make participants aware of the long and illustrious history of public-sector project management, a case study of a public-sector project is presented in each chapter. In addition to discussion questions and exercises for each chapter, key public-sector project management terms are included in the glossary.

OUTLINE OF THE BOOK

This preface introduces the book and its goals. Chapter 1 explores the challenges of public-sector project management and the relevance of project management for public-sector managers. It examines the differences between the public sector and the private sector as those differences apply to projects and looks at the looming tsunami about to impact government and how private-sector organizations have coped with the changes that have affected them. It also explores the challenges of project management in the public sector.

Chapter 2 lays the foundations for a study of project management in the public sector. It introduces some of the critical definitions of project management and critical success factors for public-sector projects. It also explores project management maturity models and how they can be adapted to the public sector. Last, it discusses how scalable models of project management can be adapted for a variety of public-sector project

types. Chapter 2 begins to explain the need to address public-sector projects as broad communities of stakeholders that require as much management as the details of the project.

Chapter 3 identifies a framework for public-sector project management and details the specific processes, Process Groups, and Knowledge Areas necessary for effective public-sector project management. It identifies the necessary functions for public-sector project management and discusses how public-sector project managers can select the right project management processes for their projects based on the risks of their projects.

The next nine chapters examine the nine project management Knowledge Areas with a focus on identifying the challenges embedded in those knowledge areas for public-sector project management. Chapter 4 begins an examination of those project management knowledge areas with a look at project integration. It examines the functions necessary for integrating the various aspects of the project and creating the project plan. It also examines the management and monitoring of project work in public-sector projects. And it focuses some attention on the initiation of the project, including the creation of the project charter, the principle document necessary for good public-sector project initiation.

Chapter 5 addresses the critical importance of managing project scope and the necessary processes for it in public-sector projects, including the development of the work breakdown structure (WBS). It highlights the WBS as the centerpiece of project planning and the definition of the project's scope. It also addresses the challenges of managing project scope in the public sector.

Chapter 6 describes methods for creating and managing the project schedule. It focuses attention on the creation of the project network diagram and the identification of the critical path. It describes and applies methods for project duration compression and the special challenges of managing the schedule for public-sector projects, in which elements of the project that take considerable amounts of time may be outside the control of the project team.

Chapter 7 describes the role of project cost management, a function that is too often overlooked in public-sector projects. It examines the techniques for estimating and managing the resources and costs of the project and identifies the challenges of public-sector project cost management. It identifies methods for project selection and prioritization and builds a model for prioritizing public-sector projects. It also describes and applies

earned-value management as a tool for integrating schedule, cost, and performance data.

Identifying and managing project quality in public-sector projects is the focus of Chapter 8. It examines methods and tools for identifying and managing quality criteria for public-sector projects. It introduces the requirements cycle and the attributes of good requirements as it explores meeting customer requirements as a definition of project quality for public-sector projects. It also describes the importance of compliance with applicable rules and laws as an indicator of public-sector project success.

Chapter 9 is devoted to a discussion of managing project human resources. It examines ways to build and nurture a project team within the constraints of the public sector. It also examines methods for managing public-sector project teams and methods for effectively managing project conflict. Last, it looks at the leadership role of the project manager as he or she attempts to inspire the project team.

Chapter 10 examines the critical role of project communications, arguably the most important role of the project manager. It identifies strategies to determine the communications needs of stakeholders and builds a plan to satisfy those needs. Last, it addresses the emerging need for project managers and other agency managers to adopt strategies to prevent the loss of organizational knowledge as the baby boom generation leaves the workplace and as workforces are downsized.

Chapter 11 addresses the management of project risks. It examines the unique risks of public-sector projects and the tools for project risk management in those projects. It shows how to build a risk register for a public project that contains identified risks, the results of risk analysis, risk-response plans, secondary risks, risk owners, residual risks, and risk triggers. It also looks at the management of the project constraints that affect public-sector projects and identifies a new tool, the constraint management plan, which can be useful for public-sector projects.

Chapter 12 discusses public-sector project procurement and vendor management. It begins with an examination of the project procurement management techniques, which are becoming more critical as public-sector organizations increase their utilization of outsourcing as a means of reducing costs. It examines the specific procurement constraints imposed on public-sector projects. Last, it identifies best practices for managing outcomes and vendors, including the creation of good service-level agreements and statements of work for vendors.

Chapter 13 introduces the role of complexity and chaos in public-sector projects, which tend to be more complex than many of their private-sector counterparts. It identifies and applies a special set of supplementary tools for the management of chaos and complexity in projects. Although good project planning is intended to reduce the complexity of the project environment, in many public-sector projects, outside factors introduce high levels of complexity. This chapter describes and applies three tools for managing those influences.

Embedded in this book is my deeply held appreciation for the work of public-sector employees, who strive in the face of nearly overwhelming constraints to do their best and to serve the public. We have come through a painful period during which public servants were labeled as a problem to be solved rather than as an asset to be fostered. In truth, we have always depended on the efforts of public servants to create and maintain an orderly and just society. As we charge into this new millennium and this new economy, we will need them more than ever before.

The Great Pyramid of Giza

Although a lot of public-sector projects create dramatic results, not every public project creates one of the Seven Wonders of the Ancient World. One that did was the Great Pyramid of Giza.

When the Egyptian pharaoh Khufu decided to create a burial tomb for himself and his close family, he went big. The Great Pyramid we see today is only a small part of the entire structure, which included two temples, three smaller pyramids for Khufu's wives, a raised causeway, and a set of small tombs for nobles. When it was finished, the Great Pyramid became the tallest structure in the world and held that title for nearly 4,000 years until the construction of the Eiffel Tower. What we see today is smaller than the original because the casing stones have fallen off and been moved away from the site. It was composed of 2,500,000 limestone blocks, each weighing between two and 70 tons.

The project team consisted of between 100,000 and 200,000 men, who had to be housed, fed, clothed, paid, coordinated, and managed. Given the length of the project and the hazards of construction, some of those workers had to be buried, and a cemetery for workers has been found. The chief architect (and probably project manager) was

Khufu's vizier, Hemon. There is no record of his earning his PMP. Debate continues as to the construction techniques applied, though they were probably innovative and comparable to the use of new technology today. The project was completed in 20 years, a short time given the size of the Great Pyramid and the daunting tasks that had to be performed.

In addition to the sheer size of the project, it was built to exacting quality standards. Some estimates conclude that construction accuracy was within .05 percent of the plan, which is astounding given the size of the endeavor and the crude tools available. It was also aligned to the four points of the compass, a feat that was regarded as being beyond the capability of the technology available at the time.

Functional requirements were also demanding. The project had to meet the needs of a demanding pharaoh and his family as they made their transition into the afterlife, which required a complex set of internal chambers and passages, including ventilation shafts that maintain the interior temperature of the Pyramid at 68 degrees Fahrenheit. Not only did the structure have to be secure, but it had to be secure *forever* so that the bodies of the pharaoh and his family would never be disturbed. Unfortunately, the project did not adequately assess the ingenuity of thieves, who simply dug around sealed entrances and quickly disturbed the burial chambers.

With an ambitious design, innovative construction techniques, a dedication to meeting demanding quality standards, and the careful coordination of a gigantic project team, the project manager for this public project was able to create a marvel of engineering that has endured for centuries.

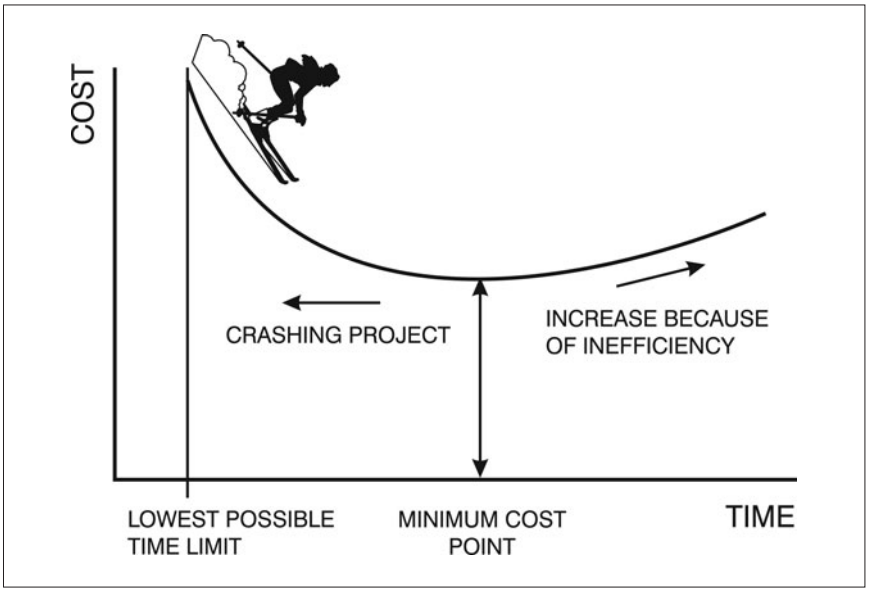
The Time-Cost Trade-Off

In today's "hurry-up" world, the heat is on to finish projects in record time. This is due in part to the pressures of competition, especially in developing products, software, or new services. If you take too long to get it done, the competition will get there first, and the first to market with a new product often captures 60 to 70 per-cent of the market, leaving the rest of the pack to pick up the scraps.Furthermore, there is pressure to reduce the cost to do the job.

Again, this is partly because costs continue to rise over time and also because if you can develop something faster and cheaper whileleaving the scope and performance constant, you can recover yourinvestment sooner and protect yourself from the dynamics of the marketplace.

Look now at the time-cost trade-off curve shown in Figure 1.3.Notice that there is some duration for a project in which costs are at a minimum. That is, there is an optimum duration. The problemis, we seldom know just what that duration is, but we aren't too concerned about it.

What is important is to note that going past that point (extending the duration) causes project costs to rise, because you are beinginefficient. You are taking too long to do the work.



To the left of the minimum cost point, we are trying to reducethe time needed for the job. The common term for this is that we aretrying to "crash" the project. That doesn't mean that we are trying to destroy it, but rather that we are trying to do it faster than the optimum time.

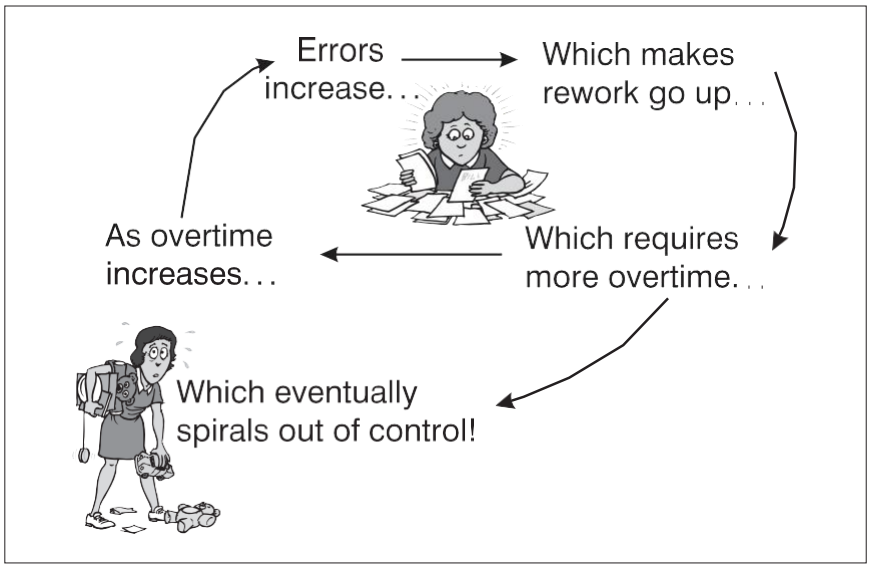
You can see that costs start to rise as you reduce time, and theyrise very steeply. This is because we usually speed up a project by assigning more resources to it. In common language, we "throw bodies at it."

The difficulty is that, as we throw more bodies at a project, theybegin to get in each other's way. The work can be subdivided onlyso far, and we hit what is called the point of diminishing returns. One way to think of this is that if one person can do something in 10 hours, two people won't be able to do the same job in 5 hours. Itmay take 6. And four people may take 4 hours. So we don't get a linear gain in time.

In addition, there is a lower limit below which you cannot go,no matter how many people you put on the job. I call this the "for-bidden zone." Naturally, there is always someone who thinks thatif you just put enough people on a project, you can get it done in almost zero time, but that is simply not true.

Further, there is a principle called Brooks's law, originally specified for software projects, that says, "Adding people to an already late project will just make it later." I believe that this principle applies to all kinds of projects—not just software. You can actually destroya project by adding people at the wrong time. This is shown in Figure 1.4. If you add some-one new to the project, that person

must be "brought up to speed."
That means that orientation and training are needed. Who is going to do the training?
You, most likely, but perhaps some other member of the team.No matter who does it, that person's productivity will drop. In orderto keep from delaying the job, that person will have to work overtime. In doing so, she will get tired, thus losing more ground. She will probably also make more errors, which means that she will have to correct them. This is called rework. As rework increases, shewill have to work more overtime to keep up, thus getting more tired,which causes more errors, which increases rework, *ad nauseum.*
In other words, the project is likely to spiral downward, out ofcontrol. The message is, be very careful about adding people to helpget the job done on time.



If You Always Do What You've Always Done

Now let's come back to the pressures that we feel to get the job done faster and cheaper at the same time. The time-cost trade-off curve shows that, if you are below the minimum point on the curve, crashing the proj-ect costs more money. Yet we are being told to reduce costs *and* time simultaneously! Are we being set up?

There is a saying in psychology, "If you always do what you've always done, you'll always get what you've always got."
And there is a corollary. "Insanity is continuing to do what you'vealways done and hopingfor a different result."
The message is that,if what you're doing isn't working, you have to change the way you're doing it. That is, you must change the *process.* In fact, that is what formal project management is all about.
Many of you have been managing projects for a long time in an informal way.
It is estimated that about one-third of the cost of doing many projects is rework. As someone has said, that is equivalent to havingone of every three people on the job working full time just to redo what the other two people did wrong in the first place. That means,of course, that the cost is extremely high.
Why all the rework?
I think it is safe to say that it is the result of taking a ready- fire-aim approach to the project. The job is ill conceived, poorly defined, and inadequately planned. Everyone just wants to "get thejob done."
It is said that haste makes waste. It is very true. But in our hurry-up-and-get-it-done world, there is little patience with "wasting time" on all that planning. So the result is rework, which is 100

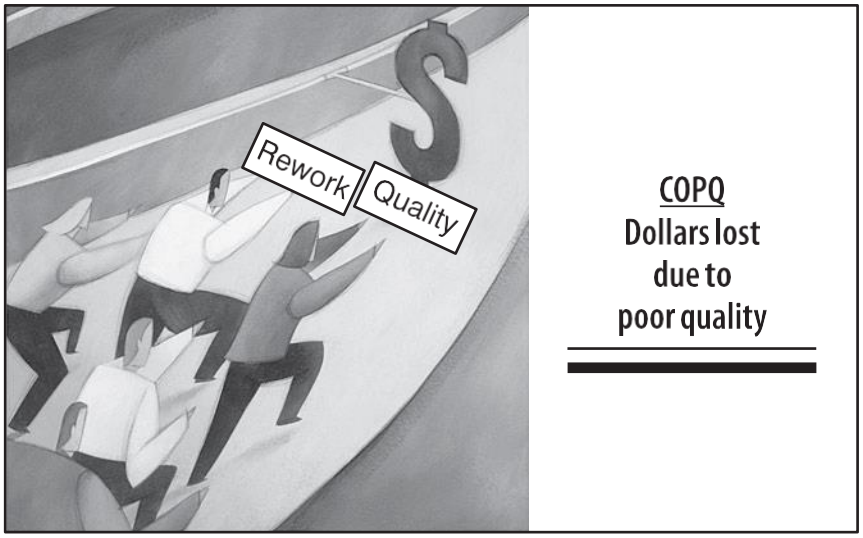
percent waste.
I would suggest that, if you find a way to measure it, you willfind that the rework in your projects ranges from 5 to 40 percent. AsI have heard Tom Peters say on a tape (I forget which one), this is a good-news, bad-news story. The bad news is that it can be so high.The good news is that there is lots of room for improvement!
The nice thing about measuring rework is that you can show progress fairly soon. If you try to do baseline comparisons, you often find that baseline data for previous projects does not exist. With rework, you simply plot trend graphs.

Quality

I have always considered this to be the forgotten aspect of projectmanagement. It has to do with the performance constraint. If the functional and technical requirements of the job are not met, you have done a poor-quality job. So, to some extent, performance is synonymous with quality.
If you put people under pressure to get the job done really fast,and you won't allow them to reduce the scope then you can almostbet that they will sacrifice quality in the process. Furthermore, as a former quality manager at ITT, I learned that if you improve quality, you get jobs done faster and cheaper, so in addition to improving processes, we must improve quality. In fact, the two go hand in hand.

In the past, quality has been defined in two primary ways. One was that quality was conformance to specifications. Another was that quality was meeting customer requirements. Of course, specifications should be written so that if you meet them, you meet customer requirements. Thus, the second definition could be said tobe the better of the two.
In the development of the Six Sigma approach to quality at Motorola, a new definition of quality was also developed. This definition says that *quality is a state in which value entitlement is realized for the customer and provider in every aspect of the business relationship*(Harry & Schroeder, 2000, p. 6). This new definition recognizes theprofit motive of every for-profit organization, whereas the old definitions focused only on the customer.
Harry and Schroeder say that most organizations are producing product and service quality levels of about three sigma. This refers to the number of errors that occur in a given number of opportunities. For 1,000,000 opportunities, a three sigma level willyield 66,807 errors. At six sigma, there will only be 3.4 errors in 1,000,000 opportunities!

They also say that a three sigma quality level means that of every sales dollar earned by the organization, approximately 25 to 30 percent (or 25 cents) is lost because of poor quality. This is called the cost of poor quality (COPQ). Most executives think that the COPQ isonly a few percent and are horrified to learn that it is this high.
That cost comes from three factors: prevention, appraisal, andfailure (PAF). Prevention is anything that we do to keep errors fromhappening in the first place. As an example of this, Alan Mulally, director of engineering at Boeing when the 777 airplane was beingdesigned (he is now CEO at Ford Motor Company), explains how toy company Fisher-Price makes the assembly of their model air-planes foolproof so that you can put them together with no hassle."Fisher-Price makes a little notch in their wheels so that you can only put the right wheel on the right hub and you can only put the left wheel on the left hub" (Sabbagh, 1996). This approach has been used by the Japanese in manufacturing processes for years.
Appraisal cost results from the inspection of a finished part tobe sure that no errors have been made. A basic given in quality is that you cannot inspect quality into a product—it must be designed in and built in to begin with. In fact, the work with Six Sigma pro- grams has shown that, "80 percent of quality problems are actually

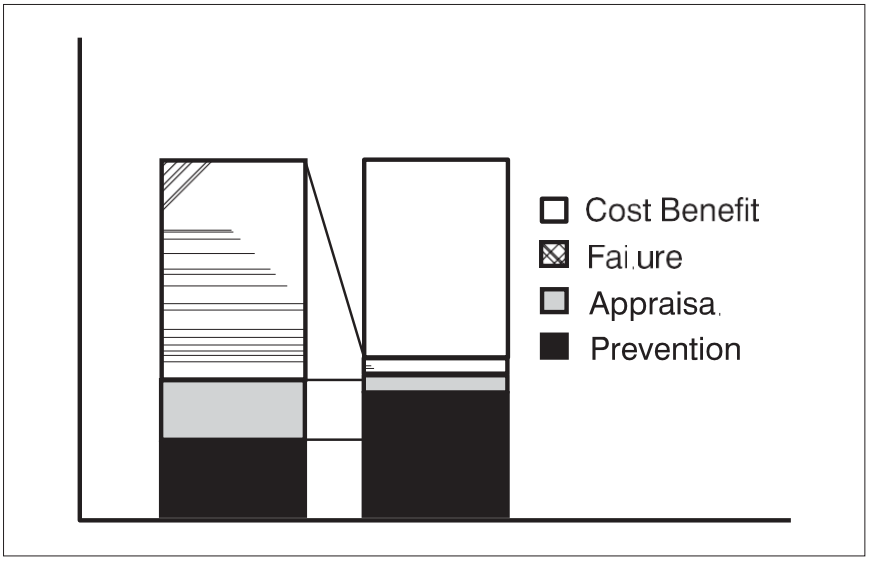


designed into the product without any conscious attempt to do so"(Harry & Schroeder, 2000, p. 36). When the problem is designed intothe product, you can't inspect it out.

Failure cost is incurred once the product leaves the plant and reaches the customer. It includes warranty costs, repair costs, and so on. And something that is almost impossible to track, but is a part of failure cost nonetheless, is lost customers.

The important thing to note is that an increase in the amountof money spent on prevention leads to significant reductions ininspection and failure costs. This is shown in Figure 1.6. Most of ourquality costs should go into prevention, so that we reap significantsavings in the other two areas. If you want to see how significantthese savings can be, I suggest that you read Harry and Schroeder.

As for projects, if you improve your processes so that quality is improved, then you will also reduce the time and cost of projectwork simultaneously. Again, this is because you eliminate rework,which adds no value to the project. Large gains can be made if moreattention is paid to quality improvement in projects. If you Improve quality, you can reduce cost.



Conflicts

7.0 INTRODUCTION

In discussing the project environment, we have purposely avoided discussion of what may be its single most important characteristic: conflicts. Opponents of project management assert that the major reason why many companies avoid changeover to a project management organizational structure is either fear or an inability to handle the resulting conflicts. Conflicts are a way of life in a project structure and can generally occur at any level in the organization, usually as a result of conflicting objectives.

The project manager has often been described as a conflict manager. In many organizations the project manager continually fights fires and crises evolving from conflicts, and delegates the day-to-day responsibility of running the project to the project team members. Although this is not the best situation, it cannot always be prevented, especially after organizational restructuring or the initiation of projects requiring new resources. The ability to handle conflicts requires an understanding of why they occur. Asking and answering these four questions may help handle and prevent conflicts.

What are the project objectives and are they in conflict with other projects?

- Why do conflicts occur?
- How do we resolve conflicts?
- Is there any type of analysis that could identify possible conflicts before they occur?

7.1 THE CONFLICT ENVIRONMENT

In the project environment, conflicts are inevitable. Conflicts occur because people on the project team may have different values, interests, feelings, and goals. Project managers that cannot resolve these conflicts in a timely manner are doomed to failure. Some conflicts can be resolved quickly while other conflicts may take much longer to resolve. In general, the fewer the number of people involved in the conflict, the less time is needed to resolve the issues. Determining the amount of time needed to resolve an issue is difficult. Resolving conflicts with direct reportees is easier than resolving conflicts with those team members that are still attached administratively to other functional managers.

There are several causes of conflicts. First, project managers have historically been brought on board the project after the business case has been prepared. As a result, the business case, schedule, cost, assumptions, and other constraints are imposed upon the project team. All of this happens well before a detailed project plan is prepared. Once the project plan is finally prepared, it is often the case that the deliverables cannot be achieved in a timely manner within the imposed requirements and constraints.

Second, companies often approve projects without any consideration being given to capacity planning and whether or not qualified resources will be available once the project begins. This is particularly true for companies that survive on competitive bidding. These companies may have no idea how many contracts they will win, if any. The result is usually a shortage of qualified resources.

Third, projects are often approved and added to the queue without knowing when the project will begin. High-level schedules are established from a go-ahead date rather than a calendar date and, once again, with little regard for available or qualified resources. Once the project officially begins, the qualifications or work habits of the assigned project team members may not fit the needs of the project. And, as expected, you are then told that these are the only resources that are available.

Fourth, your project must be accomplished without disrupting the ongoing business of your company and other projects being performed. If your project has a low priority, then you must expect that your most critical resources may be temporarily removed to put out fires elsewhere in the company. These conflicts are highly probable in non–project-driven companies.

Fifth, the type of organizational structure can create conflicts. As an example, line managers that perform in a matrix structure are under tremendous pressure to staff a multitude of projects possibly at the same time. A delay on one project could result is a late release of personnel needed to staff new projects about to begin.

Here, we described five common causes of conflicts that can occur as the project begins. There are also numerous other conflicts that can occur during project execution. Ginger Levin provides a good discussion of the types of conflicts that can exist in each life-cycle phase as well as ways to handle them.[1]

Good project managers understand that conflicts will happen and try to plan for their resolution.

1. G. Levin, *Interpersonal Skills for Portfolio, Program, and Project Managers* (Leesburg Pike, VA: Management Concepts, 2010), Chapter 8.

7.2 TYPES OF CONFLICTS

It is impossible to develop a list of all of the different types of conflicts that can exist on each and every project. All projects differ in size, scope, and complexity. The most common types of conflicts involve:

- Staffing resources
- Equipment and facilities
- Capital expenditures
- Costs
- Technical opinions and trade-offs
- Priorities
- Administrative procedures
- Scheduling
- Responsibilities
- Personality clashes

Each of these conflicts can vary in relative intensity over the life cycle of a project. However, project managers believe that the most frequently occurring conflicts are over schedules but the potentially damaging conflicts can occur over personality clashes. The relative intensity can vary as a function of:

- Getting closer to project constraints
- Having only two constraints instead of three (i.e., time and performance, but not cost)
- The project life cycle itself
- The person with whom the conflict occurs

Sometimes conflict is "meaningful" and produces beneficial results. These meaningful conflicts should be permitted to continue as long as project constraints are not violated and beneficial results are being received. An example of this is two technical specialists arguing that each has a better way of solving a problem, and each trying to find additional support-ing data for his hypothesis.

Conflicts can occur with anyone and over anything. Some people contend that personality conflicts are the most difficult to resolve.

Ideally, the project manager should report to someone high enough up to get timely assistance in resolving conflicts. Unfortunately, this is easier said than done. Therefore, project managers must plan for conflict resolution. As examples of this:

- The project manager might wish to concede on a low-intensity conflict if he knows that a high-intensity conflict is expected to occur at a later point in the project.
- Jones Construction Company has recently won a $120 million effort for a local company. The effort includes three separate construction projects, all beginning at the same time. Two of the projects are twenty-four months in duration, and the third is thirty-six months. Each project has its own project manager. When resource conflicts occur between the projects, the customer is usually called in.

- Richard is a department manager who must supply resources to four different projects. Although each project has an established priority, the project managers continually argue that departmental resources are not being allocated effectively. Richard now holds a monthly meeting with all four of the project managers and lets them determine how the resources should be allocated.

Many executives feel that the best way of resolving conflicts is by establishing priorities. This may be true as long as priorities are not continually shifted around.

The most common factors influencing the establishment of project priorities include:

- The technical risks in development
- The risks that the company will incur, financially or competitively
- The nearness of the delivery date and the urgency
- The penalties that can accompany late delivery dates
- The expected savings, profit increase, and return on investment
- The amount of influence that the customer possesses, possibly due to the size of the project
- The impact on other projects or product lines
- The impact on affiliated organizations

The ultimate responsibility for establishing priorities rests with top-level management. Yet even with priority establishment, conflicts still develop.

7.3 CONFLICT RESOLUTION

***PMBOK® Guide*, 6th Edition**
9.5.2.1 Interpersonal and Team Skills

Although each project within the company may be inherently different, the company may wish to have the resulting conflicts resolved in the same manner. The four most common methods are:

1. *The development of company-wide conflict resolution policies and procedures*. Many companies have attempted to develop company-wide policies and procedures for conflict resolution, but this method is often doomed to failure because each project and conflict is different. Furthermore, project managers, by virtue of their individuality, and sometimes differing amounts of authority and responsibility, prefer to resolve conflicts in their own fashion.
2. *The establishment of project conflict resolution procedures during the early planning activities*. One method that is often very effective is to "plan" for conflicts during the planning activities. This can be accomplished through the use of linear responsibility charts. Planning for conflict resolution is similar to the first method except that each project manager can develop his or her own policies, rules, and procedures.
3. *The use of hierarchical referral*. In theory, this appears as the best method because neither the project manager nor the functional manager will dominate. Under this arrangement, the project and functional managers agree that for a proper balance to exist

their common superior must resolve the conflict to protect the company's best interest. Unfortunately, this is not realistic because the common superior cannot be expected to continually resolve lower-level conflicts, and it gives the impression that the functional and project managers cannot resolve their own problems.

4. *The requirement of direct contact*. This is direct contact in which conflicting parties meet face to face and resolve their disagreement. Unfortunately, this method does not always work and, if continually stressed, can result in conditions where individuals will either suppress the identification of problems or develop new ones during confrontation.

Many conflicts can be either reduced or eliminated by constant communication of the project objectives to the team members. This continual repetition may prevent individuals from going too far in the wrong direction.

7.4 THE MANAGEMENT OF CONFLICTS

***PMBOK® Guide*, 6th Edition**
9.5.2.1 Interpersonal and Team Skills

Good project managers realize that conflicts are inevitable, but that good procedures or techniques can help resolve them. Once a conflict occurs, the project manager must:

- Study the problem and collect all available information
- Develop a situational approach or methodology
- Set the appropriate atmosphere or climate

If a confrontation meeting is necessary between conflicting parties, then the project manager should be aware of the logical steps and sequence of events that should be taken. These include:

- Setting the climate: establishing a willingness to participate
- Analyzing the images: how do you see yourself and others, and how do they see you?
- Collecting the information: getting feelings out in the open
- Defining the problem: defining and clarifying all positions
- Sharing the information: making the information available to all
- Setting the appropriate priorities: developing working sessions for setting priorities and timetables
- Organizing the group: forming cross-functional problem-solving groups
- Problem-solving: obtaining cross-functional involvement, securing commitments, and setting the priorities and timetable
- Developing the action plan: getting commitment
- Implementing the work: taking action on the plan
- Following up: obtaining feedback on the implementation for the action plan

The project manager or team leader should also understand conflict minimization procedures. These include:

- Pausing and thinking before reacting
- Building trust
- Trying to understand the conflict motives
- Keeping the meeting under control
- Listening to all involved parties
- Maintaining a give-and-take attitude
- Educating others tactfully on your views
- Being willing to say when you were wrong
- Not acting as a superman and leveling the discussion only once in a while

Thus, the effective manager, in conflict problem-solving situations:

- Knows the organization
- Listens with understanding rather than evaluation
- Clarifies the nature of the conflict
- Understands the feelings of others
- Suggests the procedures for resolving differences
- Maintains relationships with disputing parties
- Facilitates the communications process
- Seeks resolutions

7.5 CONFLICT RESOLUTION MODES

***PMBOK® Guide*, 6th Edition**
9.5.2.1 Interpersonal and Team Skills

The management of conflicts places the project manager in the precarious situation of having to select a conflict resolution mode (previously defined in Section 7.3). Based upon the situation, the type of conflict, and whom the conflict is with, any of these modes could be justified.

Confronting (or Collaborating) With this approach, the conflicting parties meet face to face and try to work through their disagreements. This approach should focus more on solving the problem and less on being combative. This approach is collaboration and integration where both parties need to win. This method should be used:

- When you and the conflicting party can both get at least what you wanted and maybe more
- To reduce cost
- To create a common power base
- To attack a common foe
- When skills are complementary

- When there is enough time
- When there is trust
- When you have confidence in the other person's ability
- When the ultimate objective is to learn

Compromising

To compromise is to bargain or to search for solutions so both parties leave with some degree of satisfaction. Compromising is often the result of confrontation. Some people argue that compromise is a "give-and-take" approach, which leads to a "win-win" position. Others argue that compromise is a "lose-lose" position, since neither party gets everything he/she wants or needs. Compromise should be used:

- When both parties need to be winners
- When you can't win
- When others are as strong as you are
- When you haven't time to win
- To maintain your relationship with your opponent
- When you are not sure you are right
- When you get nothing if you don't
- When stakes are moderate
- To avoid giving the impression of "fighting"

Smoothing (or Accommodating)

Smoothing is an attempt to reduce the emotions that exist in a conflict. This is accomplished by emphasizing areas of agreement and deemphasizing areas of disagreement. An example of smoothing would be to tell someone, "We have agreed on three of the five points and there is no reason why we cannot agree on the last two points." Smoothing does not necessarily resolve a conflict, but tries to convince both parties to remain at the bargaining table because a solution is possible. In smoothing, one may sacrifice one's own goals in order to satisfy the needs of the other party. Smoothing should be used:

- To reach an overarching goal
- To create obligation for a trade-off at a later date
- When the stakes are low
- When liability is limited
- To maintain harmony
- When any solution will be adequate
- To create goodwill (be magnanimous)
- When you'll lose anyway
- To gain time

Forcing (or Competing, Being Assertive)

This is what happens when one party tries to impose the solution on Being Uncooperative, the other party. Conflict resolution works best when resolution is achieved at the lowest possible levels. The higher up the conflict

goes, the greater the tendency for the conflict to be forced, with the result being a "win-lose" situation in which one party wins at the expense of the other. Forcing should be used:

- When you are right
- When a do-or-die situation exists
- When stakes are high
- When important principles are at stake
- When you are stronger (never start a battle you can't win)
- To gain status or to gain power
- In short-term, one-shot deals
- When the relationship is unimportant
- When it's understood that a game is being played
- When a quick decision must be made

Avoiding (or Withdrawing) Avoidance is often regarded as a temporary solution to a problem. The problem and the resulting conflict can come up again and again. Some people view avoiding as cowardice and an unwillingness to be responsive to a situation. Avoiding should be used:

- When you can't win
- When the stakes are low
- When the stakes are high, but you are not ready yet
- To gain time
- To unnerve your opponent
- To preserve neutrality or reputation
- When you think the problem will go away
- When you win by delay

7.6 UNDERSTANDING SUPERIOR, SUBORDINATE, AND FUNCTIONAL CONFLICTS

***PMBOK® Guide*, 5th Edition**
9.5.2.1 Interpersonal and Team Skills

In order for the project manager to be effective, he must understand how to work with the various employees who interface with the project. These employees include upper-level management, subordinate project team members, and functional personnel. Quite often, the project manager must demonstrate an ability for continuous adaptability by creating a different working environment with each group of employees. The need for this was shown in the previous section by the fact that the relative intensity of conflicts can vary in the life cycle of a project.

The type and intensity of conflicts can also vary with the type of employee, as shown in Figure 7–1. Both conflict causes and sources are rated according to relative conflict intensity.

The majority of Section 7.6, including the figures, was adapted from *Seminar in Project Management Workbook*, © 1977 by Hans J. Thamhain. Reproduced by permission of Dr. Hans J. Thamhain.

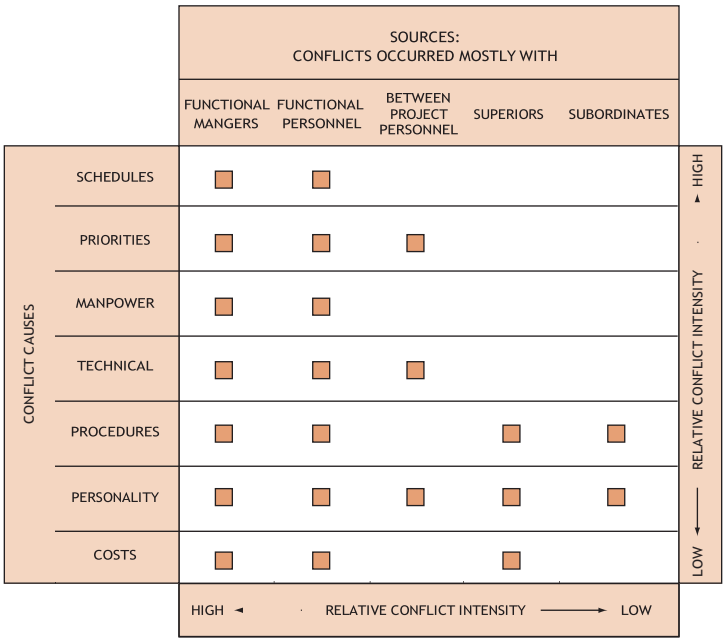


FIGURE 7–1. Relationship between conflict causes and sources.

The specific resolution mode a project manager will use might easily depend on whom the conflict is with, as shown in Figure 7–2. The data in Figure 7–2 do not necessarily show the modes that project managers would prefer, but rather identify the modes that will increase or decrease the potential conflict intensity. For example, although project managers consider, in general, that withdrawal is their least favorite mode, it can be used quite effectively with functional managers. In dealing with superiors, project managers would rather be ready for an immediate compromise than for face-to-face confrontation that could favor upper-level management.

Figure 7–3 identifies the various influence styles that project managers find effective in helping to reduce potential conflicts. Penalty power, authority, and expertise are considered as strongly unfavorable associations with respect to low conflicts. As expected, work challenge and promotions (if the project manager has the authority) are strongly favorable.

Related Case Studies (from Kerzner/*Project Management Case Studies*, 5th ed.)	**Related Workbook Exercises (from Kerzner/*Project Management Workbook and PMP®/CAPM® Exam Study Guide*, 12th ed.)**	***PMBOK® Guide*, Sixth Edition, Reference Section for the PMP® Certification Exam**
• Facilities Scheduling at Mayer Manufacturing* • Scheduling the Safety Lab • Telestar International* • The Problem with Priorities	• Multiple Choice Exam	• Human Resource Management

*Case study also appears at end of chapter.

(The figure shows only those associations which are statistically significant at the 95 percent level)

INTENSITY OF CONFLICT PERCEIVED BY PROJECT MANAGERS (P.M.)	ACTUAL CONFLICT RESOLUTION STYLE				
	FORCING	CONFRONTA-TION	COMPROMISE	SMOOTHING	WITHDRAWAL
BETWEEN P.M. AND HIS PERSONNEL	□	△	△	△	□
BETWEEN P.M. AND HIS SUPERIOR		□	△		
BETWEEN P.M. AND FUNCTIONAL SUPPORT DEPARTMENTS	□	□			△

△ STRONGLY FAVORABLE ASSOCIATION WITH REGARD TO LOW CONFLICT ($-\tau$)

□ STRONGLY UNFAVORABLE ASSOCIATION WITH REGARD TO LOW CONFLICT($+\tau$)

• KENDALL – τ CORRELATION

FIGURE 7-2. Association between perceived intensity of conflict and mode of conflict resolution.

(The figure shows only those associated which are statistically significant at the 95 percent level)

INTENSITY OF CONFLICT PERCEIVED BY PROJECT MANAGER (P.M.)	INFLUENCE METHODS AS PERCEIVED BY PROJECT MANAGERS						
	EXPERTISE	AUTHORITY	WORK CHALLENGE	FRIENDSHIP	PROMOTION	SALARY	PENALTY
BETWEEN P.M. AND HIS PERSONNEL	□	□	△		△		□
BETWEEN P.M. AND HIS SUPERIOR			△				□
BETWEEN P.M. AND FUNCTIONAL SUPPORT DEPARTMENTS		□					□

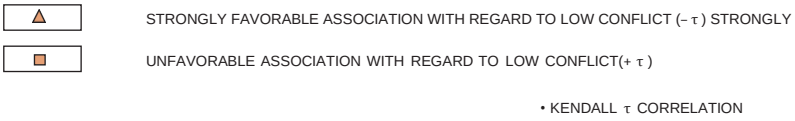


FIGURE 7-3. Association between influence methods of project managers and their perceivedconflict intensity.

Quality Management

20.0 INTRODUCTION

***PMBOK® Guide*, 6th Edition**
Chapter 8 Project Quality Management
8.1.1 Plan Quality Management Inputs

During the past twenty years, there has been a revolution in quality. Improvements have occurred not only in product quality, but also in leadership quality and project management quality. The changing views of quality appear in Table 20–1.

Unfortunately, it often takes an economic disaster, recession, or downturn in a firm's business base to get management to recognize the need for improved quality. Economic disasters provide some companies with the opportunity to become aggressive competitors in new markets. As an example, many high-tech engineering companies never fully recognized the need for shortening product development time and the relationship between project management, total quality management, and concurrent engineering until they saw their market share diminish.

The push for higher levels of quality appears to be customer driven. Customers are now demanding:

- Higher performance requirements
- Faster product development
- Higher technology levels
- Materials and processes pushed to the limit
- Lower contractor profit margins
- Fewer defects/rejects

One of the critical factors that can affect quality is market expectations. The variables that affect market expectations include:

- Salability: the balance between quality and cost
- Produceability: the ability to produce the product with available technology and workers, and at an acceptable cost

TABLE 20-1. CHANGING VIEWS OF QUALITY

Past	Present
• Quality is the responsibility of blue-collar workers and direct labor employees working on the floor. • Quality defects should be hidden from the customers (and possibly management). • Quality problems lead to blame, faulty justification, and excuses. • Corrections-to-quality problems should be accomplished with minimum documentation. • Increased quality will increase project costs. • Quality is internally focused. • Quality will not occur without close supervision of people. • Quality occurs during project execution	• Quality is everyone's responsibility, including white-collar workers, the indirect labor force, and the overhead staff. • Defects should be highlighted and brought to the surface for corrective action. • Quality problems lead to cooperative solutions. • Documentation is essential for "lessons learned" so that mistakes are not repeated. • Improved quality saves money and increases business. • Quality is customer focused. • People want to produce quality products. • Quality occurs at project initiation and must be planned for within the project

- Social acceptability: the degree of conflict between the product or process and the values of society (i.e., safety, environment)
- Operability: the degree to which a product can be operated safely
- Availability: the probability that the product, when used under given conditions, will perform satisfactorily when called upon
- Reliability: the probability of the product performing without failure under given conditions and for a set period of time
- Maintainability: the ability of the product to be retained in or restored to a performance level when prescribed maintenance is performed

Customer demands are now being handled using total quality management (TQM). Total quality management is an ever-improving system for integrating various organizational elements into the design, development, and manufacturing efforts, providing cost-effective products or services that are fully acceptable to the ultimate customer. Externally, TQM is customer oriented and provides for more meaningful customer satisfaction. Internally, TQM reduces production line bottlenecks and operating costs, thus enhancing product quality while improving organizational morale.

20.1 DEFINITION OF QUALITY

***PMBOK® Guide*, 6th Edition**
Chapter 8 Plan Quality Management
Introduction

Mature organizations readily admit that they cannot accurately define quality. The reason is that quality is defined by the customer. The Kodak definition of quality is those products and services that are perceived to meet or exceed the needs and expectations of the customer at a cost that represents out-standing value. The ISO 9000 definition is "the totality of feature and characteristics of a product or service that bears on its ability to satisfy stated or implied needs." Terms such as fitness for use, customer satisfaction, and zero defects are goals rather than definitions.

***PMBOK® Guide*, 6th Edition**
8.1 Plan Quality Management

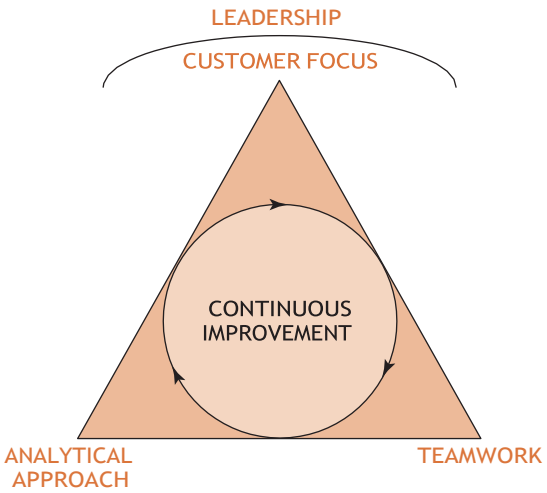


FIGURE 20-1 Kodak's five quality principles.

Most organizations view quality more as a process than a product. To be more specific, it is a continuously improving process where lessons learned are used to enhance future products and services in order to:

- Retain existing customers
- Win back lost customers
- Win new customers

Therefore, companies are developing quality improvement processes. Figure 20–1 shows the five quality principles that support Kodak's quality policy. Figure 20–2 shows a more detailed quality improvement process. These two figures seem to illustrate that organizations are placing more emphasis on the quality process than on the quality product and, therefore, are actively pursuing quality improvements through a continuous cycle.

20.2 THE QUALITY MOVEMENT

***PMBOK® Guide*, 6th Edition**
Chapter 8 Project Quality Management
Introduction

During the past hundred years, the views of quality have changed dramatically. Prior to World War I, quality was viewed predominantly as inspection, sorting out the good items from the bad. Emphasis was on problem identification. Following World War I and up to the early 1950s, emphasis was still on sorting good items from bad. However, *quality control* principles were now emerging in the form of:

- Statistical and mathematical techniques
- Sampling tables
- Process control charts

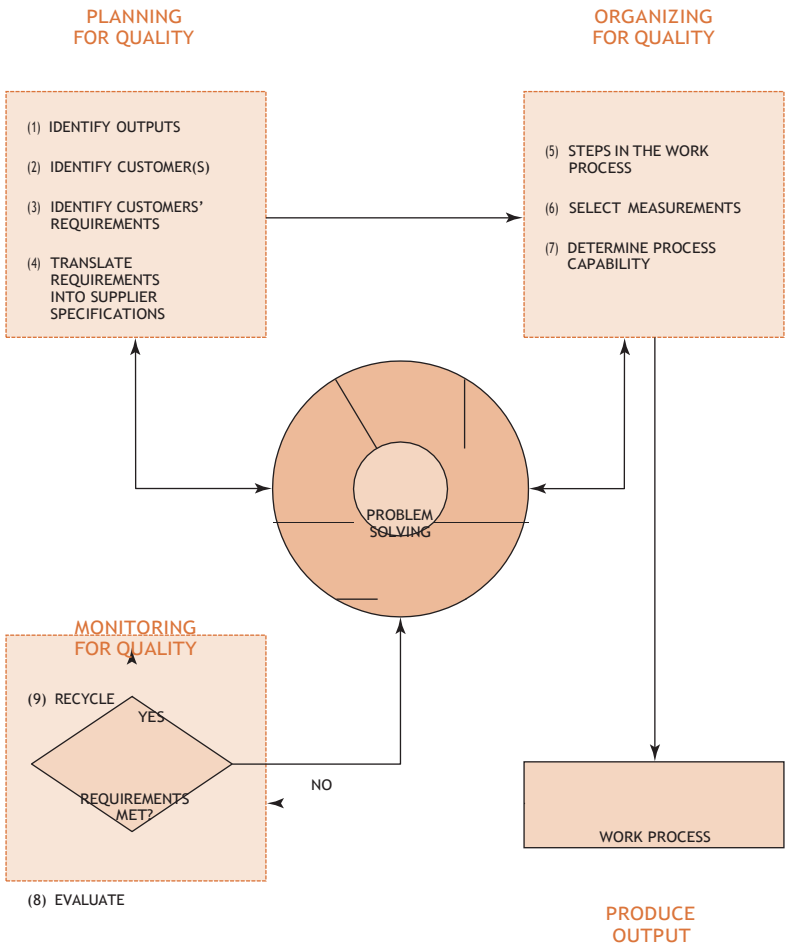


FIGURE 20-2 The quality improvement process. (Source unknown.)

From the early 1950s to the late 1960s, quality control evolved into quality assurance, with its emphasis on problem avoidance rather than problem detection. Additional quality assurance principles emerged, such as:

- The cost of quality
- Zero-defect programs
- Reliability engineering
- Total quality control

Today, emphasis is being placed on strategic quality management, including such topics as:

- Quality is defined by the customer.
- Quality is linked with profitability on both the market and cost sides.

PMBOK® Guide, 6th Edition
8.3.2 Quality Control Tools and Techniques

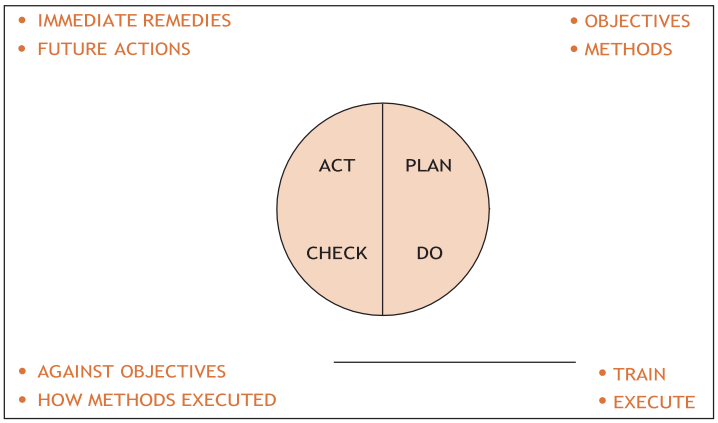


FIGURE 20-3. The Deming Cycle for Improvement.

- Quality has become a competitive weapon.
- Quality is now an integral part of the strategic planning process.
- Quality requires an organization-wide commitment.

Although many experts have contributed to the success of the quality movement, the three most influential contributors are W. Edwards Deming, Joseph M. Juran, and Phillip B. Crosby. Dr. Deming pioneered the use of statistics and sampling methods from 1927 to 1940 at the U.S. Department of Agriculture. During these early years, Dr. Deming was influenced by Dr. Shewhart, and later applied Shewhart's Plan/Do/Check/Act cycle to clerical tasks. Figure 20–3 shows the Deming Cycle for Improvement.

Deming believed that the reason companies were not producing quality products was that management was preoccupied with "today" rather than the future. Deming postulated that 85 percent of all quality problems required management to take the initiative and change the process. Only 15 percent of the quality problems could be controlled by the workers on the floor. As an example, the workers on the floor were not at fault because of the poor quality of raw materials that resulted from management's decision to seek out the lowest-cost suppliers. Management needed to change the purchasing policies and procedures and develop long-term relationships with vendors.

Processes had to be placed under statistical analysis and control to demonstrate the repeatability of quality. Furthermore, the ultimate goals should be a continuous refinement of the processes rather than quotas. Statistical process control charts (SPCs) allowed for the identification of common cause and special (assignable) cause variations. Common cause variations are inherent in any process. They include poor lots of raw material, poor product design, unsuitable work conditions, and equipment that cannot meet the design tolerances. These common causes are *beyond* the control of the workers on the floor and therefore, for improvement to occur, actions by management are necessary.

Special or assignable causes include lack of knowledge by workers, worker mistakes, or workers not paying attention during production. Special causes can be identified by

workers on the shop floor and corrected, but management still needs to change the manufacturing process to reduce common cause variability.

Deming contended that workers simply cannot do their best. They had to be shown what constitutes acceptable quality and that continuous improvement is not only possible, but necessary. For this to be accomplished, workers had to be trained in the use of statistical process control charts. Realizing that even training required management's approval, Deming's lectures became more and more focused toward management and what they must do.

Dr. Juran began conducting quality control courses in Japan in 1954, four years after Dr. Deming. Dr. Juran developed his 10 Steps to Quality Improvement (see Table 20–2), as well as the Juran Trilogy: Quality Improvement, Quality Planning, and Quality Control. Juran stressed that the manufacturer's view of quality is adherence to specifications but the customer's view of quality is "fitness for use." Juran defined five attributes of "fitness for use."

- Quality of design: There may be many grades of quality
- Quality of conformance: Provide the proper training; products that maintain specification tolerances; motivation

TABLE 20-2 VARIOUS APPROACHES TO QUALITY IMPROVEMENT

Deming's 14 Points for Management	Juran's 10 Steps to Quality Improvement	Crosby's 14 Steps to Quality Improvement
1. Create constancy of purpose for improvement of product and service. 2. Adopt the new philosophy. 3. Cease dependence on inspection to achieve quality. 4. End the practice of awarding business on the basis of price tag alone. Instead, minimize total cost by working with a single supplier. 5. Improve constantly and forever every process for planning, production, and service. 6. Institute training on the job. 7. Adopt and institute leadership. 8. Drive out fear. 9. Break down barriers between staff areas. 10. Eliminate slogans, exhortations, and targets for the work force. 11. Eliminate numerical quotas for the workforce and numerical goals for management. 12. Remove barriers that rob people of workmanship. Eliminate the annual rating or merit system. 13. Institute a vigorous program of education and self-improvement for everyone. 14. 14. Put everybody in the company to work to accomplish the transformation.	1. Build awareness of the need and opportunity for improvement. 2. Set goals for improvement. 3. Organize to reach the goals (establish a quality council, identify problems, select projects, appoint teams, designate facilitators). 4. Provide training. 5.Carry out projects to solve problems. 6. Report progress. 7. Give recognition. 8. Communicate results. 9. Keep score. 10. Maintain momentum by making annual improvement part of the regular systems and processes of the company.	1. Make it clear that management is committed to quality. 2. Form quality improvement teams with representatives from each department. 3. Determine where current and potential quality problems lie. 4. Evaluate the cost of quality and explain its use as a management tool. 5. Raise the quality awareness and personal concern of all employees. 6. Take actions to correct problems identified through previous steps. 7. Establish a committee for the zero-defects program. 8. Train supervisors to actively carry out their part of the quality improvement program. 9. Hold a "zero-defects day" to let all employees realize that there has been a change. 10. Encourage individuals to establish improvement goals for themselves and their groups. 11. Encourage employees to communicate to management the obstacles they face in attaining their improvement goals. 12. Recognize and appreciate those who participate. 13. Establish quality councils to communicate on a regular basis. 14. Do it all over again to emphasize that the quality improvement program never ends.

- Availability: reliability (i.e., frequency of repairs) and maintainability (i.e., speed or ease of repair)
- Safety: The potential hazards of product use
- Field use: This refers to the way the product will be used by the customer

Dr. Juran also stressed the cost of quality (Section 20.3) and the legal implications of quality. The legal aspects of quality include:

- Criminal liability
- Civil liability
- Appropriate corporate actions
- Warranties

Juran believes that the contractor's view of quality is conformance to specification, whereas the customer's view of quality is fitness for use when delivered and value. Juran also admits that there can exist many grades of quality. The characteristics of quality can be defined as:

- Structural (length, frequency)
- Sensory (taste, beauty, appeal)
- Time-oriented (reliability, maintainability)
- Commercial (warrantee)
- Ethical (courtesy, honesty)

The third major contributor to quality was Phillip B. Crosby. Crosby developed his 14 Steps to Quality Improvement (see Table 20–2) and his Four Absolutes of Quality:

- Quality means conformance to requirements.
- Quality comes from prevention.
- Quality means that the performance standard is "zero defects."
- Quality is measured by the cost of nonconformance.

Crosby found that the cost of not doing things right the first time could be appreciable. In manufacturing, the price of nonconformance averages 40 percent of operating costs.

20.3 QUALITY MANAGEMENT CONCEPTS

The project manager has the ultimate responsibility for quality management on the project. Quality management has equal priority withcost and Chapter 8 Introduction schedule management. However, the direct measurement of quality may be the responsibility of the quality assurance department or the assistant project manager for quality. For

a labor-intensive project, management support (i.e., the project office) is typically 12–15 percent of the total labor dollars of the project. Approximately 3–5 percent can be attributed to quality management. Therefore, as much as 20–30 percent of all the labor in the project office could easily be attributed to quality management.

From a project manager's perspective, there are six quality management concepts that should exist to support each and every project:

1. Quality policy
2. Quality objectives
3. Quality assurance
4. Quality control
5. Quality audit
6. Quality program plan

Ideally, these six concepts should be embedded within the corporate culture.

Quality Policy

The quality policy is a document that is typically created by quality experts and fully supported by top management. The policy should state the quality objectives, the level of quality acceptable to the organization, and the responsibility of the organization's members for executing the policy and ensuring quality. A quality policy would also include statements by top management pledging its support to the policy. The quality policy is instrumental in creating the organization's reputation and quality image.

Many organizations successfully complete a good quality policy but immediately submarine the good intentions of the policy by delegating the implementation of the policy to lower-level managers. The implementation of the quality policy is the responsibility of top management. Top management must "walk the walk" as well as "talk the talk." Employees will soon see through the ruse of a quality policy that is delegated to middle managers while top executives move onto "more crucial matters that really impact the bottom line."

A good quality policy will:

- Be a statement of principles stating what, not how
- Promote consistency throughout the organization and across projects
- Provide an explanation to outsiders of how the organization views quality
- Provide specific guidelines for important quality matters
- Provide provisions for changing/updating the policy

Quality Objectives

Quality objectives are a part of an organization's quality policy and consist of specific objectives and the time frame for completing them. The quality objectives must be selected carefully. Selecting objectives that are not naturally possible can cause frustration and disillusionment. Examples of acceptable quality objectives might be: to train all members of the organization on the quality policy and objectives before the end of the current fiscal year, to set up baseline measurements of specific

processes by the end of the current quarter, to define the responsibility and authority for meeting the organization's quality objectives down to each member of the organization by the end of the current fiscal year, and the like. Good quality objectives should:

- Be obtainable
- Define specific goals
- Be understandable
- State specific deadlines

Quality Assurance

***PMBOK® Guide*, 6th Edition**
8.2 Manage Quality

Quality assurance is the collective term for the formal activities and managerial processes that attempt to ensure that products and services meet the required quality level. Quality assurance also includes efforts external to these processes that provide informa- tion for improving the internal processes. It is the quality assurance function that attempts to ensure that the project scope, cost, and time functions are fully integrated.

The Project Management Institute Guide to the Body of Knowledge (*PMBOK® Guide*) refers to quality assurance as the management section of quality management. This is the area where the project manager can have the greatest impact on the quality of his project. The project manager needs to establish the administrative processes and procedures necessary to ensure and, often, prove that the scope statement conforms to the actual requirements of the customer. The project manager must work with his team to determine which processes they will use to ensure that all stakeholders have confidence that the quality activities will be properly performed. All relevant legal and regulatory requirements must also be met.

- A good quality assurance system will:
- Identify objectives and standards
- Be multifunctional and prevention oriented
- Plan for collection and use of data in a cycle of continuous improvement
- Plan for the establishment and maintenance of performance measures
- Include quality audits

Quality Control

Quality control is a collective term for activities and techniques, within the process, that are intended to create specific quality characteristics. Such activities include continually monitoring processes, identifying and eliminating problem causes, use of statistical process control to reduce the variability and to increase the efficiency of processes. Quality control certifies that the organization's quality objectives are being met.

The *PMBOK® Guide* refers to quality control as the technical aspect of quality management. Project team members who have specific technical expertise on the various aspects of the project play an active role in quality control. They set up the technical processes and procedures that ensure that each step of the project provides a quality output from design and development through implementation and maintenance. Each step's output

must conform to the overall quality standards and quality plans, thus ensuring that quality is achieved.

A good quality control system will:

- Select what to control
- Set standards that provide the basis for decisions regarding possible corrective action
- Establish the measurement methods used
- Compare the actual results to the quality standards
- Act to bring nonconforming processes and material back to the standard based on the information collected
- Monitor and calibrate measuring devices
- Include detailed documentation for all processes

Quality Audit

PMBOK® Guide, 6th Edition
8.2.2.5 Quality Audit

A quality audit is an independent evaluation performed by qualified personnel that ensures that the project is conforming to the project's quality requirements and is following the established quality procedures and policies.

A good quality audit will ensure that:

- The planned quality for the project will be met.
- The products are safe and fit for use.
- All pertinent laws and regulations are followed.
- Data collection and distribution systems are accurate and adequate.
- Proper corrective action is taken when required.
- Improvement opportunities are identified.

Quality Plan

PMBOK® Guide, 6th Edition
8.1.3.1 Quality Management Plan

The quality plan is created by the project manager and project team members by breaking down the project objectives into a work breakdown structure. Using a treelike diagramming technique, the project activities are broken down into lower-level activities until specific quality actions can be identified. The project manager then ensures that these actions are documented and implemented in the sequence that will meet the customer's requirements and expectations. This enables the project manager to assure the customer that he has a road map to delivering a quality product or service and therefore will satisfy the customer's needs.

A good quality plan will:

- Identify all of the organization's external and internal customers
- Cause the design of a process that produces the features desired by the customer
- Bring in suppliers early in the process
- Cause the organization to be responsive to changing customer needs
- Prove that the process is working and that quality goals are being met

20.4 THE COST OF QUALITY

PMBOK® Guide, 6th Edition
8.1.2.2 Data Gathering
8.1.2.3 Cost of Quality

To verify that a product or service meets the customer's requirements requires the measurement of the costs of quality. For simplicity's sake, the costs can be classified as "the cost of conformance" and "the cost of nonconformance." Conformance costs include items such as training, indoctrination, verification, validation, testing, maintenance, calibration, and audits. Nonconforming costs include items such as scrap, rework, warranty repairs, product recalls, and complaint handling.

Trying to save a few project dollars by reducing conformance costs could prove disastrous. For example, an American company won a contract as a supplier of Japanese parts. The initial contract called for the delivery of 10,000 parts. During inspection and testing at the customer's (i.e., Japanese) facility, two rejects were discovered. The Japanese returned *all* 10,000 components to the American supplier, stating that this batch was not acceptable. In this example, the nonconformance cost could easily be an order of magnitude greater than the conformance cost. The moral is clear: *Build it right the first time.*

Another common method to classify costs includes the following:

- *Prevention costs* are the up-front costs oriented toward the satisfaction of customer's requirements with the first and all succeeding units of product produced without defects. Included in this are typically such costs as design review, training, quality planning, surveys of vendors, suppliers, and subcontractors, process studies, and related preventive activities.
- *Appraisal costs* are costs associated with evaluation of product or process to ascertain how well all of the requirements of the customer have been met. Included in this are typically such costs as inspection of product, lab test, vendor control, in-process testing, and internal–external design reviews.
- *Internal failure costs* are those costs associated with the failure of the processes to make products acceptable to the customer, before leaving the control of the organization. Included in this area are scrap, rework, repair, downtime, defect evaluation, evaluation of scrap, and corrective actions for these internal failures.
- *External failure costs* are those costs associated with the determination by the customer that his requirements have not been satisfied. Included are customer returns and allowances, evaluation of customer complaints, inspection at the customer, and customer visits to resolve quality complaints and necessary corrective action.

Figure 20–4 shows the expected results of the total quality management system on quality costs. Prevention costs are expected to actually rise as more time is spent in prevention activities throughout the organization. As processes improve over the long run, appraisal costs will go down as the need to inspect in quality decreases. The biggest savings will come from the internal failure areas of rework, scrap, reengineering, redo, and so on. The additional time spent in up-front design and development will really pay off here. And, finally, the external costs will also come down as processes yield first-time quality on a regular basis. The improvements will continue to affect the company on a long-term basis in both improved quality and lower costs. Also, as project management matures, there should be further decreases in the cost of both maintaining quality and developing products.

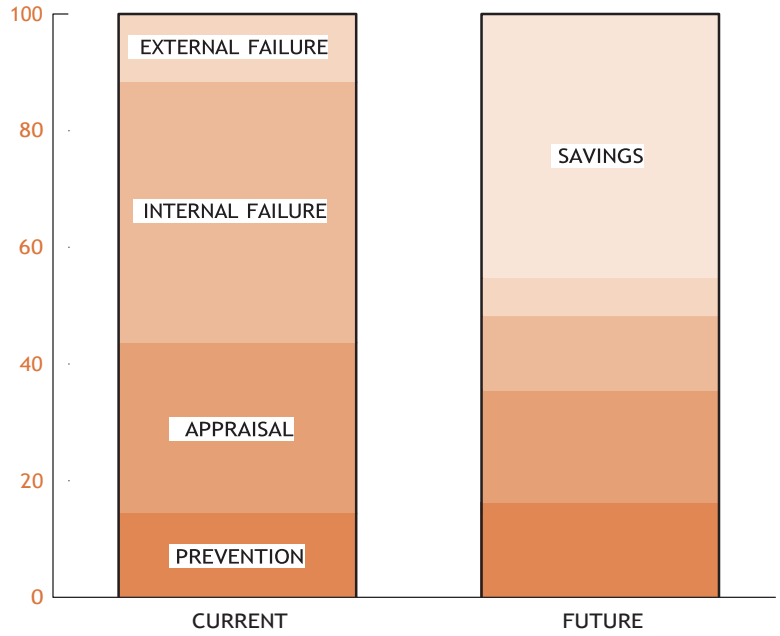


FIGURE 20-4. Total quality cost.

Figure 20–4 shows that prevention costs can increase. This is not always the case. Prevention costs actually decrease without sacrificing the purpose of prevention if we can identify and eliminate the costs associated with waste, such as waste due to

- Rejects of completed work
- Design flaws
- Work in progress
- Improperly instructed manpower
- Excess or noncontributing management (who still charge time to the project)
- Improperly assigned manpower
- Improper utilization of facilities
- Excessive expenses that do not necessarily contribute to the project (i.e., unnecessary meetings, travel, lodgings, etc.)

Another important aspect of Figure 20–4 is that 50 percent or more of the total cost of quality can be attributed to the internal and external failure costs. Complete elimination of failures may seem like an ideal solution but may not be cost-effective. As an example, see Figure 20–5. There are assumptions in the development of this figure. First, the cost of failure (i.e., nonconformance) approaches zero as defects become fewer and fewer. Second, the conformance costs of appraisal and prevention approach infinity as defects become fewer and fewer.

If the ultimate goal of a quality program is to continuously improve quality, then from a financial standpoint, quality improvement may not be advisable if the positive economic

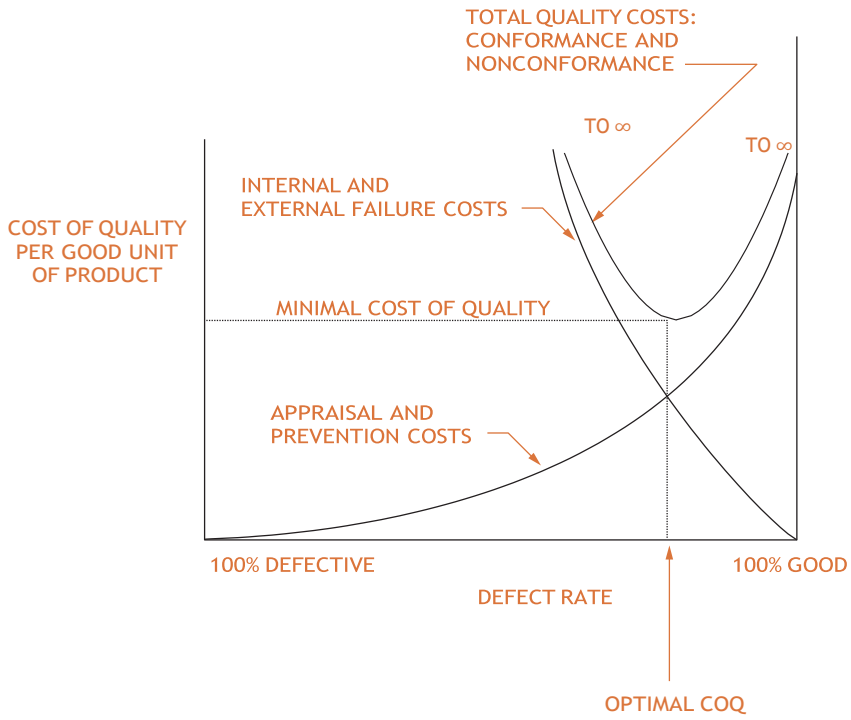


FIGURE 20-5. Minimizing the costs of quality (COQ).

return becomes negative. Juran argued that as long as the per-unit cost for prevention and appraisal were less expensive than nonconformance costs, resources should be assigned to prevention and appraisal. But when prevention and appraisal costs begin to increase the per-unit cost of quality, then the policy should be to maintain quality. The implication here is that zero defects may not be a practical solution since the total cost of quality would not be minimized.

Figure 20–4 shows that the external failure costs are much lower than the internal failure costs. This indicates that most of the failures are being discovered *before* they leave the functional areas or plants.

20.5 THE SEVEN QUALITY CONTROL TOOLS

***PMBOK® Guide*, 6th Edition**
8.3 Control Quality
8.3.2 Control Quality Tools and Techniques

Over the years, statistical methods have become prevalent throughout business, industry, and science. With the availability of advanced, automated systems that collect, tabulate, and analyze data, the practical application of these quantitative methods continues to grow.

This section is taken from H. K. Jackson and N. L. Frigon, *Achieving the Competitive Edge* (New York: John Wiley & Sons, 1996), Chapters 6 and 7.

More important than the quantitative methods themselves is their impact on the basic philosophy of business. The statistical point of view takes decision making out of the subjective autocratic decision-making arena by providing the basis for objective decisions based on quantifiable facts. This change provides some very specific benefits:

- Improved process information
- Better communication
- Discussion based on facts
- Consensus for action
- Information for process changes

Statistical process control (SPC) takes advantage of the natural characteristics of any process. All business activities can be described as specific processes with known tolerances and measurable variances. The measurement of these variances and the resulting information provide the basis for continuous process improvement. The tools presented here provide both a graphical and measured representation of process data. The systematic application of these tools empowers business people to control products and processes to become world-class competitors.

The basic tools of statistical process control are data figures, Pareto analysis, cause-and-effect analysis, trend analysis, histograms, scatter diagrams, and process controlcharts. These basic tools provide for the efficient collection of data, identification of patterns in the data, and measurement of variability. Figure 20–6 shows the relationships among these seven tools and their use for the identification and analysis of improvement opportunities. We will review these tools and discuss their implementation and applica- tions.

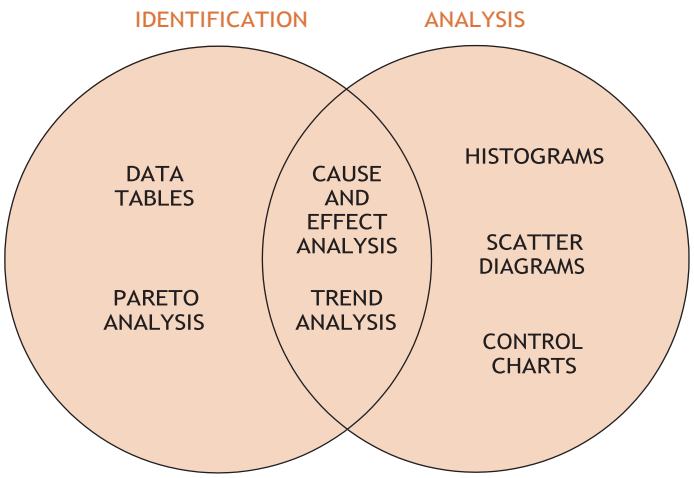


FIGURE 20-6. The seven quality control tools.

Data Tables

Data tables, or data arrays, provide a systematic method for collecting and displaying data. In most cases, data tables are forms designed for the purpose of collecting specific data. These tables are used most frequently where data are available from automated media. They provide a consistent, effective, and economical approach to gathering data, organizing them for analysis, and displaying them for preliminary review. Data tables sometimes take the form of manual check sheets where automated data are not necessary or available. Data figures and check sheets should be designed to minimize the need for complicated entries. Simple-to-understand, straightforward tables are a key to successful data gathering.

Figure 20–7 is an example of an attribute (pass/fail) data figure for the correctness of invoices. From this simple check sheet, several data points become apparent. The total number of defects is 34. The highest number of defects is from supplier A, and the most frequent defect is incorrect test documentation. We can subject these data to further analysis by using Pareto analysis, control charts, and other statistical tools.

Cause-and-Effect Analysis

After identifying a problem, it is necessary to determine its cause. The cause-and-effect relationship is at times obscure. A considerable amount of analysis often is required to determine the specific cause or causes of the problem. Cause-and-effect analysis uses diagramming techniques to identify the relationship between an effect and its causes. Cause-and-effect diagrams are also known as fishbone diagrams. Figure 20–8 demonstrates the basic fishbone diagram. Six steps are used to perform a cause-and-effect analysis.

Step 1. Identify the problem. This step often involves the use of other statistical process control tools, such as Pareto analysis, histograms, and control charts, as well as brainstorming. The result is a clear, concise problem statement.

Step 2. Select interdisciplinary brainstorming team. The team is selected based on the technical, analytical, and management knowledge required to determine the causes of the problem.

DEFECT	SUPPLIER				
	A	B	C	D	TOTAL
INCORRECT INVOICE	----	_		--	7
INCORRECT INVENTORY	-----	--	_	_	9
DAMAGED MATERIAL	---		--	---	8
INCORRECT TEST DOCUMENTATION	-	---	----	--	10
TOTAL	13	6	7	8	34

FIGURE 20-7. Check sheet for material receipt and inspection.

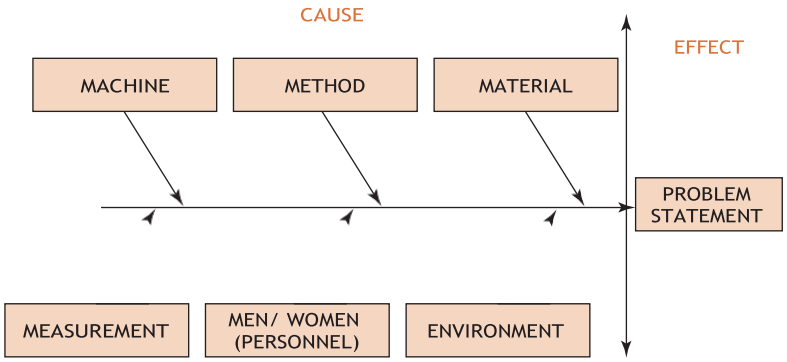


FIGURE 20-8. Cause-and-effect diagram.

Step 3. Draw problem box and prime arrow. The problem contains the problem statement being evaluated for cause and effect. The prime arrow functions as the foundation for their major categories.

Step 4. Specify major categories. Identify the major categories contributing to the problem stated in the problem box. The six basic categories for the primary causes of the problems are most frequently personnel, method, materials, machinery, measurements, and environment, as shown in Figure 20–8. Other categories may be specified, based on the needs of the analysis.

Step 5. Identify defect causes. When you have identified the major causes contributing to the problem, you can determine the causes related to each of the major categories. There are three approaches to this analysis: the random method, the systematic method, and the process analysis method.

Random method. List all six major causes contributing to the problem at the same time. Identify the possible causes related to each of the categories, as shown in Figure 20–9.

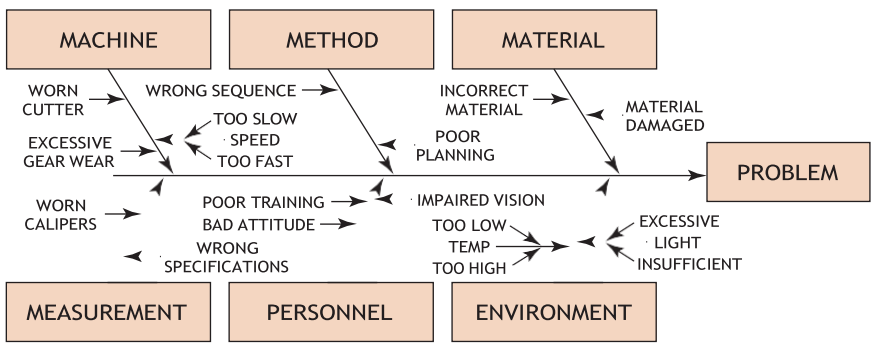


FIGURE 20-9. Random method.

Systematic method. Focus your analysis on one major category at a time, in descending order of importance. Move to the next most important category only after completing the most important one. This process is diagrammed in Figure 20–10.

Process analysis method. Identify each sequential step in the process and perform cause-and-effect analysis for each step, one at a time. Figure 20–11 represents this approach.

Step 6. Identify corrective action. Based on (1) the cause-and-effect analysis of the problem and (2) the determination of causes contributing to each major category, identify corrective action. The corrective action analysis is performed in the same manner as the cause-and-effect analysis. The cause-and-effect diagram is simply reversed so that the problem box becomes the corrective action box. Figure 20–12 displays the method for identifying corrective action.

Histogram

A histogram is a graphical representation of data as a frequency distribution. This tool is valuable in evaluating both attribute (pass/fail) and variable (measurement) data. Histograms offer a quick look at the data at a single point in time; they do not display variance or trends over time. A histogram displays how the cumulative data look *today.* It is useful in understanding the relative frequencies (percent-

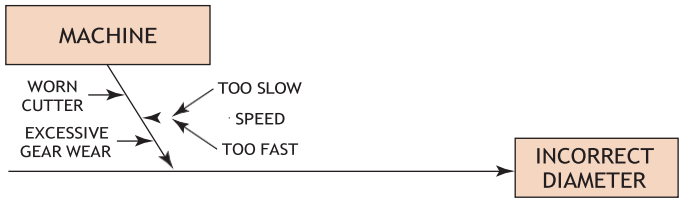


FIGURE 20-10. Systematic method.

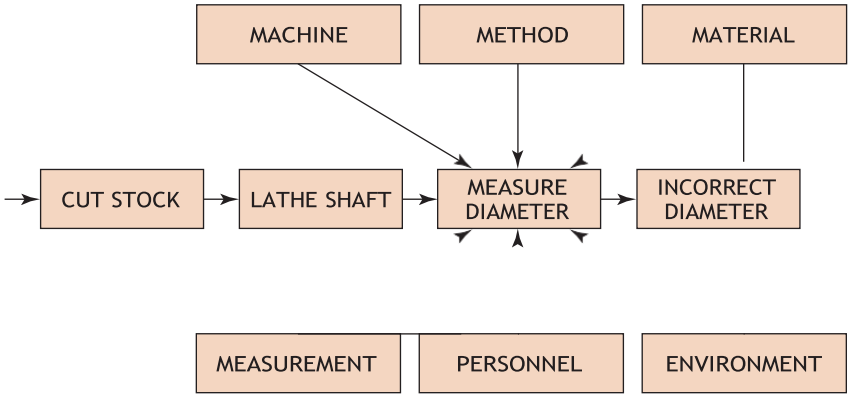


FIGURE 20-11. Process analysis method.

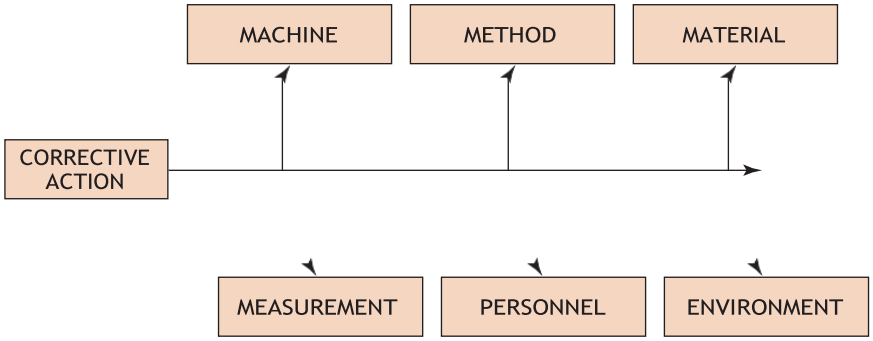


FIGURE 20-12. Identify corrective action.

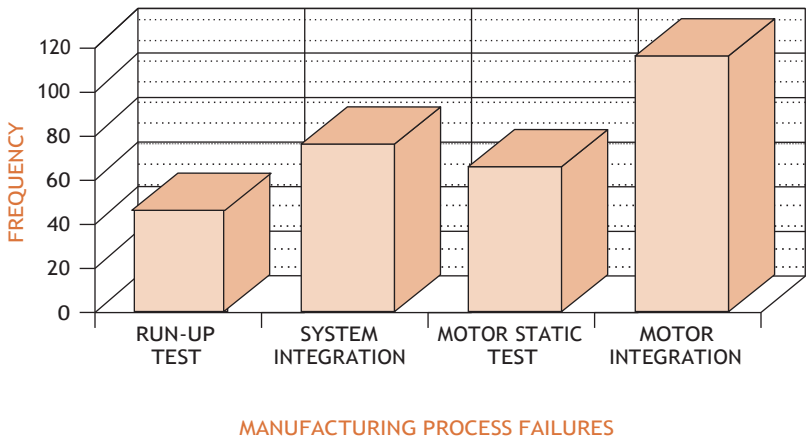


FIGURE 20-13. Histogram for variables.

ages) or frequency (numbers) of the data and how those data are distributed. Figure 20–13 illustrates a histogram of the frequency of defects in a manufacturing process.

Pareto Analysis

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A Pareto diagram is a special type of histogram that helps us to identify and prioritize problem areas. The construction of a Pareto diagram may involve data collected from data figures, maintenance data, repair data, parts scrap rates, or other sources. By identifying types of nonconformity from any of these data sources, the Pareto diagram directs attention to the most frequently occurring element.

There are three uses and types of Pareto analysis. The basic Pareto analysis identifies the vital few contributors that account for most quality problems in any system. The comparative Pareto analysis focuses on any number of program options or actions. The weighted Pareto analysis gives a measure of significance to factors that may not appear significant at first—such additional factors as cost, time, and criticality.

The basic Pareto analysis chart provides an evaluation of the most frequent occurrences for any given data set. By applying the Pareto analysis steps to the material receipt

and inspection process described in Figure 20–14, we can produce the basic Pareto analysis demonstrated in Figure 20–15. This basic Pareto analysis quantifies and graphs the frequency of occurrence for material receipt and inspection and further identifies the most significant, based on frequency.

A review of this basic Pareto analysis for frequency of occurrences indicates that supplier A is experiencing the most rejections with 38 percent of all the failures. Pareto analysis diagrams are also used to determine the effect of corrective action, or to analyze the difference between two or more processes and methods. Figure 20–16 displays the use of this Pareto method to assess the difference in defects after corrective action.

Another pictorial representation of process control data is the scatter plot or scatter diagram. A scatter diagram organizes data using two variables: an independent variable

MATERIAL RECEIPT AND INSPECTION FREQUENCY OF FAILURES			
SUPPLIER	FAILING FREQUENCY	PERCENT FAILING	CUMULATIVE PERCENT
A	13	38	38
B	6	17	55
C	7	20	75
D	9	25	100

FIGURE 20-14. Basic Pareto analysis.

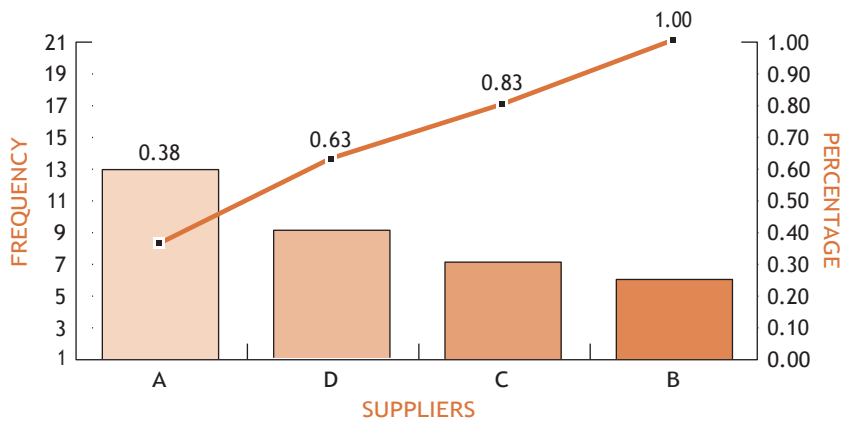

FIGURE 20-15. Basic Pareto analysis.

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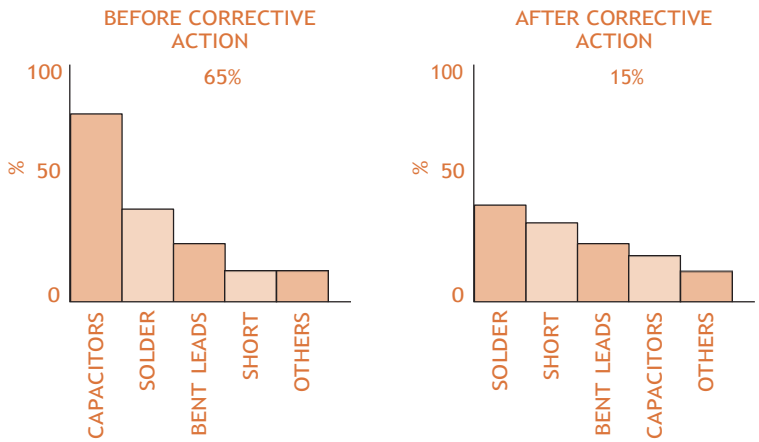

FIGURE 20-16. Comparative Pareto analysis.

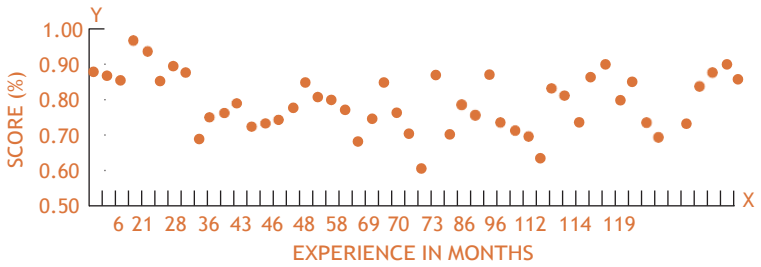

FIGURE 20-17. Solder certification test scores.

and a dependent variable. These data are then recorded on a simple graph with *X* and *Y* coordinates showing the relationship between the variables. Figure 20–17 displays the relationship between two of the data elements from solder qualification test scores. The independent variable, experience in months, is listed on the *X* axis. The dependent variable is the score, which is recorded on the *Y* axis.

These relationships fall into several categories, as shown in Figure 20–18. In the first scatter plot there is no correlation—the data points are widely scattered with no apparent pattern. The second scatter plot shows a curvilinear correlation demonstrated by the U shape of the graph. The third scatter plot has a negative correlation, as indicated by the downward slope. The final scatter plot has a positive correlation with an upward slope.

From Figure 20–17 we can see that the scatter plot for solder certification testing is somewhat curvilinear. The least and the most experienced employees scored highest, whereas those with an intermediate level of experience did relatively poorly. The next tool, trend analysis, will help clarify and quantify these relationships.

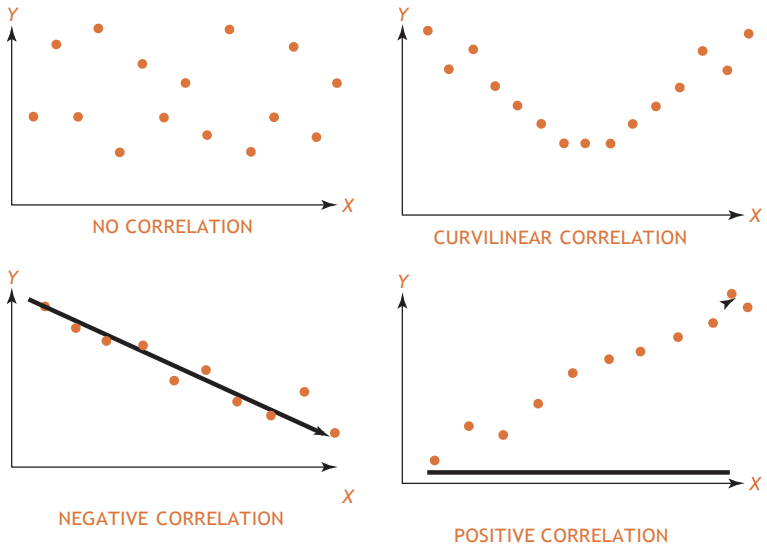

FIGURE 20-18. Scatter plot correlation.

Trend Analysis

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Trend analysis is a statistical method for determining the equation that best fits the data in a scatter plot. Trend analysis quantifies the relationships of the data, determines the equation, and measures the fit of the equation to the data. This method is also known as curve fitting or least squares.

Trend analysis can determine optimal operating conditions by providing an equation that describes the relationship between the dependent (output) and independent (input) variables. An example is the data set concerning experience and scores on the solder certification test (see Figure 20–19).

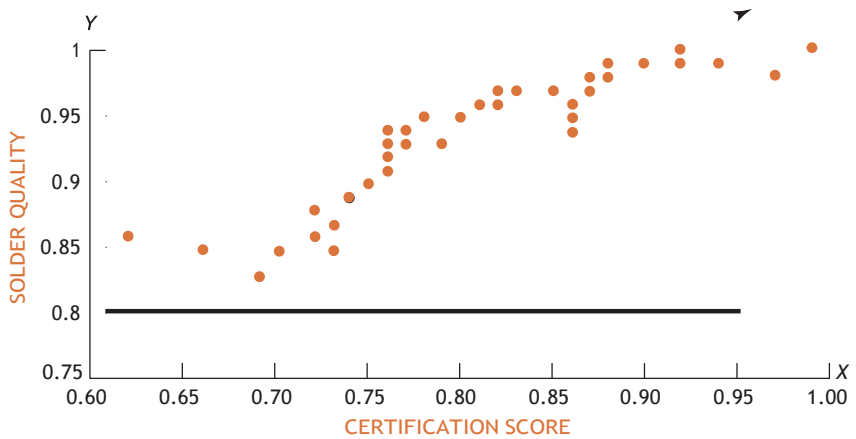

FIGURE 20-19. Scatter plot solder quality and certification score.

The equation of the regression line, or trend line, provides a clear and understandable measure of the change caused in the output variable by every incremental change of the input or independent variable. Using this principle, we can predict the effect of changes in the process.

One of the most important contributions that can be made by trend analysis is forecasting. Forecasting enables us to predict what is likely to occur in the future. Based on the regression line we can forecast what will happen as the independent variable attains values beyond the existing data.

Control Charts

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8.3.2 Control Quality—Tools and Techniques

The use of control charts focuses on the prevention of defects, rather than their detection and rejection. In business, government, and industry, economy and efficiency are always best served by prevention. It costs much more to produce an unsatisfactory product or service than it does to produce a satisfactory one. There are many costs associated with producing unsatisfactory goods and services. These costs are in labor, materials, facilities, and the loss of customers.

The cost of producing a proper product can be reduced significantly by the application of statistical process control charts.

Control Charts and the Normal Distribution

The construction, use, and interpretation of control charts is based on the normal statistical distribution as indicated in Figure 20–20. The centerline of the control chart represents the average or mean of the data ($\bar{X}$). The upper and lower control limits (UCL and LCL, respectively) represent this mean plus and minus three standard deviations of the data ($\bar{X} \pm 3s$). Either the lowercase s or the Greek letter σ (sigma) represents the standard deviation for control charts.

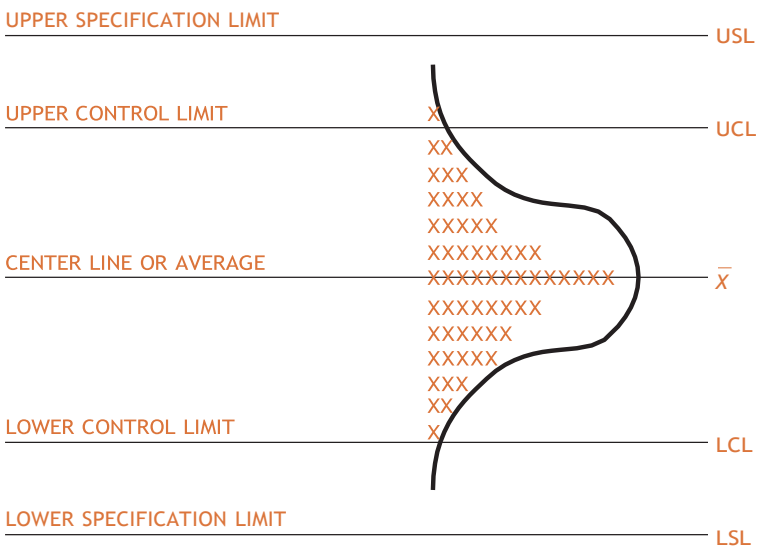

FIGURE 20-20- The control chart and the normal curve.

The normal distribution and its relationship to control charts is represented on the right of the figure. The normal distribution can be described entirely by its mean and standard deviation. The normal distribution is a bell-shaped curve (sometimes called the Gaussian distribution) that is symmetrical about the mean, slopes downward on both sides to infinity, and theoretically has an infinite range. In the normal distribution 99.73 percent of all measurements lie within $\bar{X} + 3s$ and $\bar{X} - 3s$; this is why the limits on control charts are called three-sigma limits.

Companies like Motorola have embarked upon a six-sigma limit rather than a three-sigma limit. The benefit is shown in Table 20–3. With a six-sigma limit, only two defects per billion are allowed. Maintaining a six-sigma limit can be extremely expensive unless the cost can be spread out over, say, 1 billion units produced.

Control chart analysis determines whether the inherent process variability and the process average are at stable levels, whether one or both are out of statistical control (not stable), or whether appropriate action needs to be taken. Another purpose of using con- trol charts is to distinguish between the inherent, random variability of a process and the variability attributed to an assignable cause. The sources of random variability are often referred to as common causes. These are the sources that cannot be changed readily, without significant restructuring of the process. Special cause variability, by contrast, is subject to correction within the process under process control.

- *Common cause variability or variation:* This source of random variation is always present in any process. It is that part of the variability inherent in the process itself. The cause of this variation can be corrected only by a management decision to change the basic process.
- *Special cause variability or variation:* This variation can be controlled at the local or operational level. Special causes are indicated by a point on the control chart that is beyond the control limit or by a persistent trend approaching the control limit.

Control Chart Types

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Just as there are two types of data, continuous and discrete, there are two types of control charts: variable charts for use with continuous data and attribute charts for use with discrete data. Each type of control chart can be used with specific types of data. Table 20–4 provides a brief overview of the types of control charts and their applications.

TABLE 20-3. ATTRIBUTES OF THE NORMAL (STANDARD) DISTRIBUTION

Specification Range (in ± Sigmas)	Percent within Range	Defective Parts per Billion
1	68.27	317,300,000
2	95.45	45,400,000
3	99.73	2,700,000
4	99.9937	63,000
5	99.999943	57
6	99.9999998	2

TABLE 20-4. TYPES OF CONTROL CHARTS AND APPLICATIONS

Variables Charts	Attributes Charts
$\overline{X}$ and R charts: To observe changes in the mean and range (variance) of a process.	p chart: For the fraction of attributes nonconforming or defective in a sample of varying size.
$\overline{X}$ and s charts: For a variable average and standard deviation.	np charts: For the number of attributes nonconforming or defective in a sample of constant size.
$\overline{X}$ and s^2 charts: for a variable average and variance.	c charts: For the number of attributes nonconforming or defects in a single item within a subgroup, lot, or sample area of constant size.
	u charts: For the number of attributes nonconforming or defects in a single item within a subgroup, lot, or sample area of varying size.

Variables Charts. Control charts for variables are powerful tools that we can use when measurements from a process are variable. Examples of variable data are the diameter of a bearing, electrical output, or the torque on a fastener.

As shown in Table 20–4, $\overline{X}$ and R charts are used to measure control processes whose characteristics are continuous variables such as weight, length, ohms, time, or volume. The p and np charts are used to measure and control processes displaying attribute characteristics in a sample. We use p charts when the number of failures is expressed as a fraction, or np charts when the failures are expressed as a number. The c and u charts are used to measure the number or portion of defects in a single item. The c control chart is applied when the sample size or area is fixed, and the u chart when the sample size or area is not fixed.

Attribute Charts. Although control charts are most often thought of in terms of variables, there are also versions for attributes. Attribute data have only two values (conforming/nonconforming, pass/fail, go/no-go, present/absent), but they can still be counted, recorded, and analyzed. Some examples are: the presence of a required label, the installation of all required fasteners, the presence of solder drips, or the continuity of an electrical circuit. We also use attribute charts for characteristics that are measurable, if the results are recorded in a simple yes/no fashion, such as the conformance of a shaft diameter when measured on a go/no-go gauge, or the acceptability of threshold margins to a visual or gauge check.

It is possible to use control charts for operations in which attributes are the basis for inspection, in a manner similar to that for variables but with certain differences. If we deal with the fraction rejected out of a sample, the type of control chart used is called a p chart. If we deal with the actual number rejected, the control chart is called an np chart. If articles can have more than one nonconformity, and all are counted for subgroups of fixed size, the control chart is called a c chart. Finally, if the number of nonconformities per unit is the quantity of interest, the control chart is called a u chart.

The power of control charts (Shewhart techniques) lies in their ability to determine if the cause of variation is a special cause that can be affected at the process level, or a common cause that requires a change at the management level. The information from the control chart can then be used to direct the efforts of engineers, technicians, and managers to achieve preventive or corrective action.

The use of statistical control charts is aimed at studying specific ongoing processes in order to keep them in satisfactory control. By contrast, downstream inspection aims to

identify defects. In other words, control charts focus on prevention of defects rather than detection and rejection. It seems reasonable, and it has been confirmed in practice, that economy and efficiency are better served by prevention rather than detection.

Control Chart Interpretation

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8.3.2 Control Quality—Tools and Techniques

There are many possibilities for interpreting various kinds of patterns and shifts on control charts. If properly interpreted, a control chart can tell us much more than whether the process is in or out of control. Experience and training can help extract clues regarding process behavior. Statistical guidance is invaluable, but an intimate knowledge of the process being studied is vital in bringing about improvements. A control chart can tell us when to look for trouble, but it cannot by itself tell us where to look, or what cause will be found. Actually, in many cases, one of the greatest benefits from a control chart is that it tells when to leave a process alone. Sometimes the variability is increased unnecessarily when an operator keeps trying to make small corrections, rather than letting the natural range of variability stabilize.

20.6 ACCEPTANCE SAMPLING

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8.3.2 Control Quality—Tools and Techniques

Acceptance sampling is a statistical process of evaluating a portion of a lot for the purpose of accepting or rejecting the entire lot. It is an attempt to monitor the quality of the incoming product or material after the completion of production.

The alternatives to developing a sampling plan would be 100% inspection and 0% inspection. The costs associated with 100% are prohibitive, and the risks associated with 0% inspection are likewise large. Therefore, some sort of compromise is needed. The three most commonly used sampling plans are:

- *Single sampling:* This is the acceptance or rejection of a lot based upon one sampling run.
- *Double sampling:* A small sample size is tested. If the results are not conclusive, then a second sample is tested.
- *Multiple sampling:* This process requires the sampling of several small lots.

Regardless of what type of sampling plan is chosen, sampling errors can occur. A shipment of good-quality items can be rejected if a large portion of defective units are selected at random. Likewise, a bad-quality shipment can be accepted if the tested sample contains a disproportionately large number of quality items. The two major risks are:

- *Producer's risk:* This is called the α (alpha) risk or type I error. This is the risk to the producer that a good lot will be rejected.
- *Consumer's risk:* This is called the β (beta) risk or type II error. This is the consumer's risk of accepting a bad lot.

When a lot is tested for quality, we can look at either "attribute" or "variable" quality data. Attribute quality data are either quantitative or qualitative data for which the product or service is designed and built. Variable quality data are quantitative, continuous measurement processes to either accept or reject the lot. The exact measurement can be either destructive or nondestructive testing.

20.7 IMPLEMENTING SIX SIGMA

***PMBOK® Guide*, 6th Edition**
Chapter 8 Project Quality Management
Introduction

Six Sigma is a business initiative first espoused by Motorola in the early 1990s. Recent Six Sigma success stories, primarily from the likes of General Electric, Sony, AlliedSignal, and Motorola, have captured the attention of Wall Street and have propagated the use of this business strategy. The Six Sigma strategy involves the use of statistical tools within a structured methodology for gaining the knowledge needed to create products and services better, faster, and less expensively than the competition. The repeated, disciplined application of the master strategy on project after project, where the projects are selected based on key business issues, is what drives dollars to the bottom line, resulting in increased profit margins and impressive return on investment from the Six Sigma training. The Six Sigma initiative has typically contributed an average of six figures per project to the bottom line. Ultimately, Six Sigma, if deployed properly, will infuse intellectual capital into a company and produce unprecedented knowledge gains that translate directly into bottom line results

Lean Six Sigma and DMAIC

Six Sigma is a quality initiative that was born at Motorola in the 1980s. The primary focus of the Six Sigma process improvement methodology, also known as DMAIC, is to reduce defects that are defined by the customer of the process. This customer can be internal or external. It is whoever is in receipt of the process output. Defects are removed by careful examination from a Six Sigma team made up of cross-functional positions having different lines of sight into the process. The team follows the rigor of the methodology of define, measure, analyze, improve, and control (DMAIC) to determine the root cause(s) of the defects. The team uses data and appropriate numerical and graphical analysis tools to raise awareness of process variables generating defects. Data collection and analysis is at the core of Six Sigma. "Extinction by instinct" is the phrase often used to describe intuitive decision making and performance analysis. It has been known to generate rework, frustration, and ineffective solutions. Six Sigma prescribes disciplined gathering and analysis of data to effectively identify solutions.

Lean manufacturing is another aspect of process improvement derived mostly from the Toyota Production System (TPS). The primary focus of lean is to remove waste and improve process efficiency. Lean is often linked with Six Sigma because both emphasize the importance of minimal process variation. Lean primarily consists of a set of tools

"Implementing Six Sigma" was adapted from Forrest W. Breyfogle, III, *Implementing Six Sigma* (New York: John Wiley & Sons, 1999), pp. 5–7; "Lean Six Sigma and DMAIC" was provided by Anne Foley, Director of Six Sigma, for the International Institute for Learning.

designed to assist in the identification and steady elimination of waste (muda), allowing for the improvement of quality as well as cycle time and cost reduction. To solve the problem of waste, lean manufacturing utilizes several tools. These include accelerated DMAIC projects known as kaizen events, cause-and-effect analysis using "five whys," and error proofing with a technique known as poka-yoke.

Kaizen Events. The source of the word *kaizen* is Japanese: *kai* (take apart) and *zen* (make good). This is an action-oriented approach to process improvement. Team members devote 3–5 consecutive days to quickly work through the DMAIC methodology in a workshop fashion.

Five Whys. This technique is used to move past symptoms of problems and drill down to the root causes. With every answer comes a new question until you've gotten to the bottom of the problem. Five is a rule of thumb. Sometimes you'll only need three questions, other times it might take seven. The goal is to identify the root cause of process defects and waste.

Poka-Yoke. The source of this technique is Japanese: *yokeru* (to avoid) and *poka* (inadvertent errors). There are three main principles of poka-yoke. (1) Make wrong actions more difficult. (2) Make mistakes obvious to the person so that the mistake can be corrected. (3) Detect errors so that downstream consequences can be prevented by stopping the flow or other corrective action. The philosophy behind this technique is that it's good to do things right the first time, but it is even better to make it impossible to do it wrong the first time.

When Six Sigma and lean manufacturing are integrated, the project team utilizes the project management methodology to lead them through the lean Six Sigma toolbox and make dramatic improvements to business processes. The overall goal is to reduce defects that impact the internal and external customer and eliminate waste that impact the cycle times and costs.

20.8 QUALITY LEADERSHIP

***PMBOK® Guide*, 6th Edition**
Chapter 9 Project Resource Management

Consider for a moment the following seven items:

- Teamwork
- Strategic integration
- Continuous improvement
- Respect for people
- Customer focus
- Management-by-fact
- Structured problem solving

Some people contend that these seven items are the principles of project management when, in fact, they are the seven principles of the total quality management program at Sprint. Project management and TQM have close similarity in leadership and team-based decision making.

Section 20.8 adapted from Forrest W. Breyfogle, III, *Implementing Six Sigma* (New York: John Wiley & Sons, 1999), pp. 28–29.

Quality leadership emphasizes results by working on methods. In this type of management, every work process is studied and constantly improved so that the final product or service not only meets but exceeds customer expectations. The principles of quality leadership are customer focus, obsession with quality, effective work structure, control yet freedom (e.g., management in control of employees yet freedom given to employees), unity of purpose, process defect identification, teamwork, and education and training. These principles are more conducive to long-term thinking, correctly directed efforts, and a keen regard for the customer's interest.

To give quality leadership, the historical hierarchical management structure needs to be changed to a structure that has a more unified purpose using project teams. A single per- son can make a big difference in an organization. However, one person rarely has enough knowledge or experience to understand everything within a process. Major gains in both quality and productivity can often result when a team of people pool their skills, talents, and knowledge.

Teams need to have a systematic plan to improve the process that creates mistakes/defects, breakdowns/delays, inefficiencies, and variation. For a given work environment, management needs to create an atmosphere that supports team effort in all aspects of business. In some organizations, management may need to create a process that describes hierarchical relationships between teams, the flow of directives, how directives are transformed into action and improvements, and the degree of autonomy and responsibility of the teams. The change to quality leadership can be very difficult. It requires dedication and patience to transform an entire organization.

20.9 RESPONSIBILITY FOR QUALITY

Everyone in an organization plays an important role in quality management. In order for an organization to become a quality organization, all levels must actively participate, and, according to Dr. Edwards Deming, the key to successful implementation of quality starts at the top.

Top management must drive fear from the workplace and create an environment where cross-functional cooperation can flourish. The ultimate responsibility for quality in the organization lies in the hands of upper management. It is only with their enthusiastic and unwavering support that quality can thrive in an organization.

The project manager is ultimately responsible for the quality of the project. This is true for the same reason the president of the company is ultimately responsible for quality in a corporation. The project manager selects the procedures and policies for the project and therefore controls the quality. The project manager must create an environment that fosters trust and cooperation among the team members. The project manager must also support the identification and reporting of problems by team members and avoid at all costs a "shoot the messenger" mentality.

The project team members must be trained to identify problems, recommend solutions, and implement the solutions. They must also have the authority to limit further processing when a process is outside of specified limits. In other words, they must be able to

halt any activity that is outside of the quality limits set for the project and work toward a resolution of the problem at any point in the project.

20.10 QUALITY CIRCLES

Quality circles are small groups of employees who meet frequently to help resolve company quality problems and provide recommendations to management. Quality circles were initially developed in Japan and have achieved some degree of success in the United States.

The employees involved in quality circles meet frequently either at someone's home or at the plant before the shift begins. The group identifies problems, analyzes data, recommends solutions, and carries out management-approved changes. The success of quality circles is heavily based upon management's willingness to listen to employee recommendations.

The key elements of quality circles include:

- They give a team effort.
- They are completely voluntary.
- Employees are trained in group dynamics, motivation, communications, and problem solving.
- Members rely upon each other for help.
- Management support is active but as needed.
- Creativity is encouraged.
- Management listens to recommendations.

The benefits of quality circles include:

- Improved quality of products and services
- Better organizational communications
- Improved worker performance
- Improved morale

20.11 TOTAL QUALITY MANAGEMENT (TQM)

***PMBOK® Guide*, 6th Edition**
8.1 Plan Quality Management

There is no explicit definition of total quality management. Some people define it as providing the customer with quality products at the right time and at the right place. Others define it as meeting or exceeding customer requirements. Internally, TQM can be defined as less variability in the quality of the product and less waste.

Section 20.11 has been adapted from C. Carl Pegels, *Total Quality Management* (Danvers, MA: Boyd & Fraser, 1995), pp. 4–27.

Figure 20–21 shows the basic objectives and focus areas of a TQM process. Almost all companies have a primary strategy to obtain TQM, and the selected strategy is usually in place over the long term. The most common primary strategies are:

- Solicit ideas for improvement from employees.
- Encourage and develop teams to identify and solve problems.

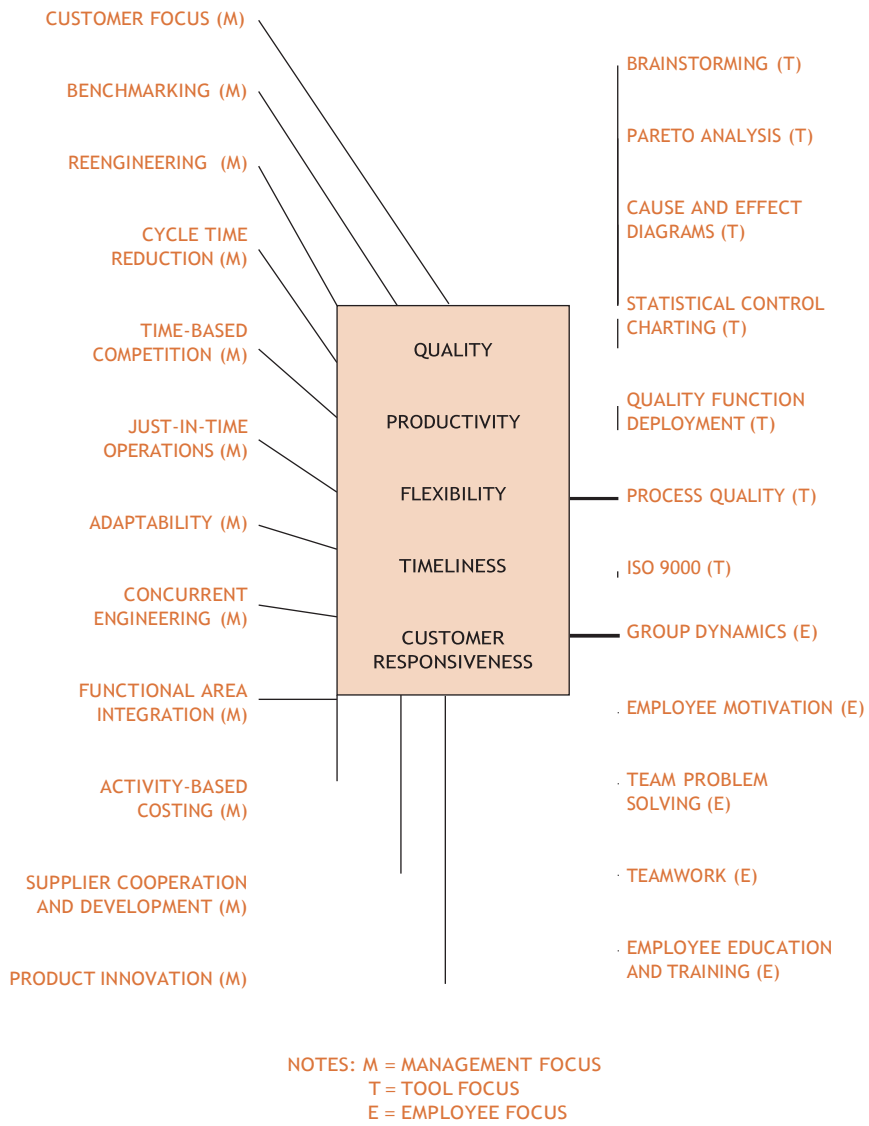

FIGURE 20-21. TQM objectives and focus areas.

Source: C. Carl Pegels, *Total Quality Management* (Danvers, MA: Boyd & Fraser, 1995), p. 6.

- Encourage team development for performing operations and service activities resulting in participative leadership.
- Benchmark every major activity in the organization to ensure that it is done in the most efficient and effective way.
- Utilize process management techniques to improve customer service and reduce cycle time.
- Develop and train customer staff to be entrepreneurial and innovative in order to find ways to improve customer service.
- Implement improvements so that the organization can qualify as an ISO 9000 supplier.

There also exist secondary strategies that, over the long run, focus on operations and profitability. Typical secondary strategies are:

- Maintain continuous contact with customers; understand and anticipate their needs.
- Develop loyal customers by not only pleasing them but by exceeding their expectations.
- Work closely with suppliers to improve their product/service quality and productivity.
- Utilize information and communication technology to improve customer service.
- Develop the organization into manageable and focused units in order to improve performance.
- Utilize concurrent or simultaneous engineering.
- Encourage, support, and develop employee training and education programs.
- Improve timeliness of all operation cycles (minimize all cycle times).
- Focus on quality, productivity, and profitability.
- Focus on quality, timeliness, and flexibility.

Related Case Studies (from Kerzner/*Project Management Case Studies*, 5th ed.)	**Related Workbook Exercises (from Kerzner/*Project Management Workbook and PMP®/CAPM® Exam Study Guide*, 12th ed.)**	***PMBOK® Guide*, 6th Edition, Reference Section for the PMP® Certification Exam**
None	• Constructing Process Charts • Constructing Cause-and-Effect • Charts and Pareto Charts • The Diagnosis of Patterns of • Process Instability, Part (A): X Charts • The Diagnosis of Patterns of Process Instability, Part (B): R Charts • Quality Circles • Quality Problems • Multiple Choice Exam • Crossword Puzzle on Quality Management	• Quality Management

Quality Circles

Practical Considerations for Public Managers

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QUALITY circles (QC) are organizational interventions that seek to increase an organization's productivity and the quality of its products through direct employee participation. The underlying assumption is that such participation will result in useful suggestions for improving work methods and quality control, and for increasing employee commitment to implement these changes. A quality circle is composed of a small group of employees, doing similar work, who volunteer to meet periodically to discuss production, quality, and related problems, to investigate causes, recommend solutions, and take corrective actions to the extent of their authority.

Normally, a company-wide steering committee of both union and management representatives decides where in the organization quality circles should be introduced and what types of problems are appropriate for the quality circles to work on. Once initiated,

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a quality circle (consisting of about ten employees from a work unit and their immediate supervisor) holds a weekly one-hour meeting to discuss ways of improving productivity and related issues. To aid their effectiveness, the group and its leader are trained in group dynamics, problem solving, data analysis, quality control, and the presentation of information and recommendations to management. Circle leaders usually receive about three days of training prior to the circle's first meeting. Circle members receive their training during the first eight to ten circle meetings. These meetings are held on company time and at company expense, and the decision to implement any of the group's suggestions remains ultimately with management. External facilitators, who have received about five days of training in the use of quality circle techniques and are usually company employees, guide and assist the quality circle during the meetings.

The QC concept, developed by the Japanese largely on organizational research conducted in the United States, has reportedly been used with great success since the early 1960s. Although it was experimentally tested in the U.S. by Corning Glass, Lockheed Missile and Space Company became the first American corporation to initiate a large-scale program in 1974. By 1977 Lockheed estimated that quality circles had saved the company approximately three million dollars. The ratio of savings to the cost of operating the circles was six to one, and the number of defects per 1,000 hours caused by manufacturing process problems had dropped sixty-seven percent.[1] While Lockheed's efforts have since waned, the spread of QC programs throughout American industry is unparallelled by any other organizational improvement program. A recent *Wall Street Journal* reports that about a thousand organizations now have some form of quality circle program.[2] This compares to 150 participating organizations just one year ago.

[1] Ed Yager, "Examining the Quality Control Circle," *Personnel Journal,* LVIII (October 1979), 682-708.

[2] *The Wall Street Journal,* September 22, 1981, 29.

The spread of QC programs throughout American industry is unparallelled by any other organizational improvement program.

Within the federal sector, the Navy was the first to implement a quality circle program in 1979 in its Norfolk Naval Shipyard. By 1980 the shipyard claimed to have achieved a four-to-one cost-benefit ratio.[3] The Navy has since expanded its QC program to a number of its bases and shipyards. In addition, a variety of other federal agencies (including the Air Force, the Veteran's Administration, and the Public Health Service) have all begun to experiment with their own quality circle programs. Interest in the QC process among federal agencies appears to be rapidly growing.

Some Unanswered Questions

The reported success of quality circle programs along with increased emphasis on public sector productivity has generated considerable interest among federal managers in the use of quality circles in the federal government. While reports of success are typical, several questions remain to be answered before the large-scale introduction of quality circles can be recommended for the federal sector.

How effective will quality circles be with the federal government's predominantly white collar workforce? Most quality circle programs in the United States and Japan have dealt primarily with blue collar, production employees. While the importance of productivity and quality of work life improvements among the government's sizable blue collar population are not to be overlooked, there is tremendous potential for larger gains in the government's huge white collar workforce. Since a large proportion of the federal workforce is white collar, it is essential that we carefully determine the potential impact of QCs on these groups before recommendations are made for their widespread implementation. The self-initiated nature of much white collar work, the nonroutine nature of much staff work, the difficulty in establishing precise performance measures, and the presence of individualistic attitudes may serve as barriers to effective QC programs. It is possible, of course, that some of these same characteristics by virtue of their creative nature could facilitate the performance of quality circles. However, the mechanisms for turning what many see as barriers into positive factors are still not known.

[3] Joseph M. Law, "Quality Control Circles at the Norfolk Naval Shipyard," *Management,* I (Summer 1980), 2-5.

How can quality circle programs be adapted to increase their success with the federal workforce? Although quality circles have been successfully introduced in several segments of American industry, their potential effectiveness for the federal government remains in question. The public sector differs in many respects from private industry. To begin with, the composition of the federal workforce and the needs of its personnel for things such as high job security may not reflect those of the private sector workforce. There may also be feelings of hostility and alienation among federal workers, who view themselves as political surrogates with a nonsupportive top management. Furthermore, in these times of personnel cutbacks and lowered pay increases, federal employees may not perceive clearly the relationship between their own productivity and their personal growth and future. The federal workforce also suffers from weak and often invalid measures of organizational performance, which are occasionally coupled with conflicting objectives due to the vagaries of the political process. Finally, the public sector encounters a planned and regular change of top management, its policies and organizational structures. The combination of these and other differences may either increase or decrease the value of introducing a quality circles program. Research must be conducted to specify clearly the impact of these employee and employment differences so that QC programs can be tailored for use by the federal workforce.

What are the underlying motivational and social processes in QCs that are responsible for their success? Although many articles report the success of quality circles, there has been little systematic attention given to determining which aspects of the QC process are responsible for their success. One possibility is the attention given by management to production employees, perhaps for the first time. This, of course, is commonly known as the Hawthorne effect, whereby employee effort and morale improve when management introduces any change that employees interpret as an expression of concern for their satisfaction and well-being. Another possible reason is the facilitation of the group's interaction due to the process-oriented aspects of team building and employee participation (e.g. the emphasis on improving group dynamics). A third reason may be the unique productivity and task-oriented nature of the QC program (e.g. the focus on data analysis and

problem-solving techniques). A better understanding of these processes is needed to successfully implement and modify quality circle programs in the federal government. It is also important to understand what process ensures QCs are the most cost effective way to achieve desired productivity changes. By determining how QCs can be the most effective, we can avoid the frustration and wasted energy associated with unsuccessful initiatives.

How successful have QC programs actually been? As indicated above, measuring the success of QC programs in the white collar, federal sector will probably be difficult. However, even in blue collar jobs (either in the public or private sectors), the reported successes probably exceed the actual effectiveness of programs in three basic ways. In the first place, there often is a bias in the reporting of successes. Secondly, cost savings are often estimated through savings in employees' time, which is then assumed (but not demonstrated) to be spent doing more productive work rather than resting or in some other nonproductive way. Thus the actual extent of success is unclear. Finally, the cost of the program (including the facilitators, their supervisors, general program management, coordination time, and the work of the steering committee) is often underestimated or not all-inclusive. On the other hand, the QWL benefits of quality circles are also often not measured. Achievements in this area could easily offset many financial costs.

How effective are quality circles relative to other, more conventional organizational interventions? Is the specific task-oriented quality circle more effective in increasing productivity than other performance improvement methods (such as team building) that emphasize improving interpersonal relations within the workgroup and between supervisors and subordinates? Alternatively, would an even more explicit attempt to match the technical and social systems, such as in the socio-technical system approach, prove to be a superior method? Indeed, would the federal government be made substantially more effective through increasing capital expenditures for office automation among its white collar workers rather than through quality circles? These different approaches are not, of course, mutually exclusive, but their relative effectiveness should be considered. The federal government need not see quality circles as the primary option for productivity improvement. There is an imperative need to determine where this tech-

nique may be more effective than other productivity improvement techniques.

How can quality circles be most effectively introduced? Should quality circles be implemented directly into ongoing workgroups, or are they more likely to be effective as a second phase of organizational intervention? If the latter, a first phase will have already focused on improving the existing interpersonal processes within the workgroup, minimizing levels of distrust and facilitating positive feelings between supervisors and employees and among fellow workers. Past observations of quality circles have indicated that such programs work best when good management-employee relationships already exist, and that they are more likely to fail when such conditions are absent.[4]

How can the programs be sustained over time? The initial success of many kinds of innovative productivity and quality of work life programs has not been sustained over time. Recent research shows that as many as seventy-five percent of initially successful programs were no longer in operation after a few years.[5] As mentioned at the beginning of this article, even Lockheed, the initial American QC proponent, has reportedly moved away from quality circles. Perhaps most sobering is the following quotation from Robert Cole, one of the leading authorities on the Japanese labor force:

> The fact is that the circles do not work very well in many Japanese companies. Even in those plants recognized as having the best operation programs, management knows that perhaps only one-third of the circles are working well, with another third borderline and one-third simply making no contribution at all. For all of the rhetoric of voluntarism, in a number of companies, the workers clearly perceive circle activity as coercive. Japanese companies face a continuing struggle to revitalize circle activity to insure that it does not degenerate into ritualistic behavior.[6]

Thus, even if there were no significant differences between Japanese and American systems of employment and levels of organizational commitment—which make the Japanese work environment

[4] Robert E. Cole, "Learning from the Japanese: Prospects and Pitfalls," *Management Review,* IX (September 1980), 22-28, 38-42.

[5] Paul S. Goodman, "Quality of Work Projects in the 1980s," *Labor Law Journal,* XXXI (August 1980), 487-94.

[6] Robert E. Cole, "Will QC Circles Work in the U.S.?" *Quality Progress,* XIII (July 1980), 30-33.

considerably more suitable for such a participative technique—this evaluation contrasts markedly with the reports of advocates who urge immediate and widespread implementation of the "proven" quality circle technique. Clearly, research is needed to find ways to keep quality circles viable and productive in the long run if they are to justify their financial and organizational costs.

Some Implications for Managers

In addition to raising these unanswered questions, we should also think carefully about the potential negative implications of the widespread introduction of quality circles. There are two fundamentally different ways in which organizational interventions of any kind can fail. The program itself may not work at all or may not work as effectively as anticipated; or the program, whether successful or not, may produce a series of other problems that were not anticipated. The latter possibility is most easily overlooked in planning for organizational change. Of course, experiencing both types of program failures can have quite negative consequences for the organization that introduces the program.

Both types of program failures are possible when quality circles are implemented. The first type might be represented by a QC program that simply fails to get many volunteers or that fails to produce useful suggestions for quality or productivity improvements. The second type could be a QC program that was perceived by the union or middle management as a major threat to their authority. The resulting perceptions could exacerbate existing union-management conflict or affect the implementation of other programs because of low morale or resistance from anxious middle managers. A quality circle program may even generate both types of program failures simultaneously. Such a set of program failures could result in a situation in which an organization did not receive the expected benefits of QC-induced productivity improvement but did suffer from worsened worker-supervisor morale and heightened union-management conflict, and these, in turn, could lower overall productivity. Some implications may be drawn from these considerations as well as from the unanswered questions raised earlier.

Managers should first conduct a careful organizational diagnosis to ensure that an organizational development intervention is appropriate. They should be sure that their problem is caused by group

processes or other types of problems addressed by organizational development interventions and not by general problems of organizational design, outmoded equipment, or technical design. Both Edward Deming and Joseph Juran, the fathers of Japanese quality control, have indicated that only about fifteen percent of the faults in production work are traceable to a certain worker whereas about eighty-five percent are attributable to the system and will stay there until reduced by management.[7] A diagnosis may require consulting with those inside or outside the organization who are knowledgeable about a variety of different sources of and solutions to organizational problems.

If such an intervention is needed, managers should be sure that quality circles are the most appropriate type of intervention. Other types of organizational interventions such as team building, job enrichment, socio-technical approaches, or alternative work schedules may be more suitable and potentially effective in a specific organizational setting.

Management should not have inflated expectations of what quality circles are likely to do. Expectations should be reduced both in terms of scope and time. Quality circles may lead to a significant cost saving or some other major productivity improvement, but in any particular organization they are unlikely to do more than make minor improvements or may even do no more than improve the quality of work life of the work group or improve job satisfaction without improving productivity. This, of course, should be a major goal of the manager, but it is a different issue than productivity improvement per se.

Improvements resulting from a QC program may not occur quickly. Even under the best circumstances, there is a long period of organization and training involved before the circles are able to operate efficiently. In addition, the actual solution to any problem (or even the suggestions for changes that the group is likely to determine) will probably take some time to materialize and even longer to implement beyond the immediate work group.

Managers should not introduce QCs into organizations that are under extreme stress. Organizations in trouble, especially from acrimonious union-management conflict or where high levels of

[7] Edward W. Deming, *Management of Statistical Techniques for Quality and Productivity* (Washington, DC: privately printed, 1981).

distrust exist between employees and management, will not likely be good candidates for QCs. Quality circles are not effective substitutes for appropriate labor-management relations; nor are they miracle cures for management problems that require fundamental changes in organizational policies and new strategic directions.

Managers should be concerned about the financial and organizational cost of large QC programs throughout the entire organization. The financial costs of introducing and maintaining a QC program and a separate staff of facilitators are sizable. An organization with many quality circles will require an appropriate number of facilitators and other support staff. While the benefits may easily outweigh the financial costs, managers should be aware of the significant maintenance and operating costs associated with large QC programs. In addition, the costs of extensive coordination and resolving potential conflict between departments and workgroups may also be great for the organization and its managers.

Managers should probably expect that, first, a number of the quality circles will fail from the start and, second, that some of those that are initially successful will not continue to be successful over the long run. Quality circle programs will generally encounter strong resistance from middle managers and distrust from unions and workers unless they are very carefully introduced with strong management support through an effective steering committee and by well trained and committed facilitators. Even with skillful implementation, this resistance and distrust may still exist and can lead to circles that fail. In addition, competing management pressures for increased production during peak periods of the month or the year may result in infrequent meetings and deterioration in interest and effectiveness. Some programs are likely to deteriorate as different policy emphases appear, as changes in personnel occur both among management and members of the work groups, as the rewards of participation and recognition become less attractive over time, or as overt labor-management conflict allows adversarial rather than cooperative arrangements to reemerge.

If there is widespread introduction of quality circles, there should not only be careful procedures for program evaluation but also an explicit commitment to develop research projects that can answer some of the questions that remain unanswered. Thus, if there are operational programs (subject to the managerial consid-

erations suggested above), there should also be experimental programs where careful research is being conducted to ensure that answers are generated for the questions we have raised here. The purpose of that research would be to try to change the probabilities of both types of program failure by more clearly understanding the group and organizational processes that lead to program success.

It would be unrealistic and inappropriate to expect that operational programs will not be introduced until all research answers are in. Such a realization, however, should not preclude the federal government or other organizations from conducting systematic research to answer these questions about quality circles at the same time that some programs are introduced.

Conclusion

Quality circle programs can and do work—but not all the time, nor in all places, or necessarily as well as expected. In this paper we have raised some troubling questions and have looked at some of their implications for managers in the federal government. Several of the issues we have addressed are unique to the white collar federal workforce. Others should apply to most organizational settings.

Quality circles should be viewed in the broader context of organizational change. They are not only a technique to improve productivity, but can also have positive effects on the quality of work life. Emphasizing only their productivity aspects may ultimately result in negative consequences. Ignoring their potential for improving the work environment may result in a substantial loss. Quality circles are clearly a valuable addition to the repertoire of improvement strategies that can be used by federal managers, but only when they are used with realistic expectations and introduced into appropriate organizational settings where there will be higher probabilities of success.

2.0 PROJECT LIFE CYCLES

Every program, project, or product has certain phases of development known as life-cycle phases. A clear understanding of these phases permits managers and executives to better control resources to achieve goals. During the past few years, there has been at least partial agreement aboutthe life-cycle phases of a product. They include:

- Research and development
- Market introduction
- Growth
- Maturity
- Deterioration
- Death

Today, there is no agreement among industries, or even companies within the same industry, about the life-cycle phases of a project. This is understandable because of the complex nature and diversity of projects. The theoretical definitions of the life-cycle phases of a system can be applied to a project. These phases include:

- Conceptual
- Planning
- Testing
- Implementation
- Closure

The first phase, the conceptual phase, includes the preliminary evaluation of an idea. Most important in this phase is a preliminary analysis of risk and the resulting impact on thetime, cost, and performance requirements, together with the potential impact on companyresources. The conceptual phase also includes a "first cut" at the feasibility of the effort.

The second phase is the planning phase. It is mainly a refinement of the elements in theconceptual phase and requires a firm identification of the resources required and the establishment of realistic time, cost, and performance parameters. This phase also includes the initial preparation of documentation necessary to support the system. For a project based on competitive bidding, the conceptual phase would include the decision of whether to bid,and the planning phase would include the development of the total bid package (i.e., time,schedule, cost, and performance).

Because of the amount of estimating involved, analyzing system costs during the conceptual and planning phases is not an easy task. As shown in Figure 2–12, most project orsystem costs can be broken down into operating (recurring) and implementation (nonrecurringring) categories. Implementation costs include one-time expenses such as construction of anew facility, purchasing computer hardware, or detailed planning. Operating costs includerecurring expenses such as human resources. The operating costs may be reduced as shownin Figure 2–12 if personnel perform at a higher position on the learning curve. The identification of a learning curve position is vitally important during the planning phase when firmcost positions must be established. Of course, it is not always possible to know what individuals will be available or how soon they will perform at a higher learning curve position.Once the approximate total cost of the project is determined, a cost-benefit analysis should be conducted (see Figure 2–13) to determine if the estimated value of the information obtained from the system exceeds the cost of obtaining the information. This analysis

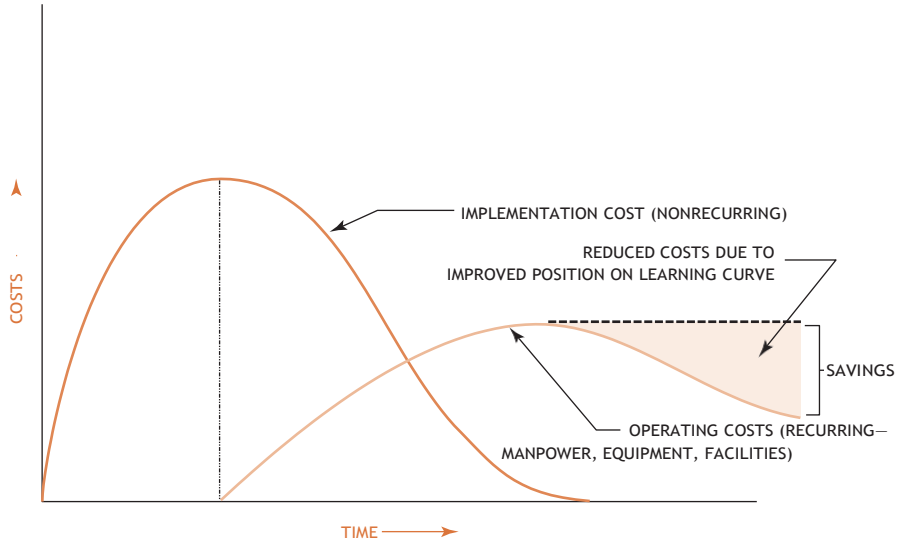


FIGURE 2–12. System costs.

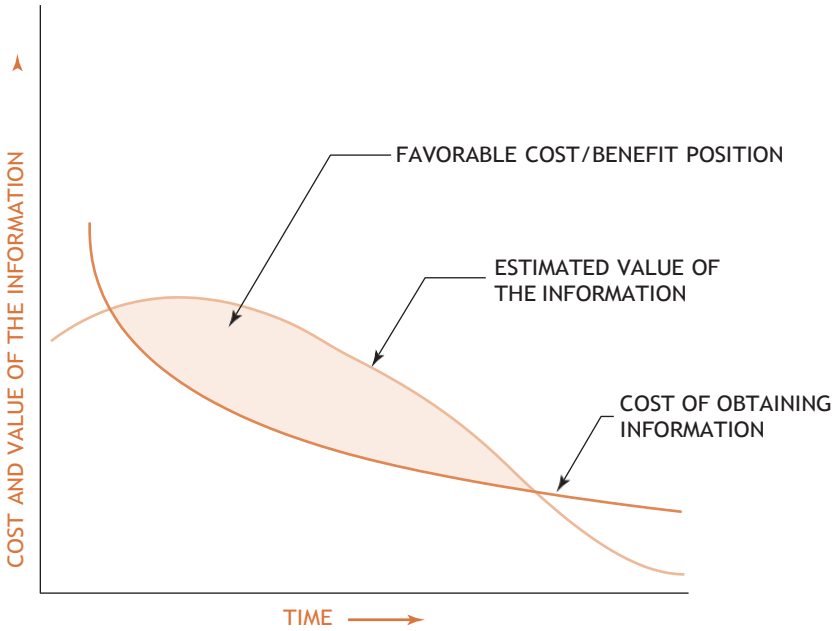


FIGURE 2–13. Cost–benefit analysis.

is often included as part of a feasibility study. There are several situations, such as in competitive bidding, where the feasibility study is actually the conceptual and definition phases. Because of the costs that can be incurred during these two phases, top-managementapproval is almost always necessary before the initiation of such a feasibility study.

The third phase—testing—is predominantly a testing and final standardization effort so that operations can begin. Almost all documentation must be completed in this phase.

The fourth phase is the implementation phase, which integrates the project's product or services into the existing organization. If the project was developed for establishment ofa marketable product, then this phase could include the product life-cycle phases of market introduction, growth, maturity, and a portion of deterioration.

The final phase is closure and includes the reallocation of resources. Consider a company that sells products to consumers. As one product begins the deterioration and death phases of its life cycle (i.e., the divestment phase of a system), new products or projects must be established. Such a company would, therefore, require a continuous stream of projects to survive, as shown in Figure 2–14. As projects A and B begin their decline, newefforts (project C) must be developed for resource reallocation. In the ideal situation, thesenew projects will be established at such a rate that total revenue will increase and companygrowth will be clearly visible.

The closure phase evaluates the efforts of the total system and serves as input to the conceptual phases for new projects and systems. This final phase also has an impact on other ongoing projects with regard to identifying priorities.

Table 2–7 identifies the various life-cycle phases that are commonly used in differentindustries. However, even in mature project management industries such as construction, one could survey ten different construction companies and find ten different definitions forthe life-cycle phases.

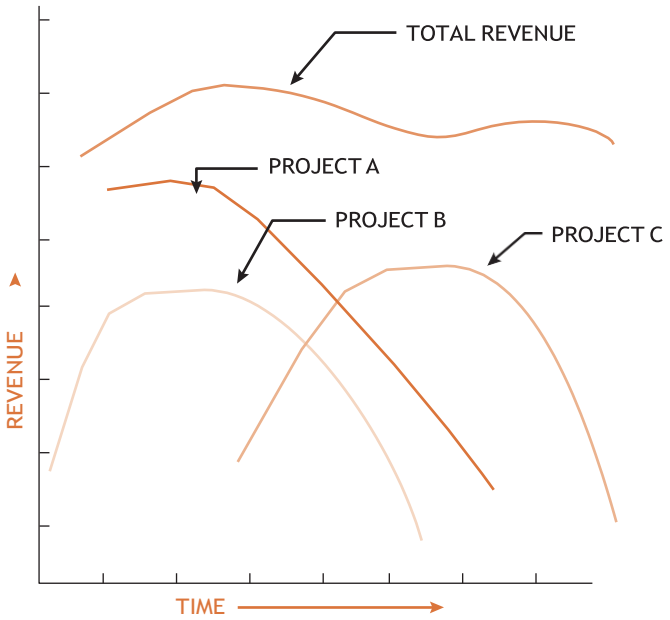


FIGURE 2–14. A stream of projects.

TABLE LIFE-CYCLE PHASE DEFINITIONS

Engineering	Manufacturing	Computer Programming	Construction
• Start-up • Definition • Main • Termination	• Formation • Buildup • Production • Phase-out • Final audit	• Conceptual • Planning • Definition and design • Implementation • Conversion	• Planning, data gathering, and procedures • Studies and basic engineering • Major review • Detail engineering • Detail engineering/construction overlap • Construction • Testing and commissioning

Not all projects can be simply transposed into life-cycle phases (e.g., R&D). It mightbe possible (even in the same company) for different definitions of life-cycle phases toexist because of schedule length, complexity, or just the difficulty of managing the phases.

Top management is responsible for the periodic review of major projects. This shouldbe accomplished, at a minimum, at the completion of each life-cycle phase.

2.1 GATE REVIEW MEETINGS (PROJECT CLOSURE)

Gate review meetings are a form of project closure. Gate review meetings could result in the closure of a life-cycle phase or the closure of the entire project. Gate review meetings must be planned for, and this includes the gathering, analysis, and dissemination of pertinent information. Thiscan be done effectively with the use of forms, templates, and checklists.

There are two forms of closure pertinent to gate review meetings: contractual closureand administrative closure. Contractual closure precedes administrative closure.

Contractual closure is the verification and signoff that all deliverables required for thisphase have been completed and all action items have been fulfilled. Contractual closure isthe responsibility of both the project manager and the contract administrator.

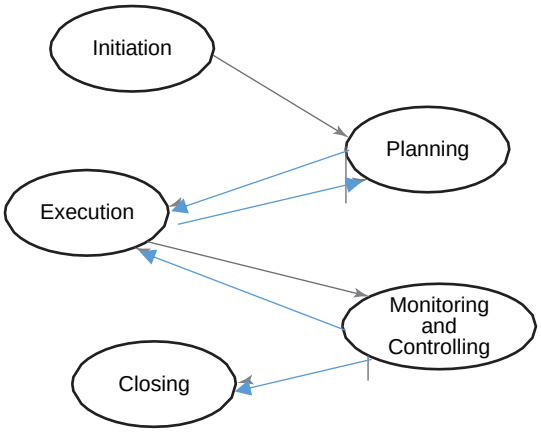
Administrative closure is the updating of all pertinent records required for both the customer and the contractor. Customers are particularly interested in documentation on any as-built or as-installed changes or deviations from the specifications. Also required isan archived trail of all scope changes agreed to during the life of the project. Contractors are interested in archived data that include project records, minutes, memos, newsletters, change management documentation, project acceptance documentation, and the history ofaudits for lessons learned and continuous improvement.

A subset of administrative closure is financial closure, which is the closing out of all charge numbers for the work completed. Even though contractual closure may have takenplace, there may still exist open charge numbers for the repair of defects or to complete archived paperwork. Closure must be planned for, and this includes setting up a timetableand budget. Table below shows the activities for each type of closure.

FORMS OF PROJECT CLOSURE

	Engineering	Administrative	Financial
Purpose	Customer signoff	Documentation and traceability completed	Shut down the completed work packages
When	End of the project	After contractual closure is completed	Throughout the project when work packages are completed
Activities	Verification and validation	Completion of minutes, memos, handouts, reports, and all other forms of documentation	Closing out work orders for completed work
	Conformance to acceptance criteria, including quality assurance requirements	Archiving of documentation administrative closure	Documenting results for
	Walkthroughs, testing, reviews, and audits	Capturing the lessons learned and best practices	Transferring unused funds to the management reserve or profits

Compliance testing	Releasing resources	User testing
Review of scope changes	Documenting as-built changes	



ProjectScheduling

Source:
Project Planning, Scheduling & Control, James P. Lewis, Ph.D., Pmp, Mcgraw Hills

THE BASICS OF SCHEDULING

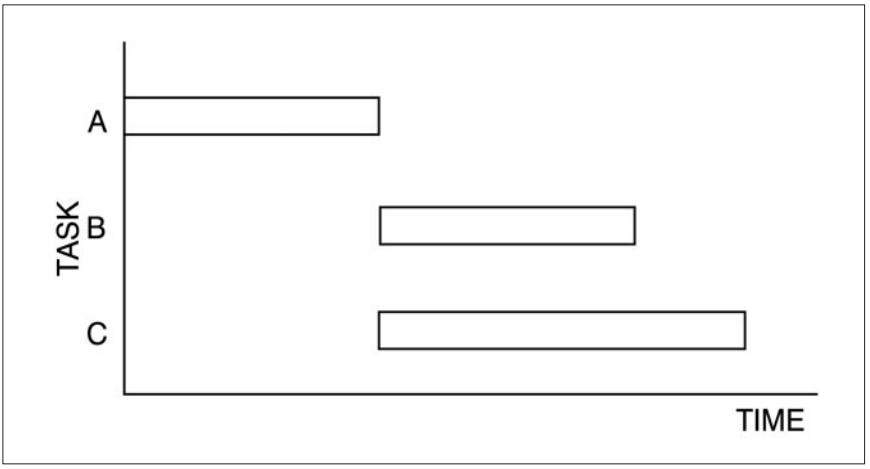
Before we go any further, let's make sure you are familiar with all ofthe terms and concepts of scheduling. If you are absolutely sure that you know this material, feel free to skip to the next section. Otherwise, read on.

> How does a project get to be a year behind schedule? One day ata time. —Fred Brooks Svstem 360 Chief Designer. IBM

Until about 1960, projects were scheduled using bar charts. Henry Gantt worked out a sys- tem of notation for creating such charts and using them to report progress, so they are commonly called Gantt charts. A simple example is shown in Figure 9.1.

This is the way Gantt charts were drawn before 1960. Notice that the chart gives no indication of whether Tasks B and C depend

F I G U R E 9.1 A Simple Gantt Chart



on the completion of Task A or whether they just coincidentally start when A is completed. This means that if Task A slips, we can'ttell what impact it will have on subsequent tasks.

For that reason, a method of showing such dependencies was developed in the late 1950s. The relationships among tasks were shown using arrow diagrams. Two different forms were developed. One was called critical path method (CPM), and the other was called program evaluation and review technique (PERT). The difference between the two systems is that PERT makes use of a calculated task duration and allows you to estimate probabilities ofcompleting work, whereas CPM just makes use of estimated task durations with no regard for probabilities.

Both systems allow you to determine which series of activities(or path) in a project will take the longest time to complete. When the project is scheduled to end at the point where the critical path ends, it will have no latitude. Shorter paths, however, will have latitude, which is called either *slack* or *float*. The slack or float providessome protection from unexpected events or from inaccurate estimates. You never want to have a schedule that has no float, as the risk that you won't meet your completion date is extremely high.

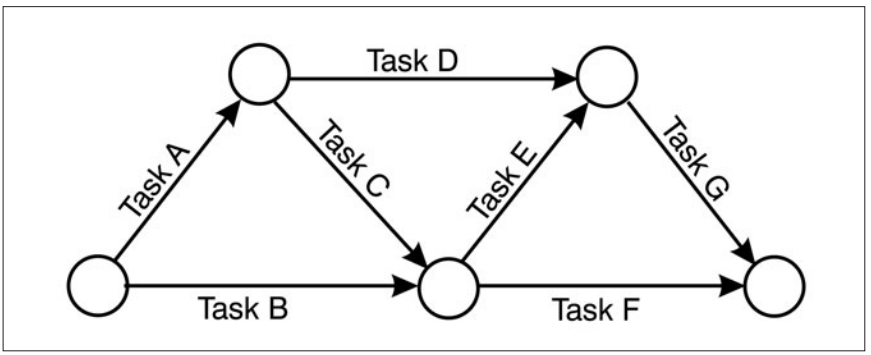
In addition to there being two systems, thereare two forms of notation.One is called activity- on-arrow (AOA), and the other is called activity-on-node (AON). In AOA

Critical path: a path that has no float and is the longest path through the project

Float or slack: any path shorter than the critical path will have latitude, which is commonly called either float or slack.

notation, the arrow rep-
resents the work to be
done, and the circle represents an event—either the beginning of an-other activity or the completion of a previous one. This is shown inFigure 9.2.

F I G U R E 9.2 Activity-on-Arrow Notation

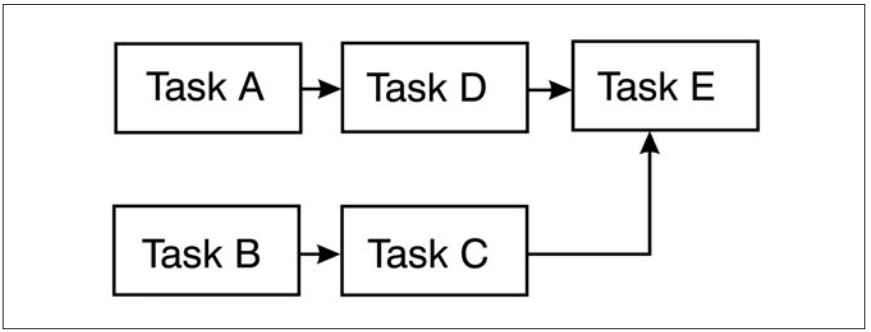


For AON notation, a box (or node) is used to show the task itself, and the arrows simply show the sequence in which work is done. This is shown in Figure 9.3.

Since both systems get the same schedule results, it makes no difference which one is used. However, most software produces only one of them, and it is usually AON. A few programs, such as Primavera, allow you to choose the system you prefer.

Arrow diagrams allow you to determine whether it is possiblefor a task to start at a certain time. When you create a large schedule using bar charting, you may inadvertently show tasks starting before a predecessor is finished, and if this isn't possible, then yourschedule won't work. This was one of the main reasons why CPMand PERT were created in the first place. So, if you want to createa schedule that will work, you should always work out the interdependencies among all of the activities in a project.

F I G U R E 9.3 Activity-on-Node Notation



However, you don't want to give people an arrow diagram touse as a working tool. These diagrams are too hard to read. The bar chart is a much better working tool because it is simple to read.Fortunately, all scheduling software will produce a bar chart for you. Be careful, though. One common error that people make is to tell the software that every task must start on a certaindate and end on a certain date, and if these conflict with what is naturally going to happen based on task dependencies, the software will just regurgitate your input,and you will be left with a useless schedule. The software itself is designed to tell you when tasks will start and end, based on their durations, resource allocations, and interdependencies. If you tam-per too much with dates, you will have a garbage-in–garbage-out situation.

> Be careful not to enter too many "must-start-on" and "must-end-on"dates into your schedule, or you will create a schedule that simply won't work.

Furthermore, if you don't enter predecessor or successor information into your software, then it cannot work out your critical path and deter-mine how much slack or float you have on noncritical paths. This approach relegates the soft-ware to a presentation tool at best, and only allows you to documentyour failures.

> You *must* enter dependencies in order for your software to work out where your critical path and float are.

Although both CPM and PERT find the critical path and float in a project, the emphasis has always been on the critical path. However,in today's world, the objective of project management is universally to complete a project in the minimum possible time,and this is a primary ad-vantage of using arrow diagrams. The shortest possible schedule will be the one in which as many tasks as possible are donein parallel. This can only be calculated using a computer, as the resource allocation problembecomes formidable and the use of manual methods is nearly impossible for all but the most trivial of networks.

> The real advantage of network diagramming is to help you find all the places where work can be done in parallel, thus creating the shortest possible schedule.

Before You Use the Software

There is a great temptation to create a schedule by entering data into the templates provided by the software. There is a major flaw in this approach. You can see only a small segment of a large projectschedule on the screen, and if activities have predecessors or succesors that are off the screen, it can be almost impossible to determine a better approach. A major advantage of this method is that a group can participate, and members can see possibilities that you may miss if you do the scheduleindividually. Then, once the logic is worked out to everyone's satisfaction, you can have someone transcribe the network into your scheduling software and let the computer generate dates foractivities.

In creating a schedule this way, follow this guideline: if twotasks can be done in parallel from a logical standpoint, draw themthat way. It is tempting to consider resource limitations while constructing a schedule, but if you do, it will take you forever to workout the network, and you may have tied your hands unnecessarily.

For example, suppose I have assigned Mary to two tasks that can logically be done in parallel. When I start constructing my schedule, I decide that it won't be possible to do the work in parallel, since Mary can't do two things at the same time. So I draw themin series instead.

But who says that Mary *must* do both of them? Perhaps Jane can do one of them and Mary can do the other. That will produce ashorter schedule than if the two tasks are done in series.

In addition, suppose one task has a 10-day duration and the second has a 5-day duration. They are parallel, but the 10-day taskalso has 5 days of float. Thus, these two tasks can be done in seriswithout impacting

project completion, and Mary can do both of them. This is shown in Figure 9.4.

A little thought reveals that following this rule means that you are adopting a hidden assumption that you have unlimited resources—which, naturally, you don't. So you find that you have double- and triple-scheduled members of your team.

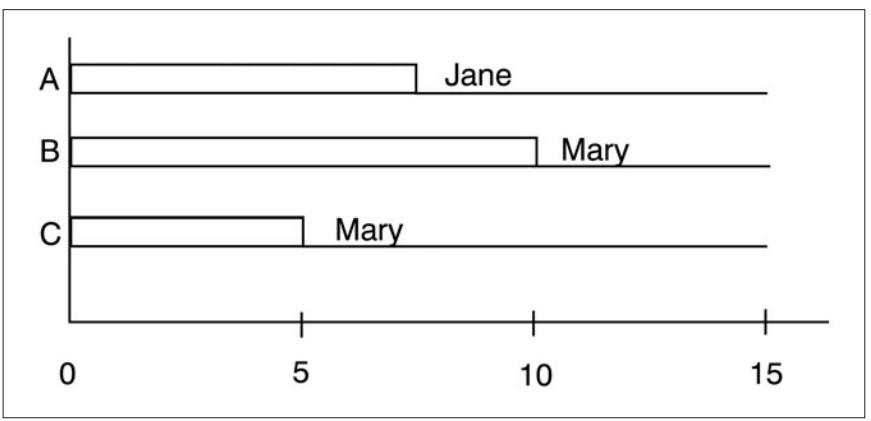
Not a good rule, you say.

True, but think about it this way. An unlimited-resource schedule will produce the shortest possible schedule. Since most projects are assigned an end date from the beginning, if you createan unlimited-resource schedule and it won't meet the imposed enddate, then you are in trouble before you do any work, and you mayas well know it. You know it will only get worse when you factor inyour limited fund of resources.

The important point is that the software enables everyone to seewhat possibilities exist for a project and to make informed decisions

F I G U R E 9.4

Schedule with Mary on Both Tasks



about trade-offs. Remember, you are always constrained by PCTS,and if you can't meet the required time with the available resources(this equates to cost), then you will have to find more help, reducescope, or—heaven help you—reduce performance (quality of work). The latter is generally unacceptable, but it is what your team membersmay do if you don't give them relief from time or scope constraints.

SOFTWARE CAPABILITIES

I have mentioned elsewhere that there are lots of people who think that project management is just scheduling. If they provide you with a software program, they have made you into an instant project manager—or, at the very least, into a scheduler. Of course, this couldn't be further from the truth.

The software can't work out dependencies for you. That is something that you must do yourself. Nor can it tell you how long a task will take. All it can do is computations. It is a tool, and unless you know how to deal with the various issues in a project, all that tool can do is help you document your failures with great precision.

In fact, we have given thousands of individuals powerful scheduling software without training them how to manage. This is like giving someone a fantastic accounting program when the per- son doesn't know the difference between a debit and a credit and expecting the software to turn him or her into a skilled accountant.

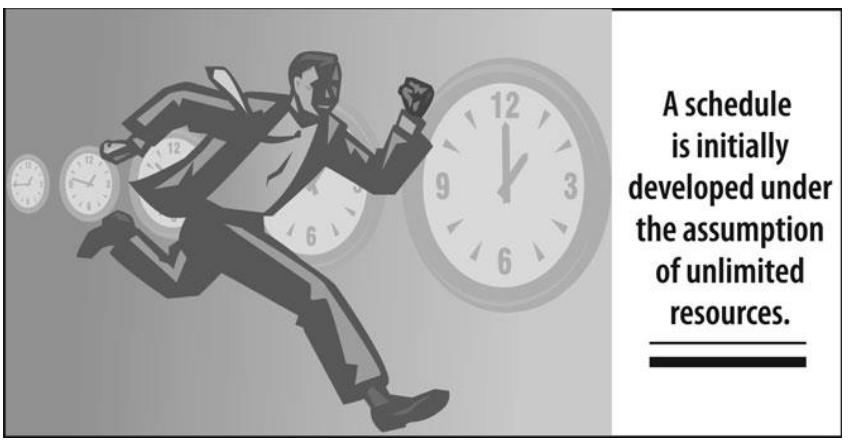
One huge advantage of using software is that it will drop out weekends, holidays, and vacation periods for employees, and tell you the actual dates on which activities should start and finish. Doing calendar computations manually is an onerous task, and the software is worth its weight in gold just for this alone.

> Giving a person a powerful scheduling software program when he knows nothing about project management just allows him to document his failures with great precision!

Resource Leveling

As I have said earlier, a schedule is initially developed under the assumption of unlimited resources. Once this is done, the softwarecan show you where you have overloaded your resources. If thereis enough float in your schedule, it can make use of that float to schedule tasks so that resources are no longer overloaded and the end date can be met. This is called *time-critical* resource allocation. The software is instructed to level resources without slipping the already determined end date. It will then make use of task float to delay activities until resources become available, but it will delay atask only to the point at which it runs out of float. To delay it any further would cause the end date to be missed.

However, if there is insufficient float in the schedule to level resources completely, the software can be instructed to relieve the overloads, even if it means sliding out the end date. This is called *resource-critical* allocation. Under this condition, you may find that a schedule that was going to end in December 2011 under the unlimited-resource assumption is now going to end in the year 2021because it is starved for resources.



Clearly, this is an unacceptable solution. Nobody is going to accept a schedule that is going to take so long to complete. So what good is the resource-critical method?

Simple: it creates a *moment of truth.*

It alerts everyone to what is going to happen to a project if something isn't done. More help is needed, scope must be reduced,or performance requirements must be relaxed; otherwise the project will take forever.

The advantage is partly psychological. In the days before soft-ware, when we had this problem, we had no credibility with our managers when we told them about the problem.

"I need more help," you would tell your boss.

"Quit whining and get the job done," the boss would snarl.And all too often, you pulled it off.

And shot yourself in the foot in the process.Why?

Because your boss expected you to pull it off the next time. After all, you'd just proved that you didn't need all the help that you claimed you needed. Your boss concluded that you were just whining.

Please don't misunderstand me. I have no objection to pullingoff a miracle once in a while. But I don't want it to become the expectation for all time to come. After all, how did I pull it off this time?Through blood, sweat, and tears. Every member of the team put inextraordinary effort to meet the end date. You don't want them to have to do that on every project, because it may not work next time.So if I get shot in the foot, my company may be set up for a fall nexttime around.

Using software to do a what-if schedule gives you more credibility. We all know that computers simply output garbage when weinput garbage, but it is *calculated garbage*, and thus more believable! That is a psychological advantage that you never had in the days before software.

Guidelines for Minor and Major Increments in a Schedule

You may fall into the trap of scheduling work in more detail than you can manage. This is especially tempting when you are using scheduling software. After all, the software can compute virtually any kind of network you create.

Sure, but can you do the work as scheduled?

I know about this trap. I have made most of the mistakes youcan make in managing projects. I got carried away and scheduled work in increments of days. The only problem was that we couldn'tcontrol the work that accurately, so before I could get the schedulepublished, it was off, and my boss was on my back because I had already missed a scheduled date. The net result was that I spent allmy time managing the schedule rather than letting the schedule help me manage the project.

The first guideline, then, is to never schedule work in more detail than you can control. For some tasks this means that you can schedule to the nearest hour. Projects to overhaul power genera- tors are sometimes scheduled to this level of detail, because they have enough history to know how long each task will take, and alsobecause getting the generator back on line as quickly as possible isvery important.

For others, scheduling to the nearest day is all that can be controlled, and in some cases, the nearest week is adequate. In large projects that last several years, you may find work being scheduledto the nearest month.

As for major durations, the first rule is that no task should havea duration greater than four to six weeks. Furthermore, you must have a marker that indicates when the task is actually complete, andthis can be very difficult with nontangible tasks—that is, those thathave no tangible deliverables. When there is no specification or deliverable that indicates task completion, then you must use some kind of exit criteria. As an example, the work is examined and a "pass-fail" judgment is made. This is totally qualitative, but it is the only thing you have where aesthetics are involved.

The rule about four- to six-week increments applies to long-duration tasks. It is especially useful to apply to outsidevendor projects, such as long-lead capital equipment. It is a good idea to require your vendors to report progress

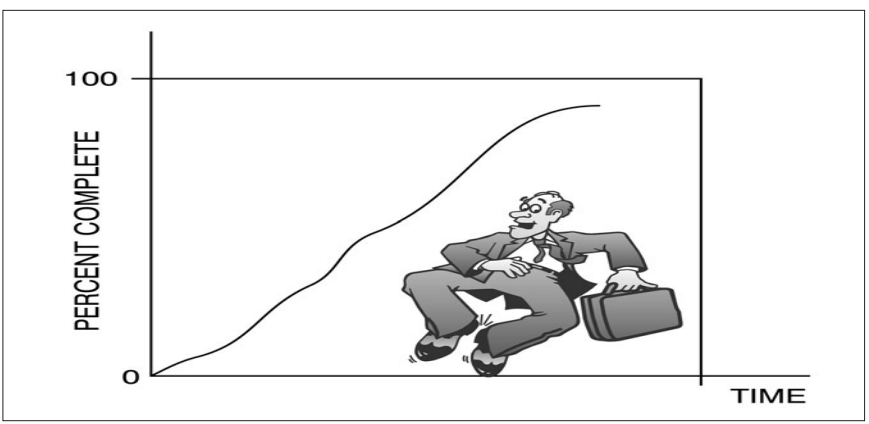
Guidelines

No task should have a duration greater than four to six weeks. For knowledge work, the maximum duration should be one to three weeks.

on their projects in minimum increments of four to six weeks, and the progress report must go beyond an affirmation that the work is on schedule. You must require that they report progress using some method such as earned value tracking (see Chapter 12), or, if this is not possible, then they should use exit criteria to ensure that their progress is really what they say it is.

The next rule applies to engineering, programming, and other knowledge work, in which there may be no tangible deliverables. For such work, the rule is that work should be scheduled in maxi- mum increments of one to three weeks. This is very important to enforce, or you can bet that such work will reach 90 percent completion and stay there forever. The progress report for knowledge workinvariably looks like the graph shown in Figure 9.5.

This is actually a universal graph. Here's how it is generated. Suppose the work is supposed to take 10 weeks to complete. This isby agreement with the person doing the work. At the end of the firstweek, you check on progress.



F I G U R E 9.5 Progress Graph for Knowledge Work

"How's your project work going?" you ask.

"Fine," says the person.

"I can't plot 'fine,' " you say. "I need to know what percent complete the job is."

Now what do you think she will tell you?

You guessed it. It's the end of the first week on a 10-week job,so she must be 10 percent complete.

And at the end of the second week?

Right again. She will be 20 percent complete.

This is called *reverse-inferential* progress reporting, and it is a method that people use when they can't tell exactly how much theyhave actually done.

Now you notice that when the work reaches around 80 or 90 percent complete, the graph turns horizontal. One of two things hashappened. Either the person has had an existential crisis, which means that she discovers the part of the iceberg that's underneath the water (that is, all the work she has to do that she has forgotten),or she is in the debugging phase of her design work. If it is an ice- berg problem, she will have to show that she is really only perhaps50 percent complete—which means that she will have to report negative progress. This is shown in Figure 9.6.

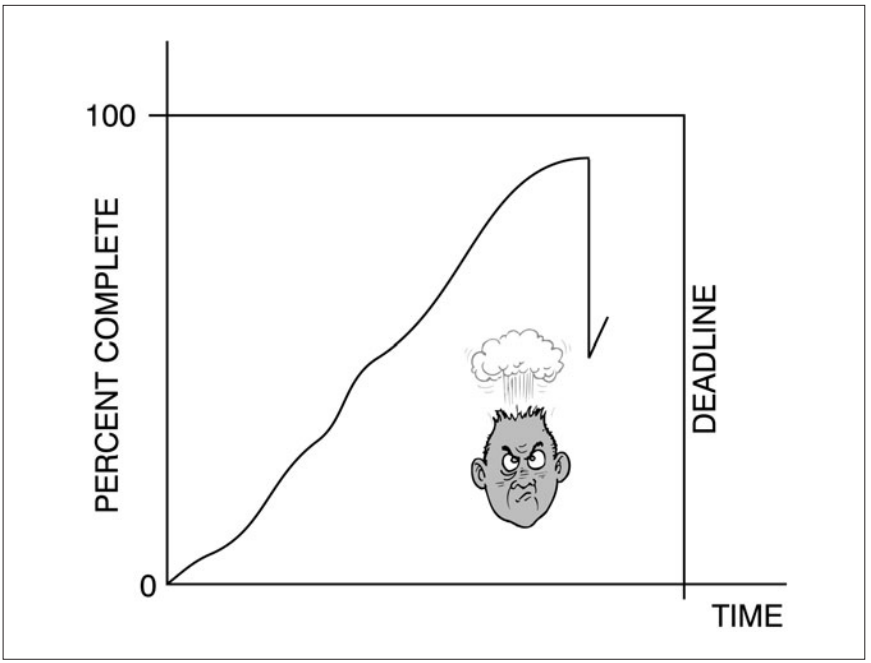
However, we know that we can't report negative progress because senior managers get very agitated if we do this. The best alternative is to report only that progress is stalled.

In the situation where debugging has started, it is commonto pass the deadline and then find the solution to the problem, so that the work is completed in one simple step. This is shown in Figure 9.7.

RESOURCE ALLOCATION

If you are going to manage resources in a project, you have to spec-ify who is working on each task and at what allocation level. Whenyou do this, be careful. Microsoft Project operates differently from

F I G U R E 9.6
Graph Showing Negative Progress

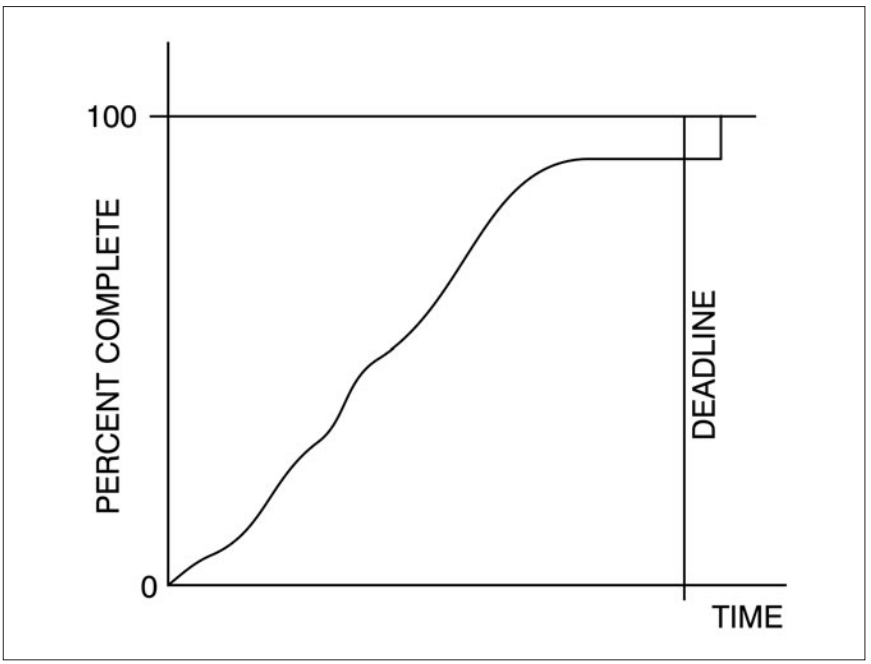


other scheduling software in how it treats allocation level and task duration.

If you specify that a task duration is 10 working days and thatRon is working on the task half-time (50 percent would be what you specify), most software programs will leave the task duration at 10 days. The calendar duration is treated as *fixed*, or as being thesame as the working time minus any weekends or holidays that may intervene. With MS Project, however, you get a different result.Project will change the duration to 20 calendar days. The assumption is that the duration of the task is *variable*, meaning that the calendar duration depends on the rate at which the person works on the task. You can change the default so that Project works like other

F I G U R E 9.7

Graph Showing Progress Being Completed in One Step



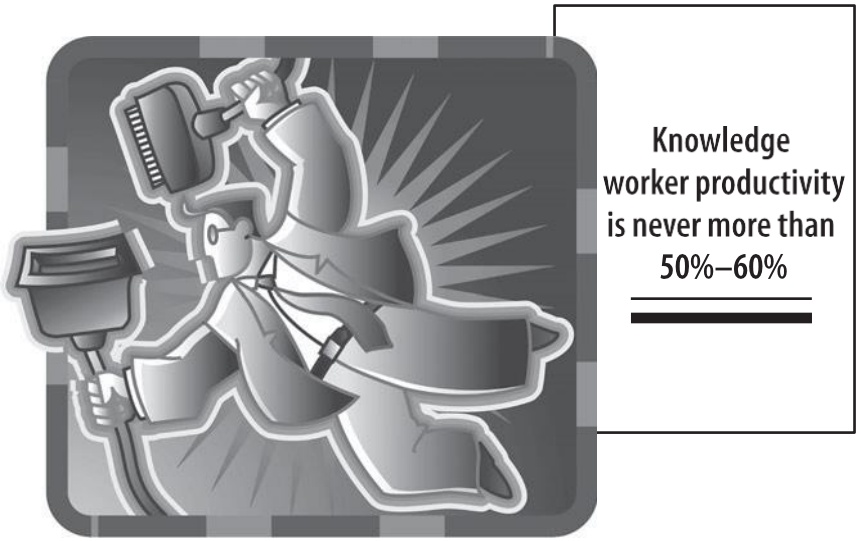
programs, treating task durations as fixed. However, there is a certain logic to the Project default. Ideally, you should always estimateworking time and convert to calendar time in exactly the way that Project does it.

In any case, be careful that you assign the correct resource availability or you will get an invalid result. For example, I had a fellow tell me that his company had always assigned people to tasks on the assumption that they were working on projects about 80 per-cent of the time. When they continuously missed project deadlines,the company did a time study to determine what was really happening. To do this, they had people log their time once an hour fortwo weeks and then analyzed the logs. To the company's surprise, they found that people were working on projects only 25 percent of the time, not the 80 percent that had been assumed! This meant thatschedules were off by a factor of 3 because of the incorrect allocation assumption.

This is a common cause of problems. The only time you ever get 80 percent availability from people is when they are tied to theirworkstations,

and the only people for whom this is true are factoryworkers. You may get close to 80 percent availability from them, but for knowledge workers—who aren't tied to their workstations—you'll never get such a high level. It is more likely to be around 50 or 60 percent.

The thing is, you have to know what that number is if you aregoing to schedule work correctly. So it helps to do a time study,as was described above, to determine that level. Have people log their time once an hour—it need not be more often—to discover their true availability. If the number seems too low, then you haveto remove the causes.



Major Causes of Reduced Availability

There are two major causes of reduced resource availability. One ishaving people work on too many projects at the same time, and theother is over allocation of people to their work. When people have to work on more than one project at the same time, they constantlyhave to shift back and forth between them. This is called multitasking. The trouble is, every time a person "shifts gears," to use the normal expression, it takes time for that person to remember wherehe or she was, get the work in place, and so on. This added timeis called *setup time* in manufacturing, and remember, we learned years ago that setup time is total waste. Setup time adds no value to the product. So, in manufacturing, an effort has been made to reduce setup time as much as possible or to eliminate it altogether by running a process continuously.

Think about it this way. Suppose you are sitting at your desk working

and the phone rings. You answer it. The person says, "Sorry, I have the wrong number," and you hang up.

"Now where was I?" you think.

You have completely lost your train of thought. Time manage-ment experts say that you will typically lose 10 to 15 minutes everytime you get interrupted, so if you get four phone calls in an hour,you may easily lose the entire hour!

So let's assume that each time you switch from one project to another, you add 15 minutes setup time to each task. As an example,suppose you had planned to work on a single project task all day. You could finish the task in that single eight-hour day if you could just work on it continuously.

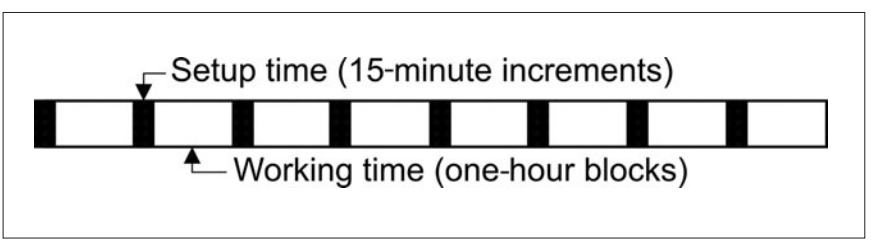
However, if you are working on several projects, you will be expected to share your time between them, and if you get no morethan one hour of uninterrupted work at a time, your eight-hour taskwill take at least nine hours and forty-five minutes. This is shown in Figure 9.8.

We assume that all tasks have some setup time built in, sowe add 15 minutes for each time the task is stopped and restarted.That is seven increments above the single eight-hour block, so it adds one hour and forty-five minutes of setup time, rather than two hours.

I can almost guarantee you that this task will actually take10 to 12 hours to complete, rather than the original 8 hours. The 15minutes of setup time is a very conservative number.

F I G U R E 9.8

Eight-Hour Task Performed in One-Hour Increments



Queuing and Resource Availability

The second major cause of reduced availability is over allocation ofpeople to their work. To understand this, we need to understand the basics of queuing theory. You may never have studied queuingtheory, but I can

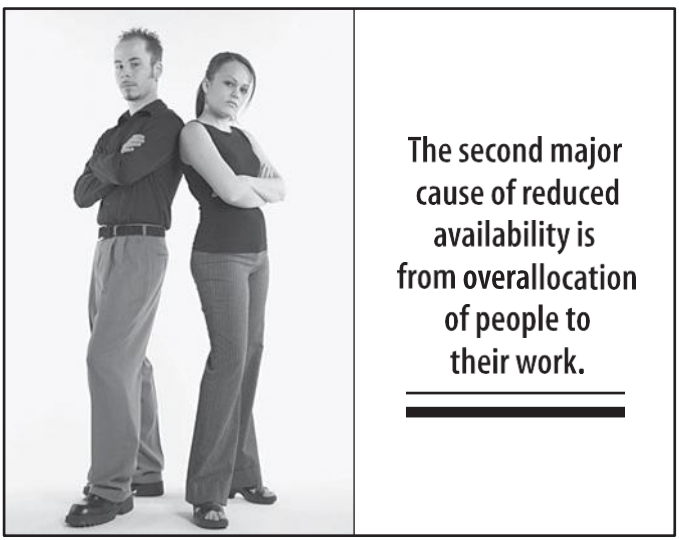
assure you that you have experienced it. Every time you try to get onto a busy highway at rush hour, you experience the effects of queuing.

As an example, Raleigh, North Carolina, has a beltway aroundthe city. At rush hour, you can bet that the beltway is packed withcars, all doing 60 to 70 miles an hour. In fact, let's assume that the cars are packed so tightly that you couldn't put another car on the road if your life depended on it.

No problem. Everyone is happy. How can this be?

No one wants onto the beltway, and no one wants off.

Of course, you realize that this is a fictitious condition thatcould exist only in a steady-state universe—one that may have been



approximated about 1800, when people weren't in as much of a hurry as they are today.

Today, we live in a turbulent universe. Everyone wants to be where they are going 10 minutes ago.

So suppose someone wants onto this bumper-to-bumper belt-way. If no one gets off, how long will it take this interloper to get onto the beltway?

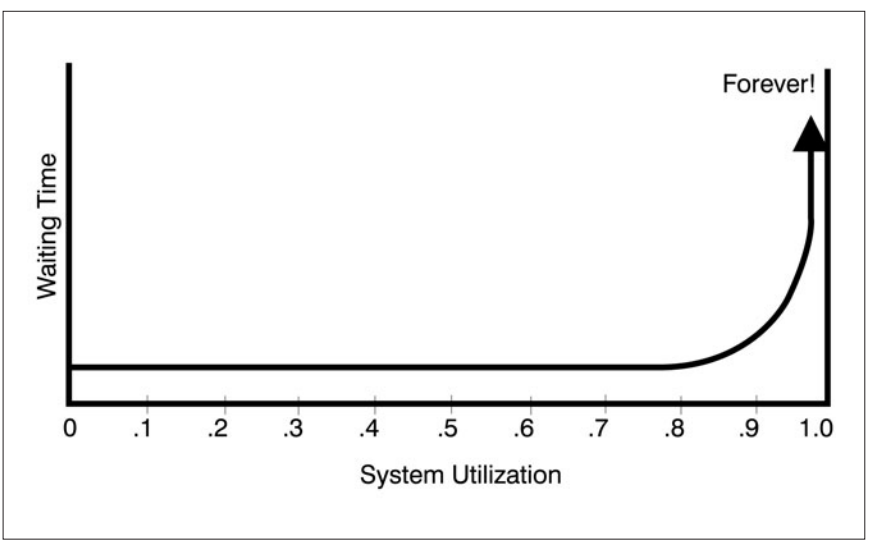
You guessed it. It will take forever!

Queuing theory shows how long you must wait to get access toa system as a function of how fully it is already loaded. The curveslook something like the one in Figure 9.9. Notice that, by definition,a system can't be loaded beyond 100 percent. It doesn't matter. At 100 percent, you have to wait forever to get access to the system, justas our driver has to wait to get onto the beltway.

Okay, what does this have to do with projects?

F I G U R E 9.9

Waiting Time as a Function of System Loading



First, let's think about a practical application of queuing the- ory. Manufacturing people have known for a long time that you shouldn't load a factory more than about 85 percent on the average.You may exceed that level occasionally, but if you consistently stayhigher than 85 percent, you are asking for big trouble, because if anything out of the ordinary happens—a machine breaks down, orsomeone calls in sick, or a supplier is late delivering materials—youare already so high on the curve that your waiting time goes to for-ever in a heartbeat.

However, we don't load people to 85 percent. We load them to 120 percent. We know that if we loaded them to only 85 percent,they would sit around and do nothing during that 15 percent of freetime, and that would be costly, so we make certain that they have no free time. This is commonly called "being lean and mean"—a biological metaphor. The question is, do you want to get rid of all of your body fat? No way. You want some for reserve energy. Thesame is true of an organization. Carrying lean and mean too far is shortsighted.

When you have no reserve capacity, you can't respond to sur-prises, glitches, or even opportunities. And since Murphy's Law guar-antees that there will be some glitches in every project, you can also be sure that there will be de-lays caused by queuing and that the result will bea late project.

> No system should be loaded beyond 85 percent capacity for very long.

Every organization should have some reserve capacity if it is to be able to respond to turbulence. But tell that to senior managerswho believe that *lean and mean* is the correct way to fly!

Beginning around 1995, a few people had begun to realize that the lean-and-mean paradigm had gone too far. Downs (1996) was a downsizing consultant until he realized this. His book *Corporate Executions* goes into far greater detail about the pitfalls of going too

far with cutting fat from an organization than is possible to cover in this chapter.

And what do you do about setup time?You reduce it by prioritizing projects.

As a general rule, no one should be working on more than twoor three projects. Ideally, a person would work on a single project until it is completed and then shift to the next job.

Can this really be justified?

You bet.

When I first realized this, I was working with a company thatwas having difficulty getting new products released. They would go along for most of the year, and nothing would be released. Thenheadquarters would call and ask why no new products had come out the back door.

"We're working on them," would be the response.

"Well, we want to see something get to market by the end of the year," headquarters would say.

> You can do *anything*, but you can't do everything!
>
> —From the cover of *Fast Company*, May 2000

So there would be a big push to release all ofthe products that were in various states of completion, and the companywould turn out 10 or 12 new products near the end of the year.

Do you know what happens when you release that many products in December?

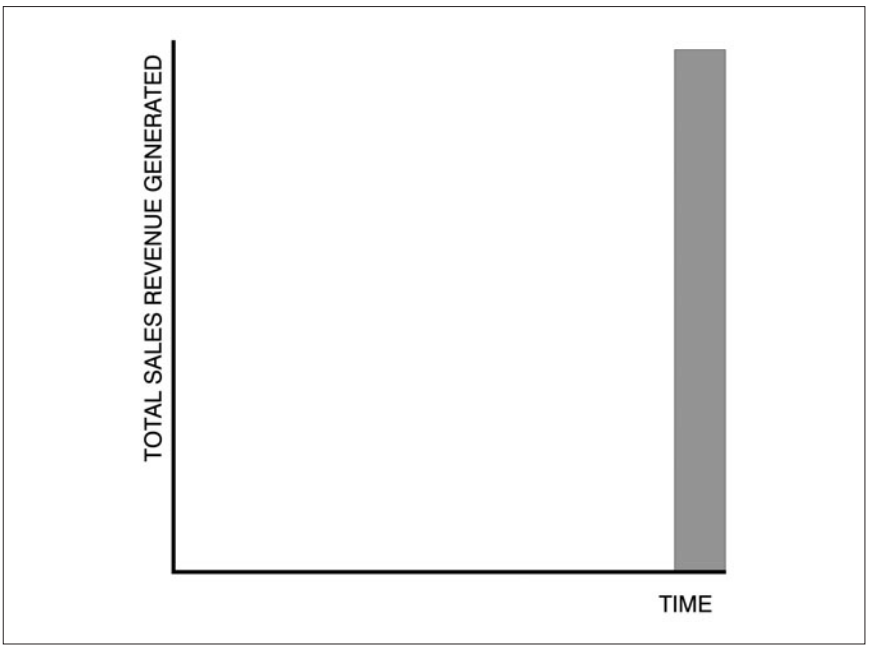
Absolutely nothing.

Manufacturing can't get set up to make them, and even if it could be done, the salespeople couldn't sell them.

But let's pretend that they could both make them and sell them,and let's assume that they were able to sell all of those new productsduring the entire month of December. If that happened, you wouldhave a sales graph like the one in Figure 9.10.

F I G U R E 9.10

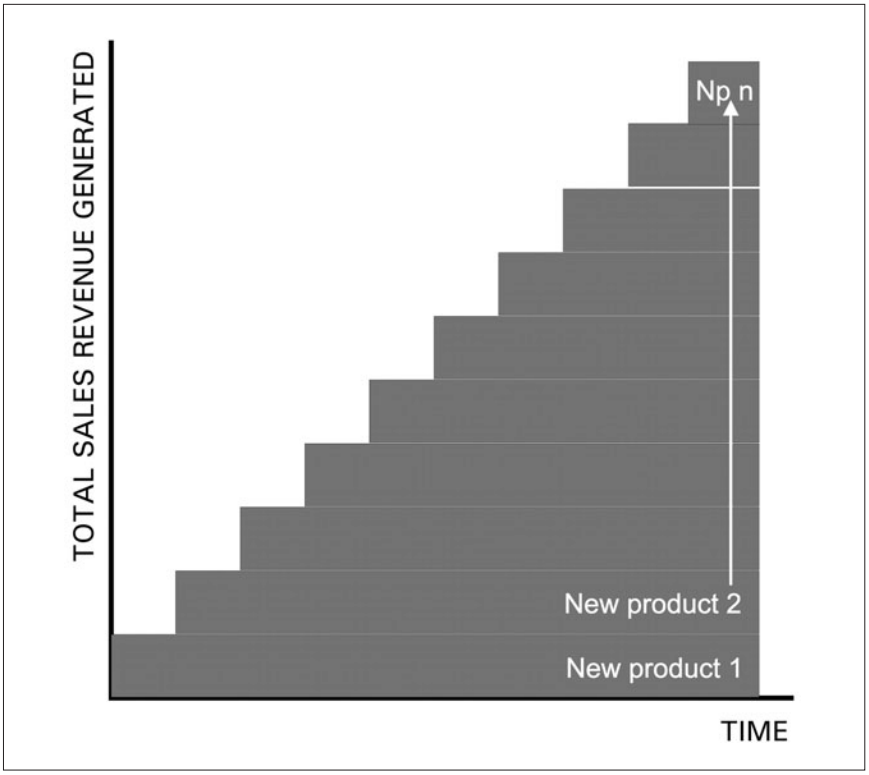
Sales for All Products in December



I said to the managers at this company, "You need to prioritizeyour projects. Work on them one at a time and get them out the back door so that they start selling sooner."

It took nearly three years to make it happen, but by that time,the company was releasing a new product every month or so. Thatis, they had a steady stream of new products entering the market.

The result can be shown in another graph, superimposed on the one from Figure 9.10. As you can see, if a new product comes out at the beginning of the year, and we assume flat sales, you get the rectangle labeled Product 1. The next month, Product 2 is released,again with flat sales throughout the year. Then Product 3 comes out,and so on. This is shown in Figure 9.11.



F I G U R E 9.11

Sales for a Constant Stream of New Products

As the graph indicates, the sales for the year approximate a triangle. The area under the triangle shows the units of money multiplied by time. This is called the *time value of money* or interest or cost of capital. So which figure has the greatest area, the rectangle for the month of December or the triangle for the entire year? It's ano-brainer. The triangle has considerably greater value to the company than the rectangle.

This demonstrates that the only economically viable approachthat a company can take is to prioritize its projects. To have "all the balls in the air" at once is to confuse activity with progress. When you ask a manager what must be done first, and she tells you, "It allhas to be done," she is overlooking the time value of money and itsimpact on the organization.

Think of this in reverse: when you are late to market with a new product, you have lost both the revenue that would have beengenerated by sales during that period and the cost of capital associated with it. That is why it is so important to complete projectson time.

UNIT – IV

CAPITAL BUDGETING

Capital Budgeting: Capital budgeting is the process of making investment decision in long-term assets or courses of action. Capital expenditure incurred today is expected to bring its benefits over a period of time. These expenditures are related to the acquisition & improvement of fixes assets.

Capital budgeting is the planning of expenditure and the benefit, which spread over a number of years. It is the process of deciding whether or not to invest in a particular project, as the investment possibilities may not be rewarding. The manager has to choose a project, which gives a rate of return, which is more than the cost of financing the project. For this the manager has to evaluate the worth of the projects in-terms of cost and benefits. The benefits are the expected cash inflows from the project, which are discounted against a standard, generally the cost of capital.

Capital budgeting Techniques:

The capital budgeting appraisal methods are techniques of evaluation of investment proposal will help the company to decide upon the desirability of an investment proposal depending upon their; relative income generating capacity and rank them in order of their desirability. These methods provide the company a set of norms on the basis of which either it has to accept or reject the investment proposal. The most widely accepted techniques used in estimating the cost-returns of investment projects can be grouped under two categories.

1. Traditional methods
2. Discounted Cash flow methods

1. Traditional methods

These methods are based on the principles to determine the desirability of an investment project on the basis of its useful life and expected returns. These methods depend upon the accounting information available from the books of accounts of the company. These will not take into account the concept of 'time value of money', which is a significant factor to determine the desirability of a project in terms of present value.

A. Pay-back period method: It is the most popular and widely recognized traditional method of evaluating the investment proposals. It can be defined, as 'the number of years required to recover the original cash out lay invested in a project'.

According to Weston & Brigham, “The pay back period is the number of years it takes the firm to recover its original investment by net returns before depreciation, but after taxes”.

According to James. C. Vanhorne, “The payback period is the number of years required to recover initial cash investment.

$$\textbf{Payback period} = \frac{cash\ outlay\ (OR) Original\ cost\ of\ project}{annual\ cash\ inflow}$$

Merits:

1. It is one of the earliest methods of evaluating the investment projects.
2. It is simple to understand and to compute.
1. It dose not involve any cost for computation of the payback period
2. It is one of the widely used methods in small scale industry sector
3. It can be computed on the basis of accounting information available from the books.

Demerits

1. This method fails to take into account the cash flows received by the company after the pay back period.
2. It doesn’t take into account the interest factor involved in an investment outlay.
3. It doesn’t take into account the interest factor involved in an investment outlay.
4. It is not consistent with the objective of maximizing the market value of the company’s share.
5. It fails to consider the pattern of cash inflows i. e., the magnitude and timing of cash in flows.

B. Accounting (or) Average rate of return method (ARR):

It is an accounting method, which uses the accounting information repeated by the financial statements to measure the probability of an investment proposal. It can be determine by dividing the average income after taxes by the average investment i.e., the average book value after depreciation.

According to 'Soloman', accounting rate of return on an investment can be calculated as the ratio of accounting net income to the initial investment, i.e.,

$$\textbf{ARR}= \frac{\boldsymbol{Average\ net\ income\ after\ taxes}}{\boldsymbol{average\ investment}} \times \mathbf{100}$$

Average income after taxes= $\frac{Total\ income\ after\ taxes}{no.of\ years}$

Average investment =$\frac{total\ investment}{2}$

On the basis of this method, the company can select all those projects who's ARR is higher than the minimum rate established by the company. It can reject the projects with an ARR lower than the expected rate of return. This method can also help the management to rank the proposal on the basis of ARR. A highest rank will be given to a project with highest ARR, where as a lowest rank to a project with lowest ARR.

Merits

1. It is very simple to understand and calculate.
2. It can be readily computed with the help of the available accounting data.
3. It uses the entire stream of earning to calculate the ARR.

Demerits:

1. It is not based on cash flows generated by a project.
2. This method does not consider the objective of wealth maximization
3. IT ignores the length of the projects useful life.
4. It does not take into account the fact that the profits can be re-invested.

II: Discounted cash flow methods:

The traditional method does not take into consideration the time value of money. They give equal weight age to the present and future flow of incomes. The DCF methods are based on the concept that a rupee earned today is more worth than a rupee earned tomorrow. These methods take into consideration the profitability and also time value of money.

A. Net present value method (NPV)

The NPV takes into consideration the time value of money. The cash flows of different years and valued differently and made comparable in terms of present values for this the net cash inflows of various period are discounted using required rate of return which is predetermined.

According to Ezra Solomon, "It is a present value of future returns, discounted at the required rate of return minus the present value of the cost of the investment."

NPV is the difference between the present value of cash inflows of a project and the initial cost of the project.

According the NPV technique, only one project will be selected whose NPV is positive or above zero. If a project(s) NPV is less than 'Zero'. It gives negative NPV hence. It must be rejected. If there are more than one project with positive NPV's the project is selected whose NPV is the highest.

The formula for NPV is

NPV= Present value of cash inflows – investment.

$$\mathbf{NPV}= \frac{c1}{1+k} + \frac{c2}{(1+k)} + \frac{c3}{(1+k)} + \frac{cn}{(1+K)}$$

Co- investment

C1, C2, C3… Cn= cash inflows in different years.

K= Cost of the Capital (or) Discounting rate

D= Years.

Merits:

1. It recognizes the time value of money.
2. It is based on the entire cash flows generated during the useful life of the asset
3. It is consistent with the objective of maximization of wealth of the owners.
4. The ranking of projects is independent of the discount rate used for determining the present value.

Demerits:

1. It is different to understand and use.
2. The NPV is calculated by using the cost of capital as a discount rate. But the concept of cost of capital. If self is difficult to understood and determine.

3. It does not give solutions when the comparable projects are involved in different amounts of investment.
4. It does not give correct answer to a question whether alternative projects or limited funds are available with unequal lines.
5. **B. Internal Rate of Return Method (IRR)**

The IRR for an investment proposal is that discount rate which equates the present value of cash inflows with the present value of cash out flows of an investment. The IRR is also known as cutoff or handle rate. It is usually the concern's cost of capital.

According to Weston and Brigham "The internal rate is the interest rate that equates the present value of the expected future receipts to the cost of the investment outlay.

The IRR is not a predetermine rate, rather it is to be trial and error method. It implies that one has to start with a discounting rate to calculate the present value of cash inflows. If the obtained present value is higher than the initial cost of the project one has to try with a higher rate. Like wise if the present value of expected cash inflows obtained is lower than the present value of cash flow. Lower rate is to be taken up. The process is continued till the net present value becomes Zero. As this discount rate is determined internally, this method is called internal rate of return method.

$$\text{IRR} = \text{L} + \frac{P1 - Q}{P1 - p2} \times D$$

L- Lower discount rate
P1 - Present value of cash inflows at lower rate.
P2 - Present value of cash inflows at higher rate.
Q- Actual investment
D- Difference in Discount rates.

Merits:

1. It consider the time value of money
2. It takes into account the cash flows over the entire useful life of the asset.
3. It has a psychological appear to the user because when the highest rate of return projects are selected, it satisfies the investors in terms of the rate of return an capital
4. It always suggests accepting to projects with maximum rate of return.
5. It is inconformity with the firm's objective of maximum owner's welfare.

Demerits:

1. It is very difficult to understand and use.
2. It involves a very complicated computational work.

3. It may not give unique answer in all situations.

C. Probability Index Method (PI)

The method is also called benefit cost ration. This method is obtained cloth a slight modification of the NPV method. In case of NPV the present value of cash out flows are profitability index (PI), the present value of cash inflows are divide by the present value of cash out flows, while NPV is a absolute measure, the PI is a relative measure.

It the PI is more than one (>1), the proposal is accepted else rejected. If there are more than one investment proposal with the more than one PI the one with the highest PI will be selected. This method is more useful incase of projects with different cash outlays cash outlays and hence is superior to the NPV method.

The formula for PI is

$$\textbf{Probability Index} = \frac{\textit{Present value of future cash inflow}}{\textit{investment}}$$

Merits:

1. It requires less computational work then IRR method
2. It helps to accept / reject investment proposal on the basis of value of the index.
3. It is useful to rank the proposals on the basis of the highest/lowest value of the index.
4. It is useful to tank the proposals on the basis of the highest/lowest value of the index.
5. It takes into consideration the entire stream of cash flows generated during the useful life of the asset.

Demerits:

1. It is some what difficult to understand
2. Some people may feel no limitation for index number due to several limitation involved in their competitions
3. It is very difficult to understand the analytical part of the decision on the basis of probability index.

Unit -5

FINANCIAL ANALYSIS THROUGH RATIOS

Accounting ratio show inter-relationships which exist among various accounting data. When relationships among various accounting data supplied by financial statements are worked out, they are known as accounting ratios.

Uses or Advantages or Importance of Ratio Analysis

Ratio Analysis stands for the process of determining and presenting the relationship of items and groups of items in the financial statements. It is an important technique of financial analysis. It is a way by which financial stability and health of a concern can be judged. The following are the main uses of Ratio analysis:

(A) Useful in financial position analysis: Accounting reveals the financial position of the concern. This helps banks, insurance companies and other financial institution in lending and making investment decisions.

(ii) Useful in simplifying accounting figures: Accounting ratios simplify, summaries and systematic the accounting figures in order to make them more understandable and in lucid form.

(iii) Useful in assessing the operational efficiency: Accounting ratios helps to have an idea of the working of a concern. The efficiency of the firm becomes evident when analysis is based on accounting ratio. This helps the management to assess financial requirements and the capabilities of various business units.

(iv) Useful in forecasting purposes: If accounting ratios are calculated for number of years, then a trend is established. This trend helps in setting up future plans and forecasting.

(v) Useful in locating the weak spots of the business: Accounting ratios are of great assistance in locating the weak spots in the business even through the overall performance may be efficient.

(vi) Useful in comparison of performance: Managers are usually interested to know which department performance is good and for that he compare one department with the another department of the same firm. Ratios also help him to make any change in the organisation structure.

Limitations of Ratio Analysis:

These limitations should be kept in mind while making use of ratio analyses for interpreting the financial statements. The following are the main limitations of ratio analysis.

1. False results if based on incorrect accounting data: Accounting ratios can be correct only if the data (on which they are based) is correct. Sometimes, the information given in the financial statements is affected by window dressing, i. e. showing position better than what actually is.

2. No idea of probable happenings in future: Ratios are an attempt to make an analysis of the past financial statements; so they are historical documents. Now-a-days keeping in view the complexities of the business, it is important to have an idea of the probable happenings in future.
3. Variation in accounting methods: The two firms' results are comparable with the help of accounting ratios only if they follow the some accounting methods or bases. Comparison will become difficult if the two concerns follow the different methods of providing depreciation or valuing stock.
4. Price level change: Change in price levels make comparison for various years difficult.
5. Only one method of analysis: Ratio analysis is only a beginning and gives just a fraction of information needed for decision-making so, to have a comprehensive analysis of financial statements, ratios should be used along with other methods of analysis.
6. No common standards: It is very difficult to by down a common standard for comparison because circumstances differ from concern to concern and the nature of each industry is different.
7. Different meanings assigned to the some term: Different firms, in order to calculate ratio may assign different meanings. This may affect the calculation of ratio in different firms and such ratio when used for comparison may lead to wrong conclusions.
8. Ignores qualitative factors: Accounting ratios are tools of quantitative analysis only. But sometimes qualitative factors may surmount the quantitative aspects. The calculations derived from the ratio analysis under such circumstances may get distorted.

Classification of ratios:

All the ratios broadly classified into four types due to the interest of different parties for different purposes. They are:

1. Profitability ratios
2. Turn over ratios
3. Financial ratios
4. Leverage ratios

Profitability ratios: These ratios are calculated to understand the profit positions of the business. These ratios measure the profit earning capacity of an enterprise. These ratios can be related its save or capital to a certain margin on sales or profitability of capital employ

Profitability ratios in relation to sales: Profitability ratios are almost importance of concern. These ratios are calculated is focus the end results of the business activities which are the sole eritesiour of overall efficiency of organisation.

1.Gross Profit Ratio $= \frac{gross\ profit}{Net\ sales} \times 100$

Note: Higher the ratio the better it is

Net Profit Ratio= $\frac{net\ profit\ after\ interest\ and\ taxes}{net\ sales} \times 100$

Note: Higher the ratio the better it is

3.Operating Ratio (Operating expenses ratio)

4. Operating ratio (Operating expenses ratio)

$$\frac{\text{Cost of goods sold} + \text{operating exenses}}{\text{Net sales}} \text{ X } 100$$

Net: Lower the ratio the better it is

5. Operating profit ratio: $\frac{\text{Operating profit}}{\text{Net sales}}$ X 100 = 100 operating ratio

Note: Higher the ratio the better it is cost of goods sold= opening stock + purchase + wages + other direct expenses- closing stock (or) sales – gross profit.

Operating expenses: = administration expenses + setting, distribution expenses operating profit= gross profit – operating expense.

Profitability ratios in relation to investments:

1. Return on investments: $\frac{\text{Net profit after tax \& latest depreciation}}{\text{share holders funds}}$ X 100

Share holders funds = equity share capital + preference share capital + receives & surpluses +undistributed profits.

Note: Higher the ratio the better it is

2. Return on equity capital: $\frac{\text{Net Profit after tax \& interest - preferencedivident}}{\text{equity share capital}}$ X 100

Note: Higher the ratio the better it is

3. Earnings per share= $\frac{\text{Net profit after tax - preferecnedivident}}{\text{No. of equity shares}}$

4. Return on capital employed = $\frac{\text{operating profit}}{\text{capital employed}} \text{x } 100$

5. Return on total assets = $\frac{\text{N. P. after tax and interest}}{\text{Total Assets}}$

Here, capital employed = equity share capital + preference share capital + reserves & surpluses + undistributed profits + debentures+ public deposit + securities + long term loan + other long term liability – factious assets (preliminary expressed & profit & loss account debt balance)

Turn over ratios or activity ratios:

These ratios measure how efficiency the enterprise employees the resources of assets at its command. They indicate the performance of the business. The performance if an enterprise is judged with its save. It means ratios are also laced efficiency ratios.

1**. Stock turnover ratio** = $\frac{\text{cost of goods sold}}{\text{average stock}}$

Here,

$$\frac{\text{opening stock} + \text{closing stock}}{2}$$

Average stock=

Note: Higher the ratio, the better it is

2. Working capital turnover ratio = $\frac{\text{sales}}{\text{working capital}}$

Note: Higher the ratio the better it is working capital = current assets – essential liabilities.

3. Fixed assets turnover ratio = $\frac{\text{sales}}{\text{fixed assets}}$

Note: Higher the ratio the better it is.

3 (i) Total assets turnover ratio is : $\frac{\text{sales}}{\text{total assets}}$

Note: Higher the ratio the better it is.

4. Capital turnover ratio= $\frac{\text{Sales}}{\text{Capital employed}}$

Note: Higher the ratio the better it is

5. Debtors turnover ratio = $\frac{\text{credits sales or sales}}{\text{average debtors}}$

5(i)= Debtors collection period = $\frac{365\,(\text{or})\,12}{\text{Turnove ratio}}$

Here,

$$\frac{\text{opening debitors} + \text{closing bebtors}}{2}$$

Average debtors =

Debtors = debtors + bills receivable

Note: Higher the ratio the better it is.

6. Creditors turnover ratio = $\frac{\text{credit purchasers or purchases}}{\text{average credetors}}$

6 (i) creditors collection period= $\frac{365\,(\text{or})\,12}{\text{Creditor turnover ratio}}$

Here,

Average creditor= $\frac{\text{opening} + \text{closing credetors}}{2}$

Creditors = creditors + bills payable.

Note: lower the ratio the better it is.

3. Financial ratios or liquidity ratios:

Liquidity refers to ability of organisation to meet its current obligation. These ratios are used to measure the financial status of an organisation. These ratios help to the management to make the decisions about the maintained level of current assets & current libraries of the business. The main purpose to calculate these ratios is to know the short terms solvency of the concern. These ratios are useful to various parties having interest in the enterprise over a short period – such parties include banks. Lenders, suppliers, employees and other.

The liquidity ratios assess the capacity of the company to repay its short term liabilities. These ratios are calculated in ratio method.

Current ratio = $\frac{\text{current assets}}{\text{current liabilities}}$

Note: The ideal ratio is 2:1

i. e., current assets should be twice. The current liabilities.

Quick ratio or liquid ratio or acid test $\frac{\text{quick assets}}{\text{current liabilities}}$ **ratio:**

Quick assets = cash in hand + cash at bank + short term investments + debtors + bills receivables short term investments are also known as marketable securities.

Here the ideal ratio is 1:1 is, quick assets should be equal to the current liabilities.

Leverage ratio or solvency ratios:

Solvency refers to the ability of a business to honour long item obligations like interest and installments associated with long term debts. Solvency ratios indicate long term stability of an enterprise. These ratios are used to understand the yield rate if the organisation.

Lenders like financial institutions, debenture, holders, banks are interested in ascertaining solvency of the enterprise. The important solvency ratios are:

1. Debt – equity ratio= $\frac{\text{outsiders funds}}{\text{share holders funds}}$ = $\frac{\text{Debt}}{\text{Equity}}$

Here, Outsiders funds = Debentures, public deposits, securities, long term bank loans + other long term liabilities.

Share holders funds = equity share capital + preference share capital + reserves & surpluses + undistributed projects.

The ideal ratio is 2:1

2. Preprimary ratio or equity ratio= $\frac{\text{share holder funds}}{\text{total assets}}$

The ideal ratio is 1:3 or 0.33:1

3. Capital – greasing ratio: = $\frac{(\text{equity share capital} + \text{reserves} \& \text{surplusses} + \text{undistributed projects})}{(\text{Outsiders funds} + \text{preferenceshare capital})}$

Here,

higher gearing ratio is not good for a new company or the company in which future earnings are uncertain.

11. Debt to total fund ratio= $\frac{\text{outsiders funds}}{\text{capital employed}}$

Capital employed= outsiders funds + share holders funds = debt + equity.

The ideal ratio is 0.6.7 :1 or 2:3

Cost Control

Source: *Project Management: A Systems Approach to Planning, Scheduling, and Controlling, Harold Kerzner, Wiley.*

14.0 INTRODUCTION

Cost control is important to all companies, regardless of size. Small companies generally have tighter monetary controls because thefailure of even one project can put the company at risk, but they haveless sophisticated control techniques. Large companies may have theluxury to spread project losses over several projects, whereas the smallcompany may have few projects.

Many people have a poor understanding of cost control yet it is crucial to long-term success. Cost control is not only "monitoring" costs and recording data, but also analyzing the data in order to take corrective action before it is too late. It should be performed by all personnel who incur costs, not merely the project office.

Cost control implies good cost management, which must include:

- Cost estimating
- Cost accounting
- Project cash flow
- Company cash flow
- Direct labor costing
- Overhead rate costing
- Other tactics, such as incentives, penalties, and profit-sharing

Cost control is actually a subsystem of the management cost and control system (MCCS) rather than a complete system per se. This is shown in Figure 14–1, where the MCCS is represented as a two-cycle process: a planning cycle and an operating cycle. The operating cycle is what is commonly referred to as the

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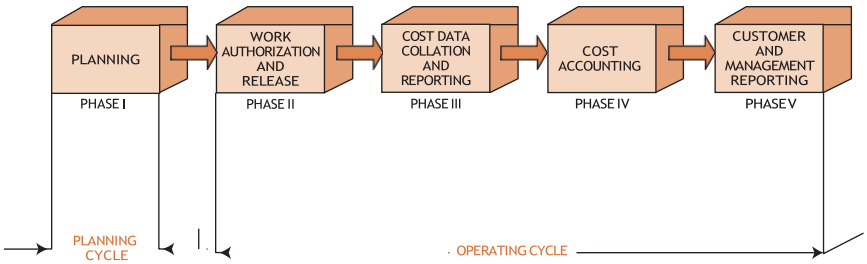

FIGURE 14–1. Phases of a management cost and control system.

cost control system. Failure of a cost control system to accurately describe the true status of a project does not necessarily imply that the cost control system is at fault. Any cost control system is only as good as the original plan against which performance will be measured. Therefore, the designing of a planning system must take into account the cost control system. For this reason, it is common for the planning cycle to be referred to as planning and control, whereas the operating cycle is referred to as cost (or cost monitoring and collection) and control.

The planning and control system must help management project the status toward objective completion. Its purpose is to establish policies, procedures, and techniques that can be used in the day-to-day management and control of projects and programs. It must, therefore, provide information that:

- Gives a picture of true work progress
- Will relate cost and schedule performance
- Identifies potential problems with respect to their sources.
- Provides information to project managers with a practical level of summarization
- Demonstrates that the milestones are valid, timely, and auditable

The planning and control system, in addition to being a tool by which objectives can be defined (i.e., hierarchy of objectives and organization accountability), exists as a tool to develop planning, measure progress, and control change. As a tool for planning, the system must be able to:

- Plan and schedule work
- Identify those indicators that will be used for measurement
- Establish direct labor budgets
- Establish overhead budgets
- Identify management reserve

The project budget that results from the planning cycle of the MCCS must be reasonable, attainable, and based on contractually negotiated costs and the statement of work. The basis for the budget is either historical cost, best estimates, or industrial engineering standards. The budget must be based upon an acceptable level of accuracy in the estimates. The budget must identify planned manpower requirements, contract-allocated funds, and management reserve. All of this information becomes the basis for the cost management plan which describes how cost are planned, structured, and controlled over the life of the project.

Establishing budgets requires that the planner fully understand the meaning of standards. There are two categories of standards. Performance results standards are quantitative measurements and include suchitems as quality of work, quantity of work, cost of work, and time-to-complete. Process standards are qualitative, including personnel, functional, and physical factors relationships. Standards are advantageousin that they provide a means for unity, a basis for effective control, and an incentive for others. The disadvantage of standards is that performance is often frozen, and employees are quite often unable to adjust to the differences.

As a tool for measuring progress and controlling change, the systems must be able to:

- Measure resources consumed
- Measure status and accomplishments
- Compare measurements to projections and standards
- Provide the basis for diagnosis and replanning

For MCCS to be effective, both the scheduling and budgeting systems must be disciplined and formal in order to prevent inadvertent or arbitrary budget or schedule changes. This does *not* mean that the baseline budget and schedule, once established, is static or inflexible. Rather, it means that changes must be controlled and result only from deliberate management actions.

Disciplined use of MCCS is designed to put pressure on the project manager to perform exceptionally good project planning so that changes will be minimized. As an example, government subcontractors may not:

- Make retroactive changes to budgets or costs for work that has been completed
- Rebudget work-in-progress activities
- Transfer work or budget independently of each other
- Reopen closed work packages

14.1 UNDERSTANDING CONTROL

Effective management of a program during the operating cycle requires that a well-organized cost and control system be designed, developed, and implemented so that immediate feedback can be obtained, whereby the up-to-date usage or resources can be compared to target objectives established during the planning cycle. The requirements for an effective control system (for both cost and schedule/performance) should include[1]:

- Thorough planning of the work to be performed to complete the project
- Good estimating of time, labor, and costs
- Clear communication of the scope of required tasks
- A disciplined budget and authorization of expenditures
- Timely accounting of physical progress and cost expenditures

1. Russell D. Archibald, *Managing High-Technology Programs and Projects* (New York: John Wiley & Sons, 1976), p. 191.

- Periodic reestimation of time and cost to complete remaining work
- Frequent, periodic comparison of actual progress and expenditures to schedules and budgets, both at the time of comparison and at project completion

Management must compare the time, cost, and performance of the program to the budgeted time, cost, and performance, not independently but in an integrated manner. Being within one's budget at the proper time serves no useful purpose if performance is only 75 percent. Likewise, having a production line turn out exactly 200 items, as planned, loses its significance if a 50 percent cost overrun is incurred. All three resource parameters (time, cost, and performance) must be analyzed as a group, or else we might "win the battle but lose the war." The use of the expression "management cost and control system" is vague in that the implication is that only costs are controlled. This is not true—an effective control system monitors schedule and performance as well as costs by setting budgets, measuring expenditures against budgets and identifying variances, assuring that the expenditures are proper, and taking corrective action when required.

The WBS is the total project broken down into successively lower levels until the desired control levels are established. The work breakdown structure therefore serves as the tool from which performance can be subdivided into objectives and sub-objectives. As work progresses, the WBS provides the framework on which costs, time, and schedule/performance can be compared against the budget for each level of the WBS.

The first purpose of control therefore becomes a verification process accomplished by the comparison of actual performance to date with the predetermined plans and standards set forth in the planning phase. The comparison serves to verify that:

- The objectives have been successfully translated into performance standards.
- The performance standards are, in fact, a reliable representation of program activities and events.
- Meaningful budgets have been established such that actual versus planned comparisons can be made.

In other words, the comparison verifies that the correct standards were selected, and that they are properly used.

The second purpose of control is decision-making. Three useful reports are required by management in order to make effective and timely decisions:

- The project plan, schedule, and budget prepared during the planning phase
- A detailed comparison between resources expended to date and those predetermined. This includes an estimate of the work remaining and the impact on activity completion.
- A projection of resources to be expended through program completion

These reports, supplied to the managers and the doers, provide three useful results:

- Feedback to management, the planners, and the doers
- Identification of any major deviations from the current program plan, schedule, or budget

- The opportunity to initiate contingency planning early enough that cost, performance, and time requirements can undergo corrected action without loss of resources

These reports provide management with the opportunity to minimize downstream changes by making proper corrections here and now. As shown in Figures 14–2 and 14–3, cost reductions are more available in the early project phases, but are reduced as we go further into the project life-cycle phases. Figure 14–3 identifies the people that most likely have the greatest influence on possibly initiating changes to a project. Downstream the cost of changes could easily exceed the original cost of the project. This is an example of the "iceberg" syndrome, where problems become evident too late in the project to be solved easily, resulting in a very high cost to correct them.

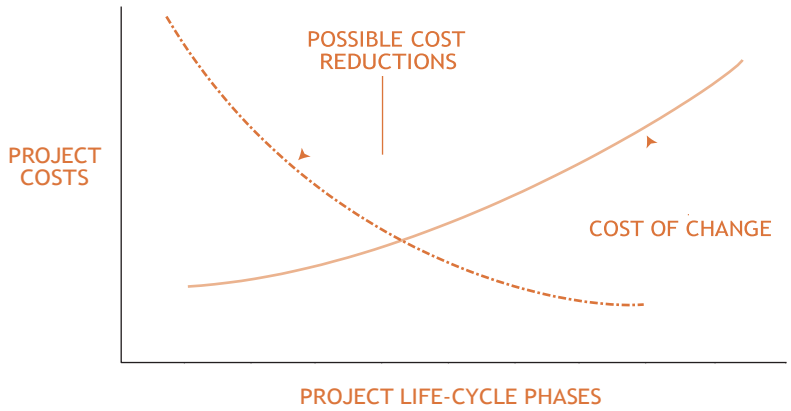

FIGURE 14–2. Cost reduction analysis.

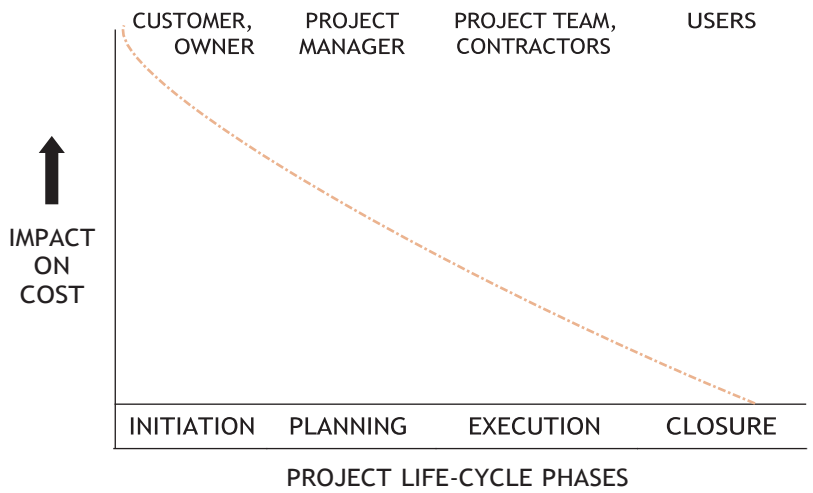

FIGURE 14–3. Cost influencers.

14.2 THE OPERATING CYCLE

The MCCS takes on paramount importance during the operating cycle of the project. The operating cycle is composed of four phases:

- Work authorization and release (phase II)
- Cost data collection and reporting (phase III)
- Cost analysis (phase IV)
- Reporting: customer and management (phase V)

These four phases, when combined with the planning cycle (phase I), constitute a closed system network that forms the basis for the management cost and control system.

After planning is completed and a contract is received, phase II is authorized via a work description document. The work description, or project work authorization form, is a contract that contains the narrative description, organization, and time frame for *each* WBS level. This multipurpose form is used to release the contract, authorize planning, record detail description of the work outlined in the work breakdown structure, and release work to the functional departments.

Contract services may require a work description form to release the contract. The contractual work description form sets forth general contractual requirements and authorizes program management to proceed.

Program management may then issue a subdivided work description form to the functional units so that work can begin. The subdivided work description specifies how contractual requirements are to be accomplished, the functional organizations involved, and their specific responsibilities, and authorizes the expenditure of resources within a particular time frame.

The work control center assigns a work order number to the subdivided work description form, if no additional instructions are required, and releases the document to the performing organizations. If additional instructions are required, the work control center can prepare a more detailed work-release document (shop traveler, tool order, work order release), assign the applicable work order number, and release it to the performing organization.

A work order number is required for all in-house direct and indirect charging. The work order number also serves as a cross-reference number for automatic assignment of the indentured work breakdown structure number to labor and material data records in the computer.

Small companies can avoid this additional paperwork cost by going directly from an awarded contract to a single work order, which may be the only work order needed for the entire contract.

14.3 COST ACCOUNT CODES

Since project managers control resources through the line managers rather than directly, project managers end up controlling direct laborcosts by opening and closing work orders. Work orders define the charge numbers for each cost account. By definition, a cost account is an identified level at a natural intersection point of the work breakdown structure and the organizational breakdown structure (OBS) at which functional responsibility for the work is assigned, and actual direct labor, material, and other direct costs are compared withactual work performed for management control purposes.

Cost accounts are the focal point of the MCCS and may comprise several work packages, as shown in Figure 14–4. Work packages are detailed short-span job or material items identified for the accomplishment of required work. Costs need not be reported at the work package level but can be rolled up to higher levels in the WBS. This referred to as cost aggregation.

To illustrate how the work packages are used, consider the cost account code breakdown shown in Figure 14–5 and the work authorization form shown in Figure 14–6. The work authorization form specifically identifies the cost centers that are "open" for this charge number, the man-hours available for each cost center, and the operational time period for the charge number. Because the exact dates of operation are completely defined, the charge number can be assigned perhaps as much as a year in advance of the work-begin date. This can be shown pictorially, as in Figure 14–7.

If a cost center needs additional time or additional man-hours, then a cost account change notice form must be initiated, usuallyby the requesting cost center, and approved by the project office. Figure 14–8 shows a typical cost account change notice form.

Cost data collection and reporting constitute the second phaseof the operating cycle of the MCCS (and phase III in the overall MCCS). Actual cost (ACWP) and the budgeted cost for work performed (BCWP) for eachcontract or in-house project are accumulated in detailed cost accounts by cost center and cost element, and reported in accordance with the flow charts shown in Figure 14–9. Thesedetailed elements, for both actual costs incurred and the budgeted cost for work performed,are usually made available monthly for all levels of the work breakdown structure. In addition, weekly supplemental direct labor reports can be printed showing the actual labor charge incurred, and can be compared to the predicted efforts.

Most weekly labor reports provide current month subtotals and previous month totals.Although these also appear on the detailed monthly report, they are included in the weeklyreport for a quick-and-dirty comparison. Year-to-date totals are usually not on the weekly report unless the users request them for an immediate comparison to the estimate at com- pletion (EAC) and the work order release.

Weekly labor output is a vital tool for members of the program office in that these reports can indicate trends in cost and performance in sufficient time for contingency plansto be established and implemented. If these reports are not available, then cost and labor overruns would not be apparent until the following month when the detailed monthly labor,cost, and materials output was obtained.

Work order releases are used to authorize certain cost centers to begin charging their time to a specific cost reporting element. Work orders specify hours, not dollars. The hoursindicate the "targets" that the program office would like to have the department shoot for.If the program office wished to be more specific and "compel" the departments to live within these hours, then the budgeted cost for work scheduled (BCWS) should be changedto reflect the reduced hours.

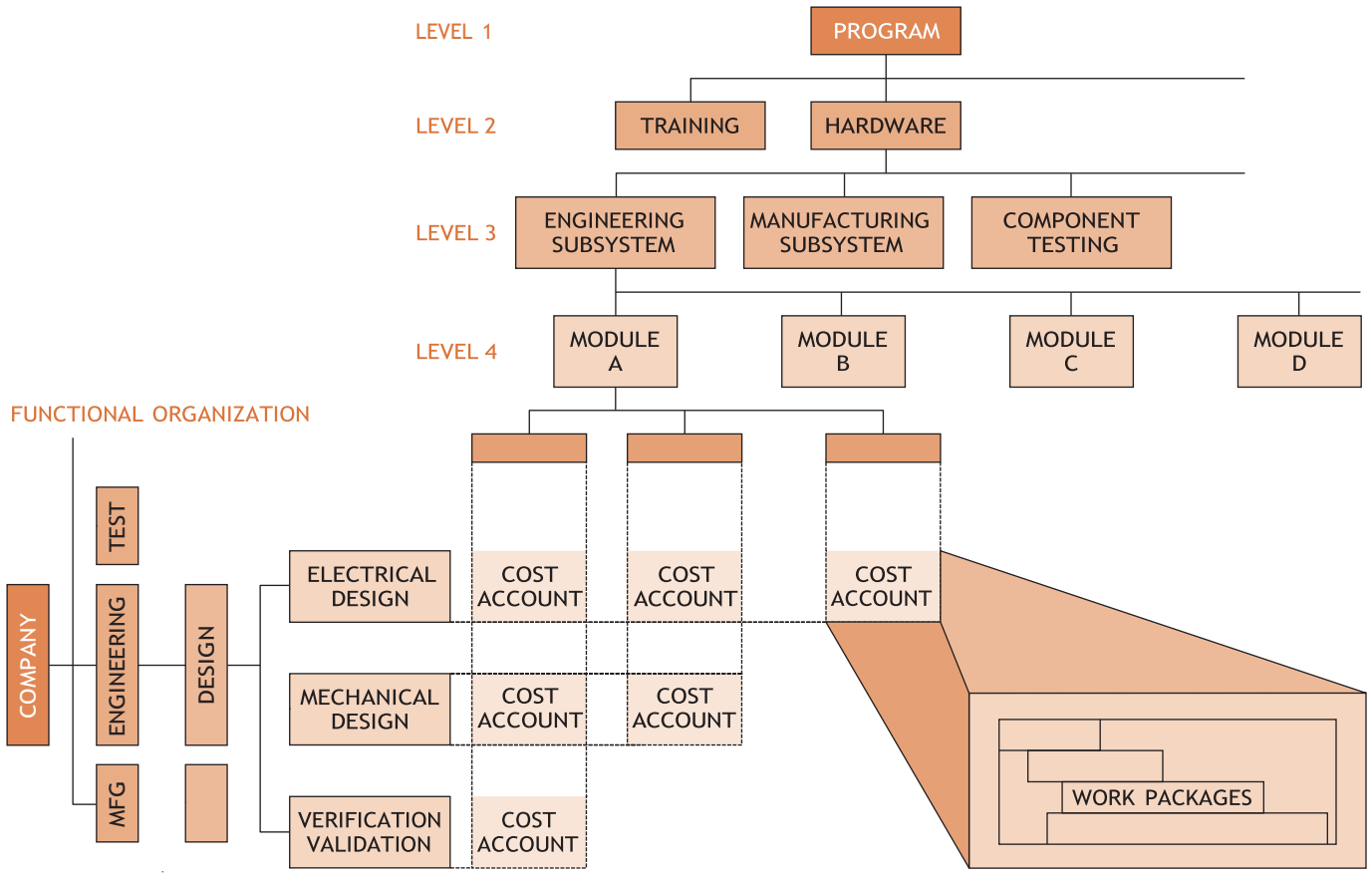

FIGURE 14-4. The cost account intersection.

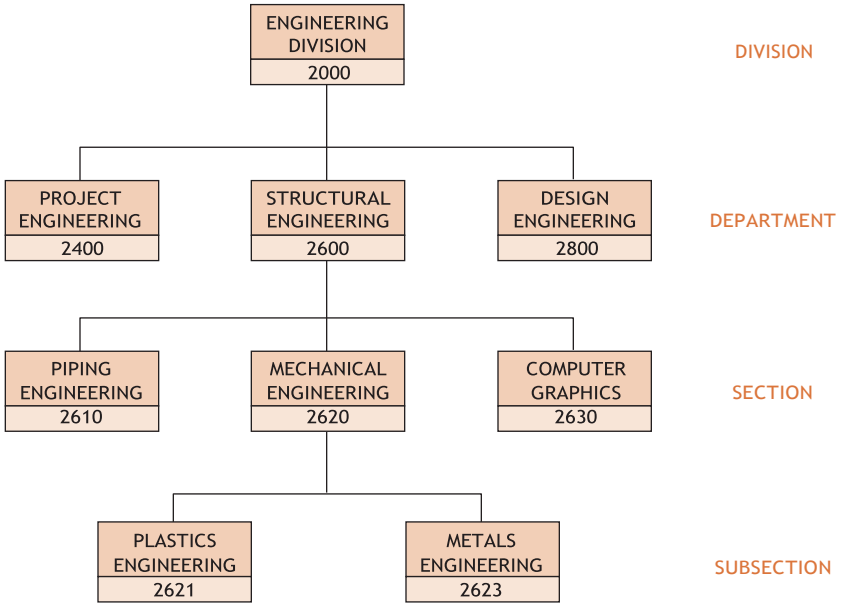

FIGURE 14–5. Cost account code breakdown.

WORK AUTHORIZATION FORM

WBS NO: 31-03-02 DATE WORK ORDER NO: D1385

OF ORIGINAL RELEASE: DATE : 3 FEB 16

OF REVISION: : 18 MAR 16

REVISION NUMBER: : C

DESCRIPTION	COST CENTERS	HOURS	WORK BEGINS	WORK ENDS
TEST MATERIAL VB-2 IN ACCORDANCE WITH THE PROGRAM PLAN AND MIL STANDARD G1483-52. THIS TASK INCLUDES A WRITTEN REPORT.	2400 2610 2621 2623 5000*	150 160 140 46 600	1 AUG 16 ↓	15 SEPT 16 ↓

PROJECT OFFICE AUTHORIZATION SIGNATURE _____

*NOTE: SOME COMPANIES DO NOT PERMIT DIVISION COST CENTERS TO CHARGE AT LEVEL 3 OF THE WBS

FIGURE 14–6. Work authorization form.

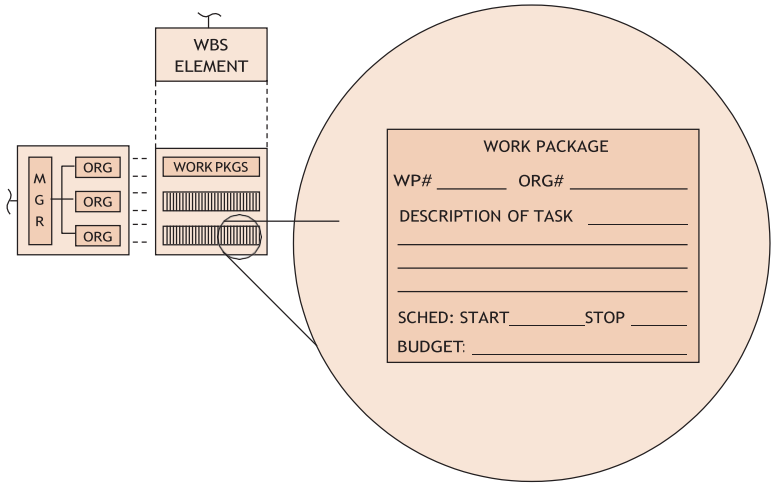

FIGURE 14–7. Planning and budgeting describe, plan, and schedule the work.

CACN No. _____ Revision to Cost Account No. _____ Date _____

DESCRIPTION OF CHANGE:

REASON FOR CHANGE:

	Requested Budget	Authorized Budget
Labor Hours		
Material $		
Indirect $		

Period of Performance:
From _____
To _____

BUDGET SOURCE:

- ☐ Funded Contract Change
- ☐ Management Reserve
- ☐ Undistributed Budget
- ☐ Other _____

INITIATED BY: _____

APPROVALS: Program Mgr. _____
Prog. Control _____

FIGURE 14–8. Cost account change notice (CACN).

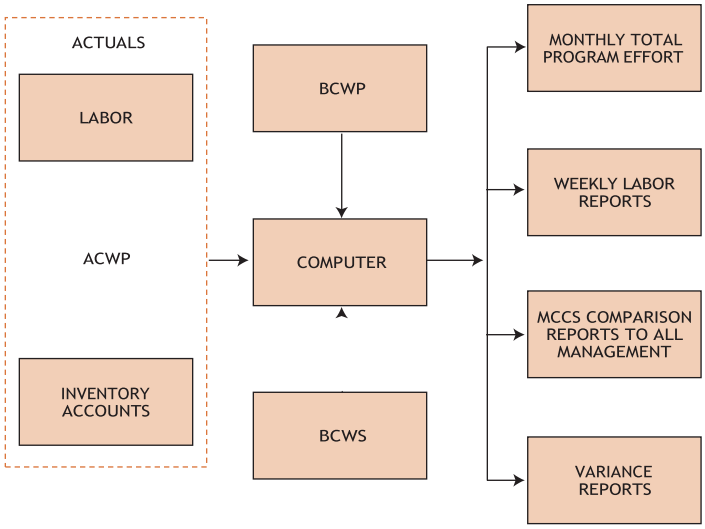

FIGURE 14–9. Cost data collection and reporting flowchart.

Four categories of cost data are normally accumulated:

- Labor
- Material
- Other direct charges
- Overhead

Project managers can maintain reasonable control over labor, material, and other direct charges. Overhead costs, on the other hand,are calculated yearly or monthly and applied retroactively to all applicable programs. Management reserves are often used to counterbalance the effects of adverse changes in overhead rates. Generally, management reserves are used for known-unknowns such as uncertainties in estimating.

14.4 BUDGETS

The project budget, which is the final result of the planning cycle of the MCCS, must be reasonable, attainable, and based on contractually negotiated costs and the statement of work. The basis for the budget is either historical cost, best estimates, or industrial engineering standards. The budget must identify planned manpower requirements, contract allocated funds, and management reserve.

All budgets must be traceable through the budget "log," which includes:

- Distributed budget
- Management reserve
- Undistributed budget
- Contract changes

The distributed or normal performance budget is the time-phased budget that is released through cost accounts and work packages. Management reserve is generally the dollar amount established for categories of unforeseen problems and contingencies resulting in special out-of-scope work to the performers.

The management reserve should be established based upon the project's risks. Some project may require no management reserve at all, whereas others may necessitate a reserve of 15 percent.

There is always the question of who should get to keep any unused management reserve at the end of the project. If the project is under a firm-fixed price contract, then the management reserve becomes extra profit for the performing organization. If the contract is a cost reimbursable type, all or part of the unused management reserve may have to be returned to the customer.

Although the management reserve may appear as a line item in the work breakdown structure, it is neither part of the distributed budget nor part of the cost baseline. Budgets are established on the assumption that they will be spent, whereas management reserve is money that you try not to spend. It would be inappropriate to consider the management reserve as an undistributed budget.

In addition to the "normal" performance budget and the management reserve budget, there are two other budgets:

- Undistributed budget, which is that budget associated with contract changes where time constraints prevent the necessary planning to incorporate the change into the performance budget. (This effort may be time-constrained.)
- Unallocated budget, which represents a logical grouping of contract tasks that have not yet been identified and/or authorized.

14.5 THE EARNED VALUE MEASUREMENT SYSTEM (EVMS)

In the early years of project management, it became evident that project managers were having difficulty determining project status. Some people believed that status could be determined only by a mystical approach, such as a fortune teller.

The critical question was whether project managers were managing costs or just monitoring costs. The government wanted costs to be managed rather than just monitored, accounted for, or reported. This need resulted in the creation of the EVMS.

The basis for the EVMS, which some consider to be a component of the MCCS, is the determination of earned value. Earned value is a management technique that relates resource planning to schedules and technical performance requirements. Earned value

management (EVM) is a systematic process that uses earned value as the primary tool for integrating cost, schedule, technical performance management, and risk management.

Without using the EVMS, determining status can be difficult. Consider the following:

- The project
  - A total budget of $1.2 million
  - A 12-month effort
  - Produce 10 deliverables
- Reported status
  - Time elapsed: 6 months
  - Money spent to date: $700,000
  - Deliverables produced: 4 complete, 2 partial

What is the real status of the project? How far along is the project: 40, 50, 60 percent, etc.? Another problem was how to accurately relate cost to performance. If you spent 20 percent of the budget, does that imply that you are 20 percent complete? If you are 30 percent complete, then have you spent 30 percent of the budget?

The EVMS provides the following benefits:

- Accurate display of project status
- Early and accurate identification of trends
- Early and accurate identification of problems
- Basis for course corrections

The EVMS can answer the following questions:

- What is the true status of the project?
- What are the problems?
- What can be done to fix the problems?
- What is the impact of each problem?
- What are the present and future risks?

The EVMS emphasizes prevention over cures by identifying and resolving problems early. The EVMS is an early warning system allowing for early identification of trends and variances from the plan. The EVMS provides an early warning system, thus allowing the project manager sufficient time to make course corrections in small increments. It is usually easier to correct small variances as opposed to large variances. Therefore, the EVMS should be used continuously throughout the project in order to detect the variances while they are small and possibly easy to correct. Large variances are more difficult to correct and run the risk that the cost to correct the large variance may displease management to the point where the project may be canceled.

14.6 VARIANCE AND EARNED VALUE

A variance is defined as any schedule, technical performance, or cost deviation from a specific plan. Variances must be tracked and reported. They should be mitigated through corrective actions and not eliminated through a baseline change unless there is a good

reason. Variances are used by all levels of management to verify the budgeting system and the scheduling system. The budgeting and scheduling system variance must be compared because:

- The cost variance compares deviations only from the budget and does not provide a measure of comparison between work scheduled and work accomplished.
- The scheduling variance provides a comparison between planned and actual performance but does not include costs.

There are two primary methods of measurement:

- *Measurable efforts:* Discrete increments of work with a definable schedule for accomplishment, whose completion produces tangible results.
- *Level of effort:* Work that does not lend itself to subdivision into discrete scheduled increments of work, such as project support and project control.

Calculating Variances

Variances are used on both types of measurement. In order to calculate variances, we must define the three basic variances for budgeting and actual costs for work scheduled and performed:

- Budgeted cost for work scheduled (BCWS) is the budgeted amount of cost for work scheduled to be accomplished plus the amount or level of effort or apportioned effort scheduled to be accomplished in a given time period.
- Budget cost for work performed (BCWP) is the budgeted amount of cost for completed work, plus budgeted for level of effort or apportioned effort activity completed within a given time period. This is sometimes referred to as "earned value."
- Actual cost for work performed (ACWP) is the amount reported as actually expended in completing the work accomplished within a given time period.

NOTE: The Project Management Institute has changed the nomenclature in their new version of the *PMBOK® Guide*, whereby BCWS is now PV, BCWP is now EV, and ACWP is now AC. However, the majority of heavy users of these acronyms, specifically government contractors, still use the old acronyms. Until the PMI acronyms are accepted across all industries,we will continue to focus on the most commonly used acronyms.

BCWS represents the time-phased budget plan against which performance is measured. For the total contract, BCWS is normally the negotiated contract plus the estimated cost of authorized but unpriced work (less any management reserve). It is time-phased by the assignment of budgets to scheduled increments of work. For any given time period, BCWS is determined at the cost account level by totaling budgets for all work packages, plus the budget for the portion of in-process work (open work packages), plus the budget for level of effort and apportioned effort.

A contractor must utilize anticipated learning when developing the time-phased BCWS. Any recognized method used to apply learning is usually acceptable as long as the BCWS is established to represent as closely as possible the expected actual cost (ACWP) that will be charged to the cost account/work package.

These costs can then be applied to any level of the work breakdown structure (i.e., program, project, task, subtask, work package) for work that is completed, in-program, or anticipated. Using these definitions, the following variance definitions are obtained:

- Cost variance (CV) calculation:

$$CV = BCWP - ACWP$$

A negative variance indicates a cost-overrun condition.

- Schedule variance (SV) calculation:

$$SV = BCWP - BCWS$$

A negative variance indicates a behind-schedule condition.

In the analysis of both cost and schedule, costs are used as the lowest common denominator. In other words, the schedule variance is given as a function of cost. To alleviate thisproblem, the variances are usually converted to percentages:

$$\text{Cost variance \%(CVP)} = \frac{CV}{BCWP}$$

$$\text{Schedule variance\%(SVP)} = \frac{SV}{BCWS}$$

The schedule variance may be represented by hours, days, weeks, or even dollars.

As an example, consider a project that is scheduled to spend \$100K for each of the first four weeks of the project. The actual expenditures at the end of week four are \$325K. Therefore, BCWS 5 \$400K and ACWP 5 \$325K. From these two parameters alone, there are several possible explanations as to project status. However, if BCWP is now known, say \$300K, then the project is behind schedule and overrunning costs.

It is important to understand the physical meaning of CV and SV. Consider the following example:

- BCWS = \$1000
- BCWP = \$800
- ACWP = \$700

In this example, CV = \$800 – \$700 = +\$100. Because CV is a positive value, it indicates that physical progress was accomplished at a lower cost than the forecasted cost. This is a favorable situation. Had CV been negative, it would have indicated that physical progress was accomplished at a greater cost than what was forecasted. If CV 50, then the physical accomplishment was as budgeted.

Although CV is measured in hours or dollars, it is actually a measurement of the efficiency with which physical progress was accomplished compared with the plan. To correcta negative cost variance, emphasis should be placed upon the productivity rate (i.e., burn rate) at which work is being performed.

Returning to the above example, SV = $800 –$1000 = –$200. In this example, the schedule variance is a negative value, indicating that physical progress is being accomplished at a slower rate than planned. This is an unfavorable condition. If the schedule variance were positive, this would indicate physical progress being accomplished at a fasterrate than planned. If SV = 0, physical progress is being accomplished as planned.

The schedule variance, SV, measures the timeliness of the physical progress compared to the plan whereas the cost variance, CV, measures the efficiency. To correct a negative schedule variance, emphasis should be placed upon improving the speed by which work is being performed.

The CV relates to the real cost. However, the problem with SV is how it relates to the real schedule. The schedule variance is determined from cost account or work package financial numbers and does not necessarily relate to the real schedule. The schedule variance does not distinguish between critical path and non–critical path work packages. The schedule variance by itself does not measure time. A negative schedule variance indicates a behind-schedule condition but does not mean that the critical path has slipped. On the contrary, the real schedule (i.e., precedence networks or the arrow diagramming networks) could indicate that the project will be ahead of schedule. A detailed analysis of the real schedule is still required irrespective of the value for the schedule variance.

Variance Controls

Variances are almost always identified as critical items and are reported to all organizational levels. Critical variances are established for each level of the organization in accordance with management policies.

Not all companies have a uniform methodology for variance thresholds. Permitted variances may be dependent on such factors as:

- Life-cycle phase
- Length of life-cycle phase
- Length of project
- Type of estimate
- Accuracy of estimate

Variance controls may be different from program to program. Table 14–1 identifies sample variance criteria for program X.

For many programs and projects, variances are permitted to change over the duration of the program. For strict manufacturing programs (product management), variances may be fixed over the program time span using criteria like those in Table 14–1. For programs that include research and development, larger deviations may be permitted during the earlier phases than during the later phases. Figure 14–10 shows time-phased cost variances for a program requiring research and development, qualification, and production phases. Since the risk should decrease as time goes on, the variance boundaries are reduced. The variance envelope in such a case may be dependent on the type of estimate.

TABLE 14–1. VARIANCE CONTROL FOR PROGRAM X

Organizational Level	Variance Thresholds*
Section	Variances greater than $20,000 that exceed 25% of costs
Section	Variances greater than $50,000 that exceed 10% of costs
Section	Variances greater than $100,000 0
Department	Variances greater than $100,000 that exceed 25% of costs
Department	Variances greater than $250,000 that exceed 10% of costs
Department	Variances greater than $400,000 0
Division	Variances greater than $1,000,000 that exceed 10% of costs

*Thresholds are usually tighter within company reporting system than required external to government. Thresholds for external reporting are usually adjusted during various phases of program (% lower at end).

By using both cost and schedule variance, we can develop an integrated cost/schedule reporting system that provides the basis for variance analysis by measuring cost performance in relation to work accomplished. This system ensures that both cost budgeting and performance scheduling are constructed on the same database.

Performance Index

***PMBOK® Guide* 6th Edition**
7.4.2.2 Data Analysis

In addition to calculating the cost and schedule variances in terms of dollars or percentages, we also want to know how efficiently the work has been accomplished. The formulas used to calculate the performance efficiency as a percentage of EV are:

$$\text{Cost performance index (CPI)} = \frac{\text{BCWP}}{\text{ACWP}}$$

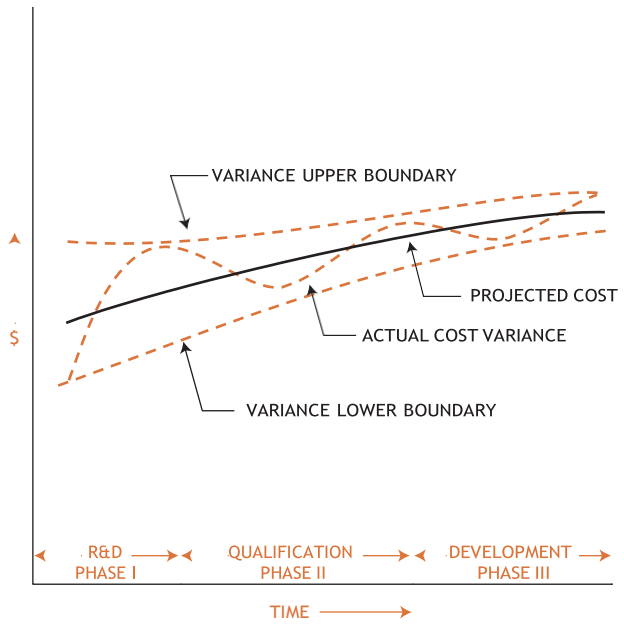

FIGURE 14–10. Project variance projection.

$$\text{Schedule performance index (SPI)} = \frac{\text{BCWP}}{\text{BCWS}}$$

If the CPI and SPI = 1.0, we have perfect cost and schedule performance. If CPI and SPI are less than 1.0, physical progress is being accomplished at a greater cost or slower rate than forecasted. This is unfavorable. If CPI and SPI are greater than 1.0, physical progress is being accomplished at less cost or a faster rate than planned, which is favorable. Similar to CV, CPI measures the efficiency by which the physical progress was accomplished compared to the plan or baseline. For an unfavorable value of CPI or SPI, emphasisshould be placed upon improving the productivity by which work was being performed orthe timeliness of the physical progress.

SPI and CPI are expressed as ratios compared to the performance factor of 1.0 whereas CV and SV are expressed in dollars or hours. One historic reason for this isthat SPI and CPI can be used to show performance for a specified time period or trends over a long time horizon without disclosing actual company sensitive numbers. This makes SPI and CPI valuable tools for customer status reporting without disclosing hard numbers.

Trend Analysis and Reporting The cost and schedule performance index is most often used for trend analysis as shown in Figure 14–11. Companies use either three-month, four-month, or six-month moving averages to predict trends. Trend analysis provides an early warning system and allows managers to take corrective action. Unfortunately, its use may be restricted to long-term projects because of the time needed to correct the situation.

Figure 14–12 shows an integrated cost/schedule system. The figure identifies a performance slippage to date because the actual performance is less than the scheduled performance. This might not be a bad situation if the costs are proportionately underrun. However, from the upper portion of Figure 14–12, we find that costs are overrun (actual costs are greater than the target cost), thus adding to the severity of the situation.

Also shown in Figure 14–12 is the management reserve. Management reserves cover unforeseen events *within* a defined project scope, but are not used for unlikely major events or changes in scope. These changes are funded separately, perhaps through management-established contingency funds. Actually, there is a difference between management reserves (which come from project budgets) and contingency funds (which come from external sources) although most people do not differentiate. It is a natural tendency for a functional manager (and some project managers) to substantially inflate estimates toprotect the particular organization and provide a certain amount of cushion. Furthermore, if the inflated budget is approved, managers will undoubtedly use all of the allocated funds, including reserves.

The line indicated as actual cost in Figure 14–12 shows a cost overrun compared to the budget. However, costs are still within the contractual requirement if we consider the management reserve. Therefore, things may not be as bad as they seem.

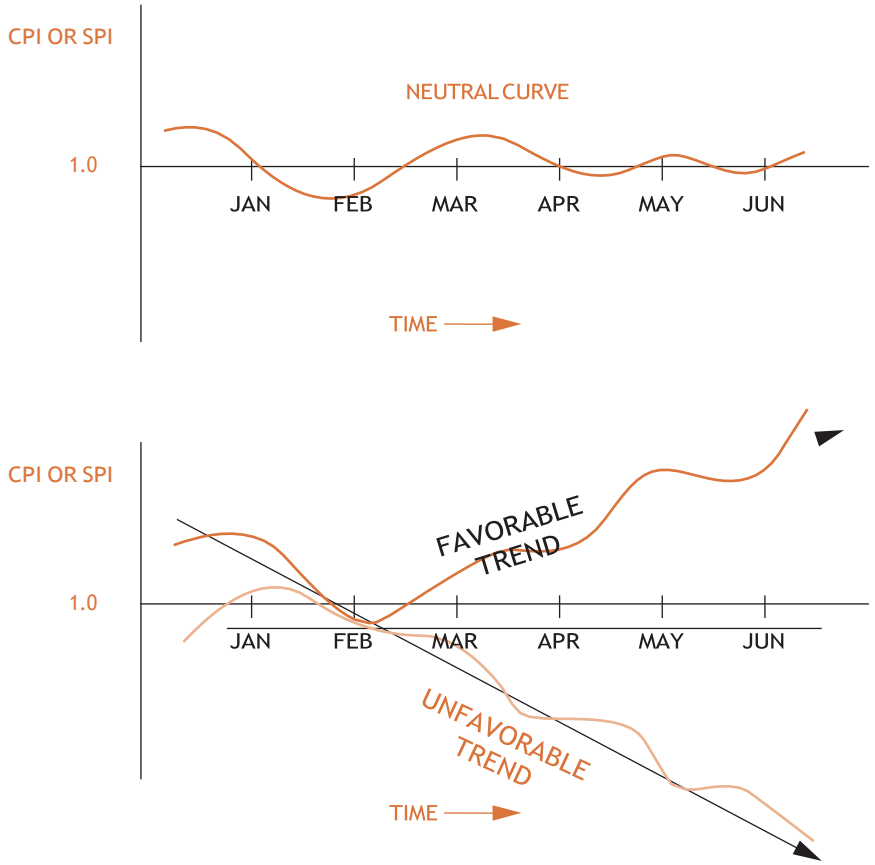

FIGURE 14–11. The performance index.

Government subcontractors are required to have a government-approved cost/schedule control system. The information requirements that must be demonstrated by such a system include:

- Budgeted cost for work scheduled (BCWS)
- Budgeted cost for work performed (BCWP)
- Actual cost for work performed (ACWP)
- Estimated cost at completion
- Budgeted cost at completion
- Cost and schedule variances/explanations
- Traceability

The last two items imply that standardized policies and procedures should exist for reporting and controlling variances. When permitted variances are exceeded, cost account

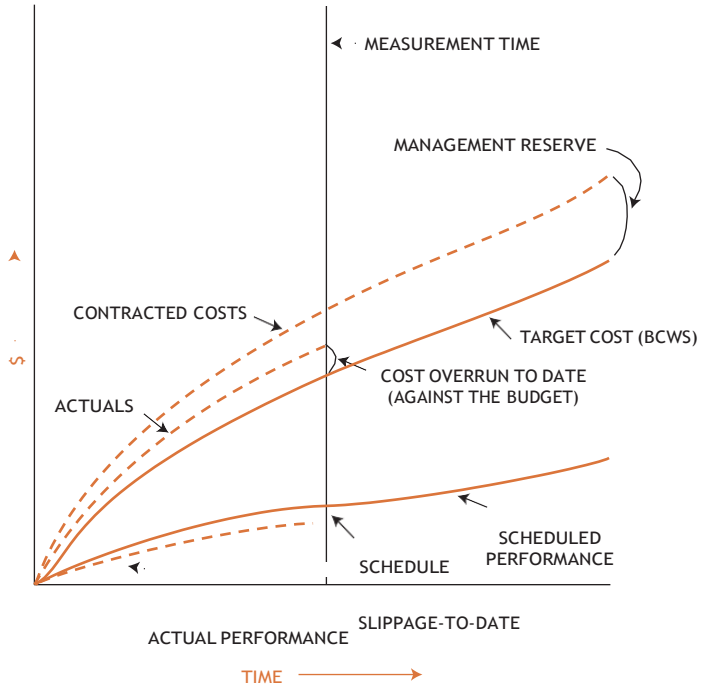

FIGURE 14–12. Integrated cost/schedule system.

variance analysis reports, as shown in Figure 14–13, are required. Required signatures may include:

- The functional employees responsible for the work
- The functional managers responsible for the work
- The cost accountant and/or the assistant project manager for cost control
- The project manager, work breakdown structure element manager, or someone with signature authority from the project office

For variance analysis, the goal of the cost account manager (whether project officer or functional employee) is to take action that will correct the problem within the original budget or justify a new estimate.

Five questions must be addressed during variance analysis:

- What is the problem causing the variance?
- What is the impact on time, cost, and performance?
- What is the impact on other efforts, if any?
- What corrective action is planned or under way?
- What are the expected results of the corrective action?

One of the key parameters used in variance analysis is the "earned value" concept, which is the same as BCWP. Earned value is a forecasting variable used to predict whether the project will finish over or under the budget.

COST ACCOUNT NO/CAM						REPORTING LEVEL		
WBS/DESCRIPTION						AS OF		
COST PERF. DATA				VARIANCE		AT COMPLETION		
	BCWS	BCWP	ACWP	SCH	COST	BUDGET	EAC	VAR.
MONTH TO DATE ($)								
CONTRACT TO DATE ($K)								
PROBLEM CAUSE AND IMPACT								
CORRECTIVE ACTION (INCLUDE EXPECTED RECOVERY DATE)								
COST ACCOUNT MANAGER DATE				COST CENTER MGR. DATE		WBS ELEMENT MANAGER DATE		DATE

FIGURE 14–13. Cost account variance analysis report.

The major difficulty encountered in the determination of BCWP is the evaluation of in-process work (work packages that have been started but have not been completed at the time of cutoff for the report). The use of short-span work packages or establishment of discrete value milestones within work packages will significantly reduce the work-in-process evaluation problem, and procedures used will vary depending on work package length. For example, some contractors prefer to take no BCWP credit for a short-term work package until it is completed, while others take credit for 50 percent of the work package budget when it starts and the remaining 50 percent at completion. Some contractors use formulas that approximate the time-phasing of the effort, others use earned standards, while still others prefer to make physical assessments of the work completed to determine the applicable budget earned. For longer work packages, many contractors use discrete milestones with pre-established budget or progress values to measure work performed.

The difficulty in performing variance analysis is the calculation of BCWP because one must predict the percent complete. The simplest formula for calculating BCWP is:

$$\text{BCWP} = (\%\ \text{complete}) \times \text{BAC}$$

Most people calculate "percent complete" based upon task durations. However, a more accurate representation would be to calculate "percent work complete." However, this requires a schedule that is resource loaded. To eliminate this problem, many companies use standard dollar expenditures for the project, regardless of percent complete. For example, we could say that 10 percent of the costs are to be "booked" for each 10 percent of the time interval. Another technique, and perhaps the most common, is the 50/50 rule:

> Half of the budget for each element is recorded at the time that the work is scheduled to begin, and the other half at the time that the work is scheduled to be completed. For a project with a large number of elements, the amount of distortion from such a procedure is minimal. (Figures 14–14 and 14–15 illustrate this technique.)

One advantage of using the 50/50 rule is that it eliminates the necessity for the continuous determination of the percent complete. However, if percent complete can be deter-mined, then percent complete can be plotted against time expended, as shown in Figure 14–16.

There are techniques available other than the 50/50 rule:

- *0/100:* Usually limited to work packages (activities) of small duration (i.e., less than one month). No value is earned until the activity is complete.
- *Milestone:* This is used for long work packages with associated interim milestones, or a functional group of activities with a milestone established at identified

Analysis

Budgeted cost for work

Scheduled (BCWS)
Performed (BCWP)

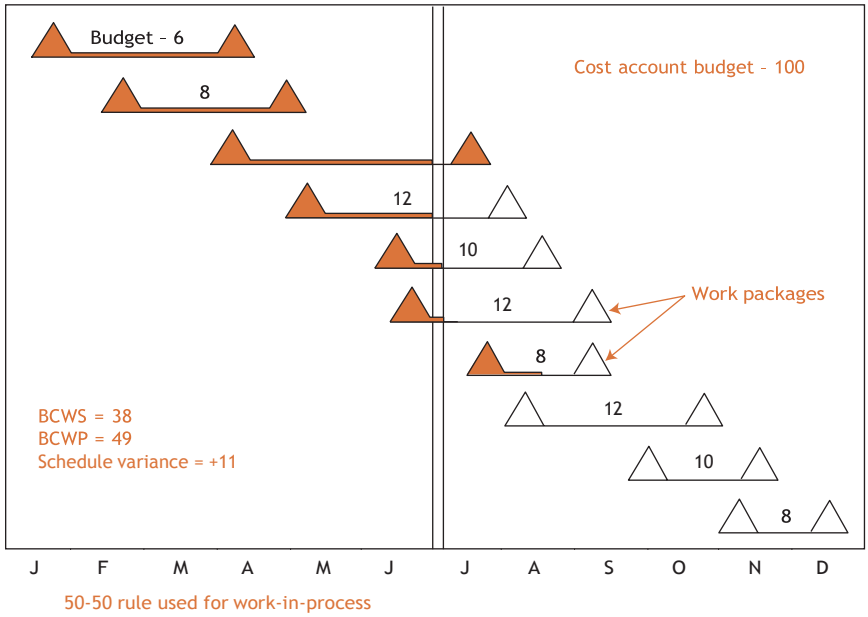

FIGURE 14–14. Analysis showing use of 50/50 rule.

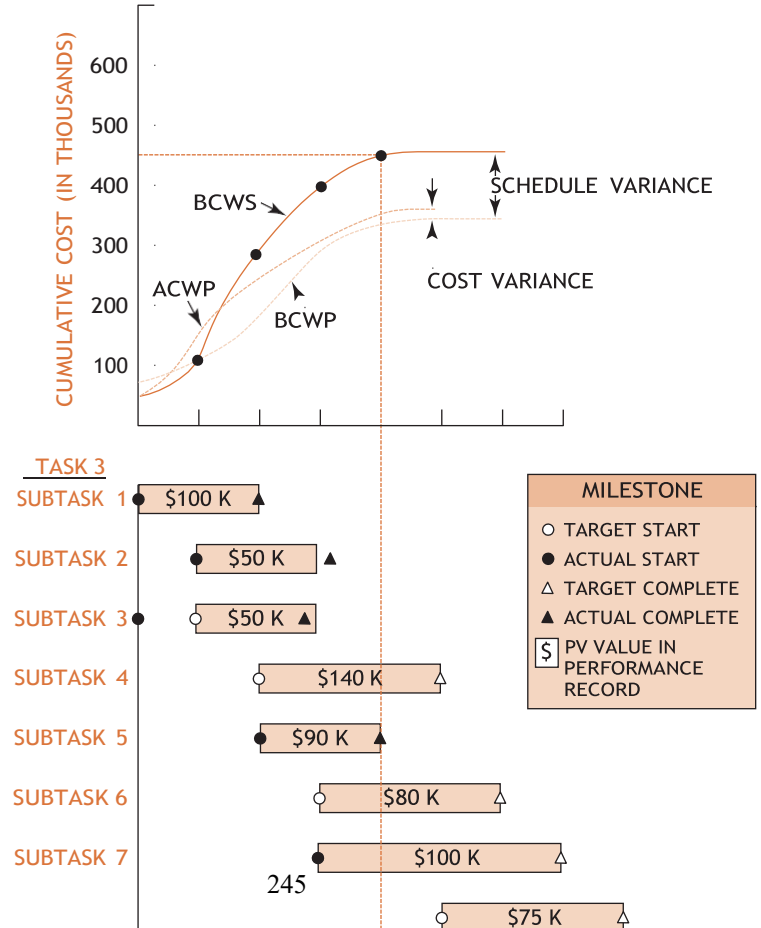

FIGURE 14–15. Project Z, task 3 cost data (contractual).

control points. Value is earned when the milestone is completed. In these cases, a budget is assigned to the milestone rather than the work packages.

- *Percent complete:* Usually invoked for long-duration work packages (i.e., three months or more) where milestones cannot be identified. The value earned would be the reported percent of the budget.
- *Equivalent units:* Used for multiple similar-unit work packages, where earnings are on completed units, rather than labor.
- *Cost formula (80/20):* A variation of percent complete for long-duration work packages.

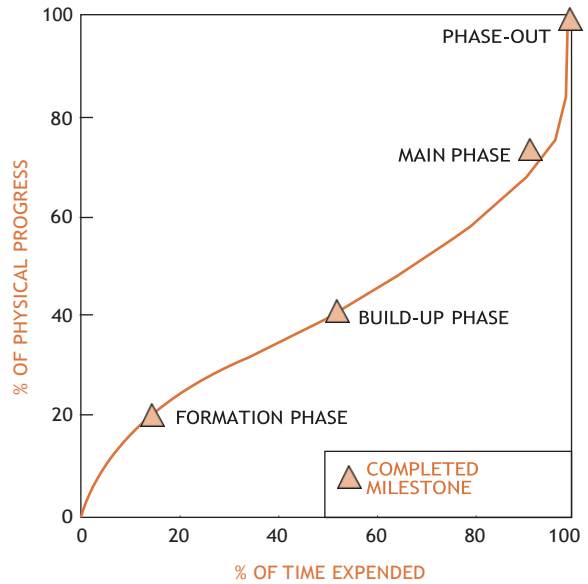

FIGURE 14–16. Physical progress versus time expended.

- *Level of effort:* This method is based on the passage of time, often used for supervision and management work packages. The value earned is based on time expendedover total scheduled time. It is measured in terms of resources consumed over a given period of time and does not result in a final product.
- *Apportioned effort:* A rarely used technique, for special related work pack- ages. As an example, a production work package might have an apportioned inspection work package of 20 percent. There are only a few applications ofthis technique. Many people will try to use this for supervision, which is not a valid application. This technique is used for effort that is not readily divisibleinto short-span work

packages but that is in proportion to some other measured effort.

Estimate at Completion (EAC)

***PMBOK® Guide* 6th Edition**
7.4.2.2 Data Analysis
7.4.2.3 To-Complete Performance Index

The estimate at completion (EAC) is the best estimate of the total cost at the completion of the project. The EAC is a periodic evaluation of the project status, usually on a monthly basis or until a significant change has been identified. It is usually the responsibility of theperforming organization to prepare the EAC.

The calculation of a new EAC and subsequent revision does not imply that corrective action has been taken. Consider a three-month task that is 99 percent complete and was budgeted to spend $400K (BCWS). The actual costs to date (ACWP) are $395K. Using the 50/50 rule, BCWP is $200K. The estimated cost-to-complete (EAC) ratio is $395K/$200K, which implies that we are heading for a 100 percent cost overrun. Obviously, this is not the case.

TABLE 14–2. PROJECT Z, TASK 3 COST SUMMARY FOR WORK COMPLETED OR IN PROGRESS (COST IN THOUSANDS)

		Cumulative to Date				
	Contractual	BCWS	BCWP	ACWP	Cost Variance	Schedule Variance

Direct labor hours	8650	6712	5061	4652	409	
Direct labor dollars	241	187	141	150	(9)	(46)
Labor overhead (140%)	338	263	199	210	(11)	(64)
Subtotal	579	450	340	360	(20)	
Material dollars	70	66	26	30	(4)	
Subtotal	649					
G&A (10%)	65					
Subtotal	714					
Fee (12%)	86					
Total	800					

Note: This table assumes a 50/50 ratio for planned and earned values of budget.

Using the data in Table 14–2, we can calculate the estimate at completion (EAC) by the expression where BAC is the value of BCWS at completion.

$$\begin{aligned} EAC &= (ACWP/BCWP) \times BAC = BAC/CIP \\ &= (360/340) \times 579{,}000 \\ &= \$613{,}059 \end{aligned}$$

The discussion of what value to use for BAC is argumentative. In the above calculation, we used burdened direct labor dollars. Some people prefer to use non-burdened labor with the argument that the project manager controls only direct labor hours and dollars. Also, the calculation for EAC did not include material costs or general and administrative costs.

The above calculation of EAC implies that we are overrunning labor costs by 6.38 percent and that the final burdened labor cost will exceed the budgeted burdened labor cost by $34,059. For a more precise calculation of EAC we would need to include material cost (assumed at $70,000) and G&A. This would give us a final cost, excluding profit, of $751,365, which is an overrun of $37,365. The resulting profit would be $86,000 less $37,365, or $48,635. The final analysis is that work is being accomplished almost on schedule except for subtask 4 and subtask 6, but costs are being overrun.

Cost Overruns

The question that remains is, "Where is the cost overrun occurring?" To answer this question, we must analyze the cost summary sheet for project Z, task 3. Table 14–2 represents a hypothetical case for the cost elements of project Z, task 3. From Table 14–2 we see that negative (overrun) variances exist for labor dollars, overhead dollars, and material costs. Because labor overhead is measured as a percentage of direct labor dollars, the problem appears to be in the direct labor dollars.

From the contractual column in Table 14–2 the project was estimated at $27.86 per hour direct labor ($241,000/8650 hours), but actuals to date are $150,000/4652 hours, or $32.24 per hour. Therefore, higher-salaried people than anticipated are being employed. This salary increase is partially offset by the fact that there exists a positive variance of 409 direct labor hours, indicating that these higher-salaried employees are performing at a more favorable position than expected on the learning curve. Since the milestones (from Figure 14–15) appear to be on target, work is progressing as planned, except for subtask 4.

The labor overhead rate has not changed. The contractual, BCWS, and BCWP overhead rates were estimated at 140 percent. The actuals, obtained from month-end reports, indicate that the true overhead rate is as predicted.

The following conclusions can be drawn:

- Work is being performed as planned (almost on schedule, although at a more favorable position on the learning curve), except for subtask 4, which is giving us a schedule delay.
- Direct labor costs are increasing through the use of higher-salaried employees.
- Overhead rates are as anticipated.
- Direct labor hours must be reduced even further to compensate for increased costs, or profits will be drastically reduced.

This type of analysis could have been carried out to one more level by identifying exactly which departments were using the more expensive employees. This step should probably be completed anyway to see if lower-paid employees are available and can work at the required position on the learning curve. Had the labor costs been a result of increased labor hours, this step would have definitely been necessary to identify the reason for the overrun in-house. Perhaps poor estimating was the cause.

In Table 14–2, there also appears a positive variance in materials. This likewise should undergo further analysis. The cause may be the result of improperly identified hardware, material escalation costs increasing beyond what was planned, increased scrap factors, or a change in subcontractors.

It should be obvious from this analysis that a detailed investigation into the cause of variances appears to be the best method for identifying causes. The concept of earned value, although a crude estimate, identifies trends concerning the status of specific WBS elements.

EAC Formulas

There are several formulas that can be used to calculate EAC. Using the data shown below, we can illustrate how each of three different formulas can give a different result. Assume that your project consists of these three activities only.

Activity	%Complete	BCWS	BCWP	ACWP
A	100	1000	1000	1200
B	50	1000	500	700
C	0	1000	0	0

$$\text{Formula I. } EAC = \frac{ACWP}{BCWP} \times BAC$$

$$= \frac{1900}{1500}(3000) = \$3800$$

$$\text{Formula II. } EAC = \frac{ACWP}{BCWP} \times \begin{bmatrix}\text{Work completed} \\ \text{and in progress}\end{bmatrix} + \begin{bmatrix}\text{Actual (or revised) cost} \\ \text{of work packages not} \\ \text{yet begun}\end{bmatrix}$$

$$= \frac{1900}{1500}(2000) + \$1000 = \$3533$$

$$\text{Formula III. } EAC = \begin{bmatrix}\text{Actual to date}\end{bmatrix} \times \begin{bmatrix}\text{All remaining work to be at planned} \\ \text{cost including remaining work in} \\ \text{progress}\end{bmatrix}$$

$$= 1900 + \begin{bmatrix}500 + 1000\end{bmatrix} = \$3400$$

$$\downarrow \quad \downarrow$$

$$B \quad C$$

Advantages and disadvantages exist for each formula. Formula I assumes that the burn rate (i.e., ACWP/BCWP) will be the same for the remainder of the project. This is the easiest formula to use. The burn rate is updated each reporting period.

Formula II assumes that all work packages not yet opened will be completed at the planned cost. However, it is possible for planned cost to be revised based upon history from completed work packages.

Formula III assumes that all remaining work is independent of the burn rate incurred thus far. This may be unrealistic unless all remaining work can be reestimated if necessary.

Organization-Level Analysis

Each critical variance identified on the organizational MCCS reports may require the completion of MCCS variance analysis procedures by the supervisor of the cost center involved. Analyzing both the work breakdown and organizational structure, the supervisor systematically concentrates his efforts on cost and schedule problems appearing within his organization.

Analysis begins at the lowest organizational level by the supervisor involved. Critical variances are noted at the cost account on the MCCS report. If a schedule variance is involved and the subtask consists of a number of work packages, the supervisor may refer to a separate report that breaks down each cost account into the various work packages that are ahead or behind schedule. The supervisor can then analyze the variance on the basis of the work package involved and determine with the aid of supporting organizations the cause of the variance, the corrective action that can be taken, or the possible effect on associated or future planned effort.

Cost variances involving labor are analyzed by the supervisor on the basis of the performance of his organization in accomplishing the work assigned, within the budgeted man-hours and planned labor rate. The cause of any variance to this performance is determined, and corrective action is then implemented.

Cost variances on non-labor efforts are analyzed by the supervisor with the aid of the program team member and other supporting organizations.

All material variance analyses are normally initiated by cost accounting as a service to the using organization. These variance analyses are completed, including cause and corrective action, to the extent that can be explained by cost accounting. They are then sent to the using organization, which reviews the analyses and completes those resulting from schedule performance or usage. If a variance is recognized as a changein the material acquisition price, this information is supplied by cost accounting to the responsible organization and a change to the estimate-to-complete is initiated by theusing organization.

The supervisor should forward copies of each completed MCCS variance analysis/ EAC change form to his higher-level manager and the program team member.

Program Team Analysis

The program team member may receive a team critical variance report that lists variances in his organization at the lowest level of the work breakdown structure at the division cost center level by cost element. Upon request of the program manager, analyses of variances contributing to the variances on the team critical variance report are summarized by the responsible program team member and reviewed with the program manager. The preparation of status reports, whether they be for internal management or for the customer, should, at a minimum, answer two funda- mental questions:

- Where are we today (with respect to time and cost)?
- Where will we end up (with respect to time and cost)?

The information necessary to answer these questions can be obtained from the following formulas:

- Where are we today?
  - Cost variances (in dollars/hours and percent complete)
  - Schedule variances (in dollars/hours and percent complete)
  - Percent complete
  - Percent money spent
- Where will we end up?
  - Estimate at completion (EAC)
  - The remaining critical path
  - SPI (trend analysis)
  - CPI (trend analysis)

Since SPI and CPI are used for trend analyses, we can use CPI and SPI to forecast the expected final cost and the expected end date of the project. We can express the cost at completion, EAC, as:

$$EAC = \frac{BAC}{CPI}$$

The time at completion uses SPI for the forecast and can be expressed as:

$$\text{New project length} = \frac{\text{Original project length}}{\text{SPI}}$$

Care must be taken with the use of SPI to calculate the new project length because a favorable value for SPI (i.e., .1.0) could be the result of work packages that are not on the critical path.

Once EAC and the new project length are calculated, we can calculate the variance at completion (VAC) and the estimated cost to complete (ETC) using the following two formulas:

$$\text{VAC} = \text{BAC} - \text{EAC} \quad \text{and} \quad \text{ETC} = \text{EAC} - \text{ACWP}$$

Percent complete and percent money spent can be obtained from the following formulas:

$$\text{Percent complete} = \frac{\text{BCWP}}{\text{BAC}}$$

$$\text{Percent money spent} = \frac{\text{ACWP}}{\text{BAC}}$$

Another formula that appears to be important today is the to-complete performance index. This shows the cost performance that is necessary to complete a component of work. The formula is:

$$\text{TCPI} = (\text{BAC} - \text{EV})/(\text{BAC} - \text{AC})$$

The program manager uses this information to review the program status with upper-level management. This review is normally on a monthly basis on large projects. In addition, the results of these analyses are used to explain variances in the contractually required reports to the customer.

After the analyses of the variances have been made, reports must be developed for both the customer and in-house (upper-level) management.

14.7 THE COST BASELINE

***PMBOK® Guide*, 6th Edition**
7.3.3.1 Cost Baseline
7.4.2.2 Data Analysis

Once the project is initiated, the project team establishes the cost or financial baseline against which status will be reported and variances will be measured. Figure 14–17 represents a cost baseline.

Each block represents a cost account or work package element. The summation of all of the cost accounts or work packages would then equal the time-phased

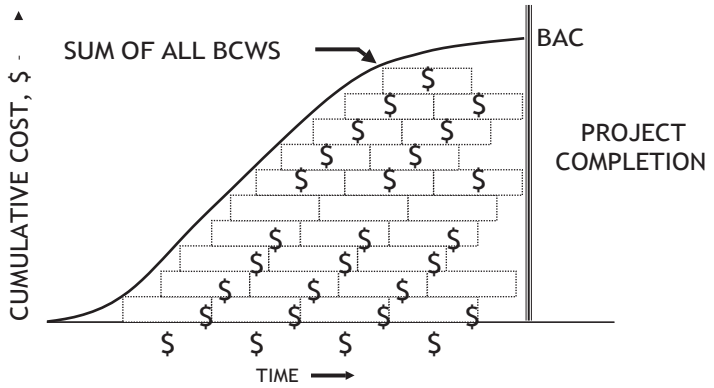

FIGURE 14–17. The cost baseline.

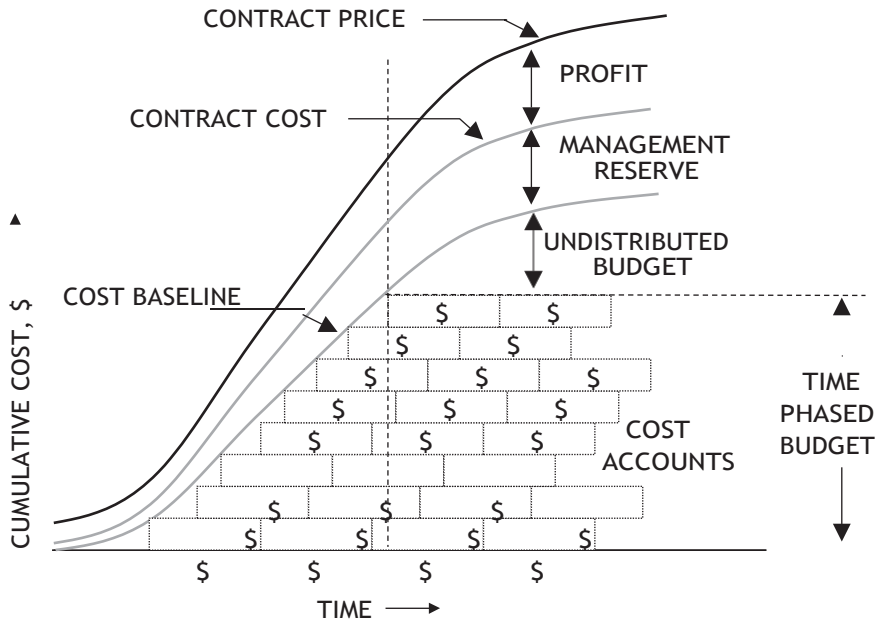

FIGURE 14–18. WBS level 1 cost breakdown.

budget. Each work package would then be described through the work authorization form for that work package.

The cost baseline in Figure 14–17 is just part of the cost breakdown. An illustration of a cost breakdown appears in Figure 14–18.

There are certain distinguishing features of Figure 14–18:

- The time-phased budget, which is the released budget, is the summation of all BCWS elements.

- The cost baseline is the summation of the time-phased budget (i.e., the distributed budget) and the undistributed budget. This will equal the released, planned budget at completion (BAC).
- The contractual cost to complete the project is the summation of the cost baseline and the management reserve, assuming that a management reserve exists.
- The contract price is the contract cost plus the profit, if any.

14.8 JUSTIFYING THE COSTS

Project pricing is often based upon best guesses rather than concrete estimates. This is particularly true for companies that survive on competitive bidding and where the preparation cost of a bid may vary between $50,000 and $500,000. If the probability of winning abid is low, then the company may spend the minimum amount of time and cost during bidpreparation.

Table 14–3 shows a typical project pricing summary where each functional area or division can have its own overhead rate. In this summary, the overhead rate for engineering is 110 percent, whereas the manufacturing overhead rate is 200 percent. If this company is a subsidiary of a larger company, then a corporate general and administrative (G&A) cost may be included. If the project is for an external customer, then a profit margin will be included.

Once the project pricing summary is completed, the costs must be justified before executive committee. Every company has its own evaluation criteria cost summary approval process.

Typical elements that must be justified or supported by hard data include:

Labor Rates: For estimating purposes, department averages or skill set weighted averages can be used. This is sometimes called the blended rate. The best-case scenario would

TABLE 14–3. TYPICAL PROJECT PRICING SUMMARY

	Direct Labor			Overhead		
Department	**Hours**	**Rate**	**Dollars**	**%**	**Dollars**	**Total**
Engineering	1000	$42.00	42,000	110	46,200	$ 88,200
Manufacturing	500	$35.00	17,500	200	35,000	$ 52,500
					Total Labor	$140,700
				Other: Subcontracts	$10,000	
				Consultants	$ 2,000	$ 12,000
			Total labor and material			$152,700
			Corporate G&A: 10%			$ 15,270
						$167,970
			Profit: 15%			$ 25,196
						$193,166

TABLE 14–4. FORWARD PRICING RATES: SALARY (DEPARTMENT PAY STRUCTURE)

		Salary (per hour)		
Pay Grade	**Title**	**2015**	**2016***	**2017***
9	Engineering Consultant	$73	$81	$85
8	Senior Engineer	60	63	67
7	Engineer	51	55	58
6	Junior Engineer	46	49	52
5	Apprentice Engineer	41	43	45

*Projected rates.

be estimating from the actual salary or skill set of the workers to be assigned. This may be impossible during competitive bidding because we do not know who will be available or who will be assigned assuming the contract is received. Also, if the project is a multiyear effort, we may need forward pricing rates, which are the predicted, full burdened salaries anticipated in the next few years. This is illustrated in Table 14–4.

- Overtime: If resources are scarce and the company has no intention of hiring additional resources, then some of the work must be accomplished on overtime. This could increase the cost of the project and an allowance must be made for possiblemistakes made during this period of excessive overtime.
- Scrap factors: If the project includes procurement of raw materials, then some scrap factor allowance may be necessary. This calculation may be impacted by the skill set of the resources assigned and using the materials, previous experience using these materials, and experience on these types of projects.
- Risks: Risk analysis may be based upon the quality of the estimates and experience of those who made the estimates. Other risks considered include the company's ability to achieve the anticipated benefits or the designated profits and, if a disaster occurs, the company's exposure and liability for lawsuits.
- Hidden costs: These costs, such as travel, shipping and postage, capital costs, and meeting attendance, can erode all of the profitability expected on a project. Another potentially hidden cost is the yearly or monthly workload availability. A typical calculation appears in Table 14–5. If we use Table 14–5 and all of the workers are long-term employees, then there may be less than 1840 hours available per year to account for vacations, sick leave, etc.

14.9 THE COST OVERRUN DILEMMA

The lifeblood of most organizations is a continuous stream of new products or services. Because of the word "new," historical data may be at a minimum and cost overruns are expected. Figure 14–19 shows a typical range of overruns.

TABLE 14–5. HOURS AVAILABLE FOR WORK

Hours available per year (52 × 40):	2080 hours
Vacation (3 weeks):	–120 hours
Sick leave (3 days):	–24 hours
Paid holidays (11 days):	–88 hours
Jury duty (1 day):	–8 hours
	1840 hours
(1840 hours/year) ÷ 12 months = 153 hours/month	

Rough order-of-magnitude (ROM) estimates are often made from "soft" data, which can result in a wide range of overruns, and are used in the initiation phase of a project. Aswe go from soft data to hard data and enter the planning phase of a project, the accuracy ofthe estimates improves and the range of the overruns narrows.

When overruns occur, the project manager looks for ways of reducing costs. The simplest way is to reduce scope. This begins with a search for items that are easy to cut. The items that are easiest to cut are those items that were poorly understood during the estimating process and were therefore underestimated. Typical items that are cut or reduced in magnitude include project management supervision, line management supervision, processcontrols, quality assurance, and testing.

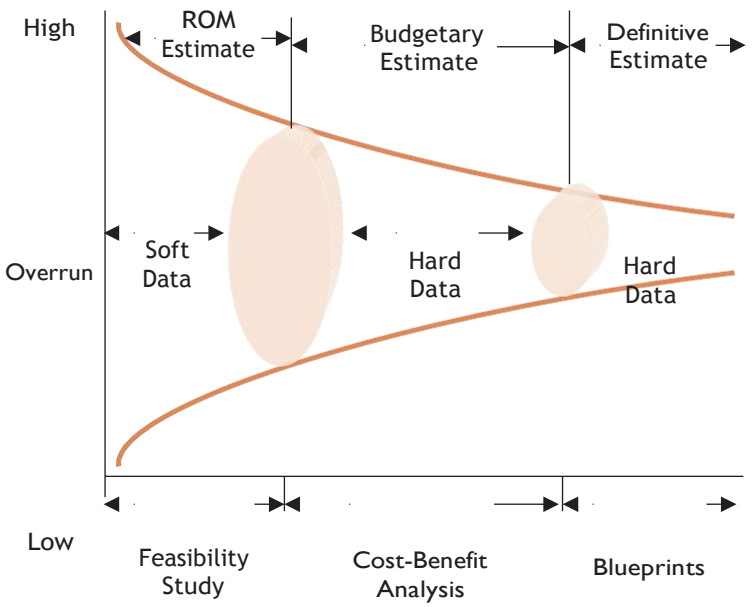

FIGURE 14–19. Range of overruns.

If the easy-to-cut items do not provide sufficient cost reductions, then a desperate search begins among the hard-to-cut items. Hard-to-cut items include direct labor hours, materials, equipment, facilities, and other items.

If the cost reductions are unacceptable to management, then management must decide whether or not to pull the plug and cancel the project.

14.10 RECORDING MATERIAL COSTS USING EARNED VALUE MEASUREMENT

Recording direct labor costs usually presents no problem since labor costs are normally recorded as the labor is accomplished. Therefore, recorded and reported labor will be the same. Material costs, on the other hand, may be recorded at various times. Material costs can be recorded as commitments, expenditures, accruals, and applied costs. All provide useful information and are important for control purposes.

Because of the choices available for material cost analysis, material costs should be reported *separately* from the standard labor hour/labor dollar earned value report. For example, cost variances associated with the procurement of material may be determined at the time that the purchase orders are negotiated and placed with the vendors since this information provides the *earliest* visibility of potential cost variance problems. Significant variances in the anticipated and actual costs of materials can have a serious effect on the total contract cost and should be reflected promptly in the estimated cost at completion (EAC) and explained in the narrative part of the project status report.

Separating labor from material costs is essential. Consider the following example: You are budgeted to spend $1,000,000 in burdened labor and $600,000 in material.At the end of the first month of your project, the following information is availableto you:

Labor:	ACQP = $90,000
	BCWP = $100,000
	BAC = $1,000,000
Material:	AWCP = $450,000
	BCWP = $400,000
	BAC = $600,000

For simplicity's sake, let us use the following formula for EAC:

$$EAC = (ACWP/BCWP) \times BAC$$

Therefore,

EAC (labor)	= $900,000
EAC (material	= $675,000

If we add together both EACs, the estimated cost at completion will be $1,575,000, which is $25,000 *below* the planned budget. If the costs are combined before we calculate EAC, then

$$\text{EAC} = [(\$450{,}000 + \$90{,}000)/\$500{,}000] \times (\$1{,}600{,}000) = \$1{,}728{,}000$$

which is a $128,000 *overrun.* Therefore, it is usually best to separate material from labor in status reporting. Another major problem is how to account for the costs of material placed on order, which does *not* reflect the cost of work completed and is not normally used in status reporting. For performance measurement purposes, it is desirable that material costs be recorded at the time that the materials are received, paid for, or used rather than as of the time that they are ordered. Therefore, the actual costs reported for materials should be derived in accordance with established procedures, and normally will be recorded for earned value measurement purposes at or after time of material receipt. In addition, costs should always be recorded on the same basis as budgets are prepared in order to make comparisons between budgeted and actual costs meaningful. For example, material should not be budgeted on the basis of when it is used and then have its costs collected/reported on the basis of when it is received.

14.11 MATERIAL VARIANCES: PRICE AND USAGE

When the actual material costs exceed a material budget, there are normally two causes:

- The articles purchased cost more than was planned, called a "price variance."
- More articles were consumed than were planned, called a "usage variance."

Price variances (PV) occur when the budgeted price value (BCWS) of the material was different than what was actually experienced (ACWP). This condition can arise for a host of reasons: poor initial estimates, inflation, different materials used than were planned, too little money available to budget, and so on.

The formula for price variance (PV) is:

$$\text{PV} = (\text{Budgeted price} - \text{Actual price}) \times (\text{Actual quantity})$$

Price variance is the difference between the budgeted cost for the bill of materials and the price paid for the bill of materials. By contrast, usage variances (UV) occur when a greater quantity of materials is consumed than were planned. The formula for usage variance (UV) is:

$$\text{UV} = (\text{Budgeted quantity} - \text{Actual quantity}) \times (\text{Budgeted price})$$

Section 14.11 is adapted from Quentin W. Fleming, *Cost/Schedule Control Systems Criteria* (Chicago: Probus Publishers, 1992), pp. 151–152.

Normally, usage variances are the resulting costs of materials used over and above the quantity called for in the bill of materials.

Consider the following example: The project manager establishes a material budget of 100 units (which includes 10 units for scrap factor) at a price of $150 per unit. Therefore, the material budget was set at $15,000. At the end of the short project, material actuals (ACWP) came in at $15,950, which was $950 over budget. What happened?

Applying the formulas defined previously,

$$\begin{aligned}\text{Price variance (PV)} &= (\text{BCWS price} - \text{ACWP price}) \times \text{Actual quantity}\\ &= (\$150 \text{ per unit} - \$145 \text{ per unit}) \times 110 \text{ units}\\ &= \$550 \text{ favorable}\end{aligned}$$

$$\begin{aligned}\text{Usage variance (UV)} &= (\text{BCWP qty} - \text{ACWP qty}) \times \text{BCWS price}\\ &= (100 \text{ units} - 110 \text{ units}) \times \$150 \text{ per unit}\\ &= \$1{,}500 \text{ unfavorable}\end{aligned}$$

The analysis indicates that your purchase price was less than you anticipated, thus generating a cost savings. However, you used 10 units more than planned for, thus generating an unfavorable usage variance. Further investigation indicated that your line manager had increased the scrap factor from 10 to 20 units.

14.12 SUMMARY VARIANCES

Summary variances can be calculated for both labor and material. Consider the information shown below:

	Direct Material	Direct Labor
Planned price/unit	$ 30.00	$ 24.30
Actual units	17,853	9,000
Actual price/unit	$ 31.07	$ 26.24
Actual cost	$554,630	$236,200

We can now calculate the total price variance for direct material and the rate cost variance:

- *Total* price variance for direct material

  = Actual units × (BCWP – ACWP)
  = 17,853×($30.00 – $31.07)
  = $19,102.71 (unfavorable)

- Labor *rate* cost variance

  = Budgeted rate – Actual rate
  = $24.30 – $26.24
  = $1.94 (unfavorable)

14.13 STATUS REPORTING

PMBOK® Guide, 6th Edition
7.4.3.5 Project Documents updates

There are four types of performance reports that are generally printed out from the earned value measurement system:

- Progress reports: These reports indicate the physical progress to date, namely, BCWS, BCWP, and ACWP. The report might also include information on material procurement, delivery, and usage, but most companies have separate reports on materials.
- Status reports: These reports identify where we are today and use the information from the performance reports to calculate SV and CV.
- Projection reports: These reports calculate EAC, ETC, SPI, and CPI as well as any other forward-looking projections. These reports emphasize where we will end up.
- Exception reports: These reports identify exceptions, problems, or situations that exceed the threshold limits on such items as variances, cash flow, resources assigned, and other such topics.

Reporting procedures for variance analysis should be as brief as possible. The reason for this is simple: the shorter and more concise the report, the faster that feedback can be generated and responses developed. Time is critical if rescheduling must be accomplished with limited resources.

This by no means implies that all variances require corrective action. There are four major responses to a variance report:

- Ignoring it
- Functional modification
- Replanning
- System redesign

Permissible variances exist for all levels of the organization. If the variance is within these permitted deviations, then there will be no response, and the variance may be ignored. In some situations where the variance is marginal (or even within limits), corrective action may be required. This would normally occur at the functional level and might simply involve using another test procedure or possibly considering some alternative not delineated in the program plan.

If major variances occur, then either replanning or system redesign must take place.

14.14 COST CONTROL PROBLEMS

PMBOK® Guide, 6th Edition
7.4 Control Costs

No matter how good the cost and control system is, problems can occur. Common causes of cost problems include:

- Poor estimating techniques and/or standards, resulting in unrealistic budgets
- Out-of-sequence starting and completion of activities and events
- Inadequate work breakdown structure
- No management policy on reporting and control practices
- Poor work definition at the lower levels of the organization
- Management reducing budgets or bids to be competitive or to eliminate "fat"
- Inadequate formal planning that results in unnoticed, or often uncontrolled, increases in scope of effort
- Poor comparison of actual and planned costs
- Comparison of actual and planned costs at the wrong level of management
- Unforeseen technical problems
- Schedule delays that require overtime or idle time costing
- Material escalation factors that are unrealistic

Cost overruns can occur in any phase of project development. The most common causes for cost overruns are:

- Proposal phase
  - Failure to understand customer requirements
  - Unrealistic appraisal of in-house capabilities
  - Underestimating time requirements

  Planning phase
  - Omissions
  - Inaccuracy of the work breakdown structure
  - Misinterpretation of information
  - Use of wrong estimating techniques
  - Failure to identify and concentrate on major cost elements
  - Failure to assess and provide for risks
- Negotiation phase
  - Forcing a speedy compromise
  - Procurement ceiling costs
  - Negotiation team that must "win this one"
- Contractual phase
  - Contractual discrepancies
  - SOW different from RFP requirements
  - Proposal team different from project team
- Design phase
  - Accepting customer requests without management approval
  - Problems in customer communications channels and data items
  - Problems in design review meetings
- Production phase
  - Excessive material costs
  - Specifications that are not acceptable
  - Manufacturing and engineering disagreement

COMPETENCES OVERVIEW

Source: Project Manager Competency Development Framework, Project Management Institute, Newtown Square, Pennsylvania

1.1 What Is Portfolio/Program/Project Manager Competence?

Competent portfolio/program/project managers consistently apply their management knowledge and personal behaviors to increase the likelihood of delivering portfolios/programs/projects that meet stakeholders' requirements.

With regard to portfolio/program/project managers, competency is the demonstrated ability to perform activities within a portfolio, program, or project environment that lead to expected outcomes based on defined and accepted standards.

Competency for the portfolio/program/project manager consists of three separate dimensions:

- **Knowledge competence.** What the portfolio/program/project manager knows about the application of processes, tools, and techniques for portfolio/program/project activities.
- **Performance competence.** How the portfolio/program/project manager applies portfolio/program/project management knowledge to meet the project requirements.
- **Personal competence.** How portfolio/program/project managers behave when performing activities within the portfolio/program/project environment, their attitudes, and core personality characteristics.

To be recognized as fully competent, a portfolio/program/project manager needs to satisfy each of the three dimensions described above.

1.3.1 Competencies Addressed by the *PMCD Framework*

The three dimensions of competency addressed in the *PMCD Framework*—knowledge, performance, and personal—are demonstrated in different ways:

- **Knowledge competence.** Can be demonstrated by passing an appropriately credentialedassessment, such as the PMP® examination or any equivalent international portfolio/program/project manager accreditation. These knowledge competences are detailed in the examination content outlines,for example, the *Project Management Professional (PMP)® Examination Content Outline* [1][1] and are not defined in the *PMCD Framework*.
- **Performance competence.** Can be demonstrated by assessing the portfolio/program/project-related actions and outcomes to be considered competent. This is covered in Sections 3 through 5.

[1] The numbers in brackets refer to the list of references at the end of this standard.

- **Personal competence.** Can be demonstrated by assessing the portfolio/program/project manager's behavior. This is covered in Sections 3 through 5.

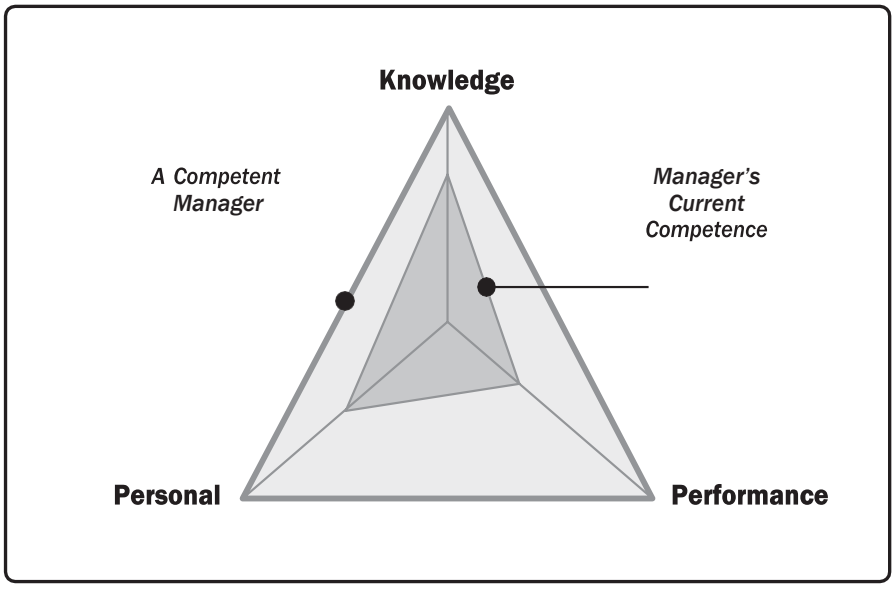

Figure 1-1. *PMCD Framework* Dimensions of Competence

Figure 1-1 illustrates the three dimensions for assessing portfolio/program/project managers. As a result of the assessment, the portfolio/program/project manager will better understand the skill development necessary to attain recognition as a competent portfolio/program/project manager. The outer boundaries of the Figure 1-1 are a conceptual representation of a fully competent portfolio/program/project manager. The dark shaded area represents an individual manager's current assessment of competence. The difference between the two areas represents the individual manager's competence development needs for the specific role and/or project. While the minimum level of competence may exist at this point in the initiative, efforts to maintain competence should also be undertaken in each dimension. The *PMCD Framework* provides the baseline to assess performance and personal competences.

2.1 Purpose of Performance and Personal Competences

2.1.1 Performance Competences

Performance competence is what portfolio/program/project managers are able to do or accomplish by applying their project management knowledge and individual skills. It is generally accepted that there is a causal link between project manager competency and project success. This applies in an analogous way to success in programs and portfolios.

To assess performance competence, endorsed standards or baselines are required for each skill against which:

- Individuals are able to measure and plan their progress toward competency. Organizations are able to design performance measurement instruments, design job or position specifications, employment specifications, and individual development programs.
- Performance competence can be measured by assessing individuals against each unit of competence and element using the performance criteria and types of evidence specified in this section.

The performance competences in this standard provide the framework, structure, and baselines against which an individual may be measured. Assessing the performance competence of project managers and closing any gaps may help individuals and their organizations to maximize project manager competency. The ten units of performance competence described in this section provide one important dimension of the framework for that assessment.

The performance criteria given in this document need to be tailored to the specific organization in accordance with the organizational portfolio/program/project management processes/policies and their applicability.

2.1.2 Personal Competences

Personal competences are those behaviors, attitudes, cultural influences, and core personality characteristics that contribute to a person's ability to manage portfolios, programs, and projects.

Project management is a people-oriented profession. It is important for a portfolio/program/project manager to possess skills that enable effective interaction with others. Personal competences describe such skills.

Improvements in personal competence enhance a portfolio/program/project manager's ability to use knowledge and performance competence effectively on projects. The treatment of personal competences as given in this framework provides a basis for assessing and developing the ability of individuals with regard to the personal competence elements described in this document.

2.2 Structure of Performance and Personal Competences

2.2.1 Performance Competences

The *PMCD Framework* – Third Edition uses the latest edition of the *PMBOK® Guide*, *The Standard for Program Management* and *The Standard for Portfolio Management,* and the PMP® Examination Content Outline to define the structure of the units of performance competence:

- **Project Integration Management.** Performing the activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Groups.
- **Project Scope Management.** Performing the work required to ensure that the project includes all the work required, and only the work required, to complete a project successfully.
- **Project Time Management.** Performing the work required to manage the timely completion of the project.
- **Project Cost Management.** Performing the work involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget.
- **Project Quality Management.** Managing the work of the performing organization that determines the quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken.
- **Project Human Resource Management.** Performing the work to organize, manage, lead, and develop the project team.
- **Project Communications Management.** Performing the work to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information.
- **Project Risk Management.** Conducting risk management planning, identification, analysis, response planning, and controlling risk on a project.
- **Project Procurement Management.** Performing the work necessary to purchase or acquire products, services, or results needed from outside of the project team.
- **Project Stakeholder Management.** Performing the work required to identify the people, groups, or organizations that could impact or be impacted by the project; to analyze stakeholders' expectations and their impact on the project; and to develop appropriate management strategies for effectively engaging stakeholders in project decisions and execution.

2.2.2 Personal Competences

Personal competences are grouped into the following six units:

- **Communicating.** Effectively exchanges timely, accurate, appropriate, and relevant information with stakeholders using suitable methods.
- **Leading.** Guides, inspires, and motivates team members and other project stakeholders to manage and overcome issues to effectively achieve project objectives.
- **Managing.** Effectively administers the project through deployment and use of human, financial, material, intellectual, and intangible resources.
- **Cognitive ability.** Applies an appropriate depth of perception, discernment, and judgment to effectively direct a project in a changing and evolving environment.
- **Effectiveness.** Produces desired results by using appropriate resources, tools, and techniques in all project management activities.
- **Professionalism.** Conforms to ethical behavior governed by responsibility, respect, fairness, and honesty in the practice of project management.

There are elements within each of the personal competences that overlap or are very similar to the other competences. In addition, there are individual capabilities that will be outside of a portfolio/program/project manager's personal competences as defined in this document.

2.3 Structure of Elements of Competence

2.3.1 Performance Competences

Each element is further defined in the terms of performance criteria, expectations, sources of evidence, and examples:

- **Performance criteria.** Specify what the individual needs to do to demonstrate competent performance in each element.
- **Expectation.** The action and level of activity that is required to be demonstrated for each performance criteria.
- **Individual performance criteria and sources of evidence.** Individual performance criteria can be assessed using the sources of evidence. When an individual performs the activities described in the performance criteria, there should be an outcome that provides some type of evidence. This may include deliverables, documents, or feedback from a stakeholder or some other tangible or intangible result. Assessment requires that some form of evidence be reviewed to determine the degree of compliance with the performance criteria.
- **Examples.** Examples of evidence for each criterion are provided. Assessors should note that the *PMCD Framework* provides these examples as general guidance and for the purpose of providing context for an assessment plan. These examples are not standards, nor are they expected outcomes. Project outcomes should reflect cultures, organizations, and industries. As such, assessors can expect to find variance in the outcomes among projects.

In the *PMCD Framework*, the term "documented" means tangible evidence. In this context, "documented" is inclusive of data, any form of media, formal or informal correspondence, objects, and outputs.

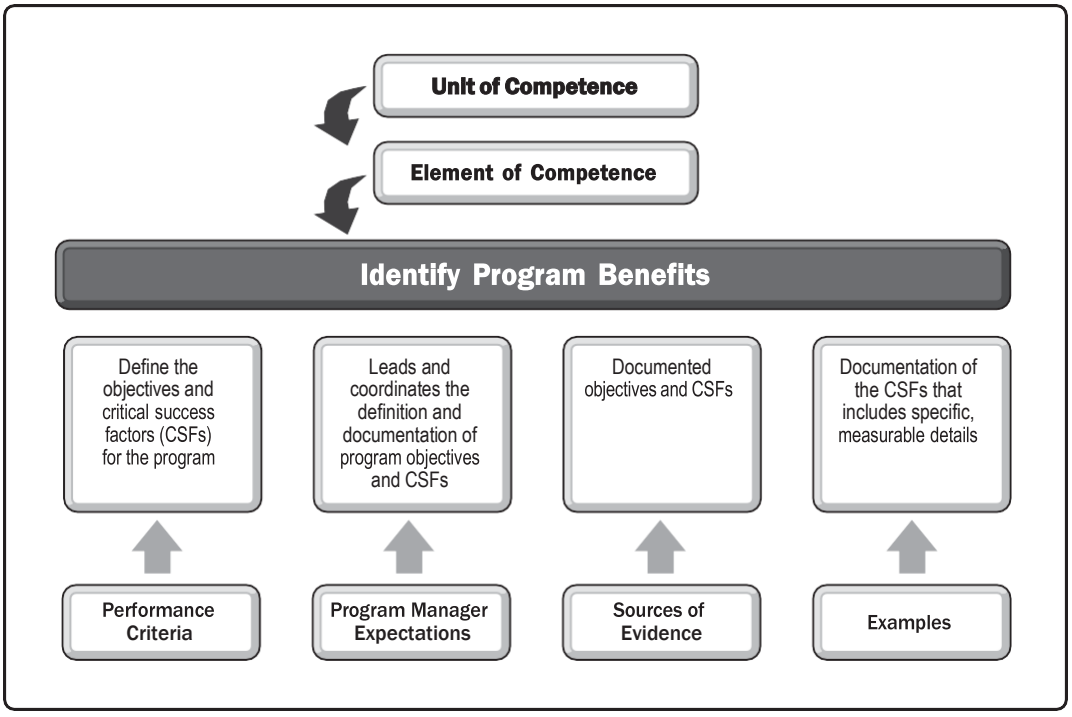

Figure 2-1. Example of a Performance Competence Element

2.3.2 Personal Competences

Each unit is composed of several elements that are considered necessary for an individual to demonstrate personal competence, represented in a similar way as for performance competence (see Figure 2-1).

Performance criteria describe the behaviors that show each competence element. While it is generally difficult to show objective proof of human behavior, the types of evidence provide examples that could reflect the achievement of a certain performance criteria.

Some sources of evidence are project documents, while others are documented observations of a person's behavior by stakeholders or team members. There are instances where some of the evidence may apply to more than one performance criteria; the duplication of evidence is deliberate, given that the behavior can vary from one unit to another, while the type of evidence used to demonstrate may be the same. The type of evidence should guide the assessor; however, the evidence outlined should not be seen as prescriptive but rather as a typical example.

2.3.3. Project Manager Indicative Competence Requirement

As a guide to assist with understanding the level of competence that may be required for a project manager, the scale shown in Table 2-1 is used. This is an indicative scale and measure and will need to be tailored in accordance with the organization's specific requirements and needs. Also it will very much depend on the responsibility and accountability that the project manager may have and will need to be considered where an organization has different levels of seniority within the project manager job level. In addition, some organizations may put more importance in competency in a particular area, such as the creation of a project charter, for example. More background and detail on how this could be adapted for an organization is provided in Section 7.

Table 2-1. Competence Level Scale for Project Managers

Competence Level	Description of Level
1	Limited experience or knowledge is required in this competence
2	Some knowledge and experience of this competence is required
3	This competence needs to be demonstrated though may only be partially demonstrated and could be performed under supervision
4	Full competency is required, supported by knowledge and experience
5	Full competency, supported by deep knowledge and broad experience; the individual is likely to be regarded as a thought leader

2.4 Project versus Program versus Portfolio Management

This edition of the *PMCD Framework* provides guidance on not only project management competencies, but also those competencies for program and portfolio management. As such the following sections detail the relationship and key differences between the three roles. Refer to Table 2-2. Further details can be found in the *PMBOK® Guide*, *The Standard for Program Management*, and *The Standard for Portfolio Management*.

2.4.1 The Relationship Between Project and Program Management

During the course of a program, projects are initiated and the program manager oversees and provides direction and guidance to the project managers. Program managers coordinate efforts between projects, but typically do not directly manage the individual components. Essential program management responsibilities include planningthe program, identifying and planning for benefits realization and sustainment, identification and control of the interdependencies between projects, addressing escalated issues among the projects that comprise the program, and tracking the contribution of each project and the non-project work to the consolidated program benefits.

The integrative nature of program management processes involves coordinating the processes for the projects or program. This coordination applies through all program management activities and involves managing the

processes at a level higher than those associated with individual projects. An example of this type of integration is the management of issues and risks needing resolution at the program level, because they involve multiple projects or otherwise cross project boundaries and therefore cannot be addressed at the individual project level.

The interactions between a program and its components tend to be iterative and cyclical. Information flows predominantly but not exclusively from the program's components, such as a subordinate project, to the program during the program planning phase. During this time, information regarding status changes affecting cross- cutting dependencies could be flowing from the projects to the program and then from the program to the affected projects. Early in a program, the program guides and directs the individual program components to align and achieve desired goals and benefits. The program also influences the approach for managing the individual projects within it. This is accomplished through the program manager's decision-making capability along with program stakeholder engagement and program governance. Later in the program, the individual components report through program governance processes on project status, risks, changes, costs, issues, and other information affecting the program. An example of such an interaction can be found during schedule development, where a detailed review of the overall schedule at the component level is needed to validate information at the program level.

2.4.2 The Relationship Between Program and Portfolio Management

The portfolio manager is responsible for the execution of the portfolio management process. Where program and project managers focus on "doing work right," portfolio managers focus on "doing the right work." Portfolio managers receive information on portfolio component performance and progress, and they convey to the portfolio management governing body how the portfolio components as a whole are aligned with the strategic goals, then provide appropriate recommendations or options for action. They also ensure that timetables for portfolio management processes are maintained and followed and that the managers of portfolio components (projects, programs, and operations) receive and provide the information required under the portfolio management processes. They are the primary conduit between managers of portfolio components and portfolio stakeholders. A portfolio has a parent-child relationship with its portfolio components, just as a program has a parent-child relationship with its projects.

Similar to the interactions between program and project management, portfolio management and program management interact as part of their relationship within the organizational strategy and objectives. As the organization manages its portfolio, the programs are influenced by the portfolio needs, such as organizational strategy and objectives, benefits, funding allocations, requirements, timelines, and constraints, which are translated into the program scope, deliverables, budget, and schedule. The direction of influence flows from the portfolio tothe program.

Similarly, during the program's benefits delivery, transition, and closing phases the program manager provides key data to the portfolio management function. This data may include program status information, program performance reports, budget and schedule updates, earned value and other types of cost performance reporting, change requests and approved changes, and escalated risks and issues. The type and frequency of these

Table 2-2. Comparative Overview of Project, Program, and Portfolio Management

Organizational Project Management			
	Projects	**Programs**	**Portfolios**
Definition	A project is a temporary endeavor undertaken to create a unique product, service, or result.	A program is a group of related projects, subsidiary programs, and program activities managed in a coordinated way to obtain benefits not available from managing them individually.	A portfolio is a collection of projects, programs, subsidiary portfolios, and operations managed as a group to achieve strategic objectives.
Scope	Projects have defined objectives. Scope is progressively elaborated throughout the project life cycle.	Programs have a scope that encompasses the scopes of its program components. Programs produce benefits to an organization by ensuring that the outputs and outcomes of program components are delivered in a coordinated and complementary manner.	Portfolios have an organizational scope that changes with the strategic objectives of the organization.
Change	Project managers expect change and implement processes to keep change managed and controlled.	Programs are managed in a manner that accepts and adapts to change as necessary to optimize the delivery of benefits as the program's components deliver outcomes and/or outputs.	Portfolio managers continuously monitor changes in the broader internal and external environments.
Planning	Project managers progressively elaborate high-level information into detailed plans throughout the project life cycle.	Programs are managed using high-level plans that track the interdependencies and progress of program components. Program plans are also used to guide planning at the component level.	Portfolio managers create and maintain necessary processes and communication relative to the aggregate portfolio.
Management	Project managers manage the project team to meet the project objectives.	Programs are managed by program managers who ensure that program benefits are delivered as expected, by coordinating the activities of a program's components.	Portfolio managers may manage or coordinate portfolio management staff, or program and project staff that may have reporting responsibilities into the aggregate portfolio.
Monitoring	Project managers monitor and control the work of producing the products, services, or results that the project was undertaken to produce.	Program managers monitor the progress of program components to ensure the overall goals, schedules, budget, and benefits of the program will be met.	Portfolio managers monitor strategic changes and aggregate resource allocation, performance results, and risk of the portfolio.
Success	Success is measured by product and project quality, timeliness, budget compliance, and degree of customer satisfaction.	A program's success is measured by the program's ability to deliver its intended benefits to an organization, and by the program's efficiency and effectiveness in delivering those benefits.	Success is measured in terms of the aggregate investment performance and benefit realization of the portfolio.

interactions is specified by the portfolio management or governance board, and influenced by the program review and update cycles.

In organizations that leverage portfolios, the program manager is responsible for ensuring that the overall program structure and program management processes align with the portfolio management plan and enable the project teams to successfully complete their work. The program manager ensures that project deliverables are ableto be integrated into the program's end product, service, results, and benefits. Program managers also ensure thatthe projects are organized and executed in a consistent manner and fulfilled within established standards.

2.5 Typical Development Paths

There are project, program, and portfolio managers with various levels of experience; however, this document does not attempt to define these levels. The level of competency that a project, program, or portfolio manager is required to have will depend on a number of factors and is likely to be determined by the organization. Exampleson how this can be done are covered in Section 7.

As individuals develop in project, program, or portfolio management, they are likely to acquire skills and experience associated with general management competences and gain a more strategic perspective. The extent of this development is different by person, but also heavily influenced by the organization.

2.5.1 Project Managers

There is typically a development path from novice project managers to experienced project managers. This development is based on growing competences as a result of increased experience and skills resulting from formal or informal development activities (see Section 6).

Subject matter experts or a managers who move into project management are likely to be experts in specific topics, operations, or leadership. They can build on these competences by adding project management specific knowledge and skills. As project management requires many competences that are also needed in line management, a manager usually can quickly develop the competences. Experts without a background in leadership or operations usually have to bridge a bigger competence gap.

2.5.2 Program and Portfolio Managers

As focus and tasks of portfolio, program, and project managers are quite different, there is no “automatic” development from project to program to portfolio management. The development into one of these roles requires additional competences and a shift in focus. Not every project manager will develop into a program or portfolio manager—and not every program or portfolio manager is suited to run a project. As with project managers, the development between different roles is founded on growing competence as a result of experience and increased skills set resulting from formal or informal development activities (see Section 6).

Program management requires a sound knowledge of project management. So project managers can bring in their project experience and extend their competence into the field of program management to develop into program managers. However, good project managers do not always make good program managers, because the different skill set and perspective that is required for a program manager may not come naturally. Likewise a good program manager may not be a good project manager. Like project managers, line managers may develop into program management by acquiring the necessary competence in project and program management.

Portfolio management, on the other hand, is much closer to general management. So it is not simply a “next step” for experienced program managers. Both program managers and line managers need to develop specific competences required for successful portfolio management. Project managers can also develop directly into portfolio managers, even though the competence gap may be bigger.

3

PROJECT MANAGER COMPETENCES

This section of the *PMCD Framework* lists competences and elements for a project manager in a preponderance of settings and circumstances by identifying performance criteria relative to specific elements of competence. Gaining an understanding through assessment of the individual project manager's current capability is essential to creating a baseline of competence. Details on evidence, expectation, and examples for each element in the competence are contained in Appendix X3. Both performance and personal competences are listed. Additional details on performance and personal competences are contained in Section 2.

Measuring the individual performance against a competency baseline will identify the project manager's strengths and development needs. The dimension of personal competence looks at the project manager's behavior relative to overall competence in managing projects. The goal is to meet or exceed the baseline competency defined by the *PMCD Framework*.

For each element, there is a competence level shown, as described in Section 2.3.3. These are not intended to be prescriptive and each organization will have its own levels for a competence based on the types of projects that it manages. The level is intended to assist the project managers and their managers in assessing where they are against where they need to be. More details can be found in Section 7.

3.1 Project Manager Performance Competences

Table 3-1 lists the Knowledge Areas and processes from the *PMBOK® Guide*.

Table 3-1. *PMBOK® Guide* Knowledge Areas and Processes

Knowledge Area	Process Name
Project Integration Management	• Develop Project Charter • Develop Project Management Plan • Direct and Manage Project Work • Monitor and Control Project Work • Perform Integrated Change Control • Close Project or Phase
Project Scope Management	• Plan Scope Management • Collect Requirements • Define Scope • Create the Work Breakdown Structure (WBS) • Validate Scope • Control Scope
Project Time Management	• Plan Schedule Management • Define Activities • Sequence Activities • Estimate Activity Resources • Estimate Activity Durations • Develop Schedule • Control Schedule
Project Cost Management	• Plan Cost Management • Estimate Costs • Determine Budget • Control Costs
Project Quality Management	• Plan Quality Management • Perform Quality Assurance • Control Quality
Project Human Resource Management	• Plan Human Resource Management • Acquire Project Team • Develop Project Team • Manage Project Team
Project Communications Management	• Plan Communications Management • Manage Communications • Control Communications
Project Risk Management	• Plan Risk Management • Identify Risks • Perform Qualitative and Quantitative Risk Analysis • Plan Risk Responses • Control Risks
Project Procurement Management	• Plan Procurement Management • Conduct Procurements • Control Procurements • Close Procurements
Project Stakeholder Management	• Identify Stakeholders • Plan Stakeholder Engagement • Manage Stakeholder Engagement • Control Stakeholder Engagement

3.2 Units of Personal Competence

Table 3-2 defines the respective elements for each unit of personal competence.

Table 3-2. Elements of Project Manager Personal Competence

Personal Competence	Description of Level
Communicating	• Actively listens, understands, and responds to stakeholders • Maintains lines of communication • Ensures quality of information • Tailors communication to audience
Leading	• Creates a team environment that promotes high performance • Builds and maintains effective relationships • Motivates and mentors project team members • Takes accountability for delivering the project • Uses influencing skills when required
Managing	• Builds and maintains the project team • Plans and manages for project success in an organized manner • Resolves conflict involving project team or stakeholders
Cognitive Ability	• Takes a holistic view of the project • Effectively resolves issues and solves problems • Uses appropriate project management tools and techniques • Seeks opportunities to improve project outcome
Effectiveness	• Resolves project problems • Maintains project stakeholder involvement, motivation, and support • Changes at the required pace to meet project needs • Uses assertiveness when necessary
Professionalism	• Demonstrates commitment to the project • Operates with integrity • Handles personal and team adversity in a suitable manner • Manages a diverse workforce • Resolves individual and organizational issues with objectivity

X3.1 Units of Project Manager Performance Competence

X3.1.1 Project Integration

Project Integration Management includes the processes and activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Groups.

The elements for this unit are:

- Develop Project Charter,
- Develop Project Management Plan,
- Direct and Manage Project Work,
- Monitor and Control Project Work,
- Perform Integrated Change Control, and
- Close Project or Phase.

Table X3-1. Project Integration—Project Manager Performance Competence

Element: Develop Project Charter		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Complete relevant sections of the project charter	Leads and manages development of relevant sections of project charter	Completed or in progress project charter	Project charter or portions thereof contain substantive content. Charter includes all or some of the sections listed below in accordance with organizational expectations and complexity of the project: • Purpose or justification • Measurable objections or success criteria • Requirements • Assumptions and constraints • Project description and boundaries • Risks • Milestone schedule • Budget • Stakeholder list • Approval requirements • Assigned project manager, responsibility, and authority level • Designation of sponsor and authority level
Obtain approval to proceed	• Works with senior management or project sponsor to obtain approval to proceed • Develops relationships to facilitate the approval processes • Resolves any authority conflicts, using project charter as basis, related to assignment of resources to the project	Signed project charter	Project charter or portions thereof contain substantive content. Charter includes sections as noted above and signed by project manager, senior management, and/or sponsor in accordance with organizational expectations and complexity of the project
Element: Develop Project Management Plan		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Develop subsidiary plans	Leads and manages the development of subsidiary plans	Completed subsidiary plans	Completed subsidiary plans that contain substantive content. Plans developed include all or some listed below in accordance with organizational expectations and complexity of the project: • Communications management • Cost management/cost baseline • Human resources • Procurement management • Quality management • Requirements management • Risk management • Schedule management/schedule baseline • Scope management/scope baseline • Stakeholder management
Integrate subsidiary plans into comprehensive project management plan	Leads and manages the integration of the subsidiary plans into project management plan	Fully cross-referenced and integrated project management plan	• Project management plan of substantive content through the subsidiary plans in accordance with organizational expectations and complexity of the project • Demonstrated leadership throughout development process
Maintain project management plan	Leads and manages maintenance of project management plan and its subsidiary plans throughout the project including changes made to project ~~scope, cost, schedule, and quality~~ requirements	Documented reviews and revised versions, as required, of the project management plan and its subsidiary plans	• Project management plan is progressively elaborated through periodic reviews and updates • Periodic reviews/plan updates are ~~documented and retained~~ in accordance with organizational standards

Element: Direct and Manage Project Work		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Lead performance of project work	• Ensures project activities performed will accomplish project objectives • Demonstrates ownership of work process with specific ownership of project management related tasks	Project documents and deliverables	• Tangible components that demonstrate completion of project objectives • Complete and meaningful work performance data throughout project that demonstrate project objectives were met
Implement approved changes	Incorporates approved changes into project's scope, plans, and environment	• Processed change requests • Evidence of incorporation for approved requests	Approved changes are incorporated in a timely manner and in accordance with organizational expectations. Ownership of tasks to implement changes is defined. Documentation of changes includes: • Signed change requests • Updated project documentation
Element: Monitor and Control Project Work		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Track and review progress of project meeting its objectives	Uses tools such as earned value (EV) to monitor performance and applies corrective or preventive actions, as required, to drive the project to successful completion	• Periodic data reports on project performance • Documentation of decisions on preventive and corrective actions taken to control project performance	• Project notebooks that contain current and historical project data allowing for ongoing robust reviews of project's performance • Documented forward planning and corrective actions with routine progress reviews
Report on progress of meeting project objectives	• Defines or revises status reporting standards to appropriately reflect project complexity and stakeholder involvement • Provides periodic thorough and robust reporting of project progress	• Project status reports • Stakeholder communications • Project performance data	• Periodic performance updates delivered as report, presentation, or other means appropriate to the project that thoroughly address status of work; evaluation of the project scope, schedule, and cost; health; accomplishments; and issues/corrective actions • Documents are preserved according to organizational standards
Element: Perform Integrated Change Control		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Review change requests	Leads and manages review and evaluation of all project change requests	Change requests and documentation of review process (change control board [CCB]) including configuration management process	• Changes are raised and reviewed in a timely manner • Review process is conducted in accordance with organizational standards
Approve/reject change requests	• Leads discussions to review and disposition change requests • Documents, by signature, the approval or rejection of all change requests • Changes are processed and implemented, if approved, in a timely manner • Follows change control process in accordance with organizational standards	• Signed change requests • Documented implementation of approved changes	• Dispositioned change requests include sufficient level of detail of change and approval or rejection to allow for future understanding of basis • Change request documentation is completed and maintained as part of project records
Manage the impact of approved changes	Assesses the impact of approved change requests on project plans, documents, and deliverables, and makes corresponding modifications	• Documented implementation of approved changes • Evidence of specific actions taken as a result of approved changes	• New/changed deliverables are reflected in project documents and communicated to project team and stakeholders • Corrective/preventive actions are taken as necessary

Table X3-1. *(continued)*

Element: Perform Integrated Change Control		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Communicate status of change requests and impact of approved changes	Informs team and stakeholders in a timely manner of approved changes, rejected changes, and resulting impacts	• CCB documentation • Monthly reports • Team/stakeholder communications	• CCB minutes include a complete accounting of change requests, their status, final disposition, and impacts to the project • Communications/monthly reports address change requests and resulting impacts to the project
Element: Close Project or Phase		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Review deliverables against project scope, schedule, and budget baseline performance criteria	Leads and plans reconciliation of project deliverables to project baselines	Documented comparison of deliverables to key project elements	Documented match of deliverables against scope, schedule, and budget with explanations of any gaps or other differences
Document project closure	Communicates phase or project completion to stakeholders, adjusting message based on specific information needs of shareholders	Stakeholder communications	• Communications are appropriately written based on recipient stakeholder(s) • Communications address success (or failure) of the project, ongoing considerations if any, and any other closure-related factors • Communications are maintained as required by organizational standards
Transition to next phase (including post-project support)	Leads and enables transition planning	Transition plans	Documented plan to transition to next phase and evidence that the plan has been successfully implemented
Document lessons learned	Leads and facilitates lessons learned session and publishes resulting lessons	Lessons learned documentation and/or meeting notes	• A complete listing of lessons learned, including best practices and recommended improvements is documented for use on future projects • Documentation is clearly identified and maintained in database or other organizational tool to ensure it can be easily located and accessed by future projects
Archive project records	Ensures archival tasks related to phase and/or project closure are completed and performed in a timely manner	Project documents retrievable from organization's archival system	• Project documents are clearly identified and stored in organization's archival system • Accounting of complete set of archived project documents

X3.1.2 Project Scope Management

Project Scope Management covers performance of the work required to ensure that the project includes all the work required, and only the work required, to complete a project successfully. Clear characteristics of the project scoping is essential so as stakeholders know what is included and excluded in the project.

The elements for this unit are:

- Plan Scope Management,
- Collect Requirements,

- Define Scope,
- Create Work Breakdown Structure (WBS),
- Validate Scope, and
- Control Scope.

Table X3-2. Project Scope Management—Project Manager Performance Competence

Element: Plan Scope Management		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Create and define plan for scope management	Leads and manages the development of scope management plan Identifies and validates scope requirements – what is included and what is excluded. Categorizes needs versus wants	Approved scope management plan	• Plan addresses how project scope is defined, developed, monitored, controlled, and verified • In accordance with organizational expectations and complexity of the project the plan includes processes for: ◦ Preparing detailed scope statement ◦ Enabling creation of WBS ◦ Establishing how the WBS will be maintained and approved ◦ How formal acceptance of deliverables will occur ◦ How requests for changes to the scope statement will be processed
Element: Collect Requirements		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Create and define the project requirements	Solicits requirements from stakeholders and validates them through requirements management processes	Requirements documentation such as requirements traceability matrix	• Requirements documentation meets organizational expectations for level of detail and formality • Requirements documented are unambiguous (measurable and testable)
Element: Define Scope		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Develop a detailed description of the project and result/product	Leads and manages scope definition process and ensures approval by project sponsor and key stakeholders	Project scope statement	Statement includes a complete description of project scope including what scope is not included
Element: Create Work Breakdown Structure (WBS)		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Decompose project deliverables and work down to its lowest level of planned work	Leads and manages development of the work breakdown structure	Work breakdown structure	• WBS clearly presents total scope at the work package level • WBS provides the project team and sponsors a structured vision of what has to be delivered
Element: Validate Scope		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Obtain formal acceptance of completed project deliverables	Leads preparation of documentation packages for presentation to the customer or sponsor for completed project deliverables and obtains formal acceptance	• Documentation packages of completed deliverables requesting formal acceptance • Letter or other documentation formally accepting completed deliverables	• Documentation packages include sufficient detail to support formal acceptance • Formal acceptance by the customer or sponsor includes affirmation of their satisfaction with the completed deliverable(s)

Table X3-2. *(continued)*

Element: Control Scope		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Monitor project status and product scope	Monitors project against baseline scope (scope statement, WBS, and WBS Dictionary)	• Work performance data • Documented evaluation of data that demonstrates project progress is being monitored	• Project status reports clearly present project status, emerging/ongoing issues, actions taken, and results
Manage changes to scope baseline	• Leads discussions to review and disposition scope change requests • Documents, by signature, approval, or rejection of all change requests • Processes and implements changes, if approved, in a timely manner • Follows change control process in accordance with organizational standards	• Signed change requests • Documented implementation of approved changes • Updated scope statements and other project documents, as needed	• Dispositioned change requests include sufficient level of detail of change and approval or rejection to allow for future understanding of basis • Change request documentation is completed and maintained as part of project records

X3.1.3 Project Time Management

Project Time Management covers the processes involved in planning, estimating, developing, managing, and controlling the schedule to complete the project in a timely manner.

The elements for this unit are:

- Plan Schedule Management
- Define Activities
- Sequence Activities
- Estimate Activity Resources
- Estimate Activity Durations
- Develop Schedule
- Control Schedule

Table X3-3. Project Time Management—Project Manager Performance Competence

Element: Plan Schedule Management		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Create and define plan for schedule management	Leads and manages the development of schedule management plan Develops guidance and direction on how the project schedule will be managed throughout the project	Approved schedule management plan	• Plan addresses policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule • In accordance with organizational expectations and complexity of the project the plan establishes the following: ◦ Scheduling methodology and scheduling tool to be used ◦ Acceptable level of accuracy for activity duration estimates ◦ Units of measurement for each resource ◦ Organizational procedures links ◦ Process for maintaining the project schedule ◦ Variance thresholds for monitoring schedule performance
Element: Define Activities		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Identify and document the specific actions to be performed to produce the project deliverables	Leads activity definition process	• Activity list • Activity attributes • Milestone list	Level of activity detail provides a sound basis for estimating, scheduling, executing, monitoring and controlling
Element: Sequence Activities		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Identify and document the relationships and dependencies among project activities	Leads activity sequencing process	Project schedule network diagrams	Sequence of work represents, while recognizing constraints, the greatest efficiency for the project
Element: Estimate Activity Resources		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Estimate the type and quantity of resources required to perform each activity	Leads activity resource estimation process	• Activity resource requirements • Resource breakdown structure	• Resource requirements estimated for material, human resources, equipment and supplies, as applicable • Resource requirements include sufficient detail to allow accurate cost and duration estimates
Element: Estimate Activity Durations		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Estimate the duration of each activity with estimated resources	Leads activity duration estimation process	Activity duration estimates	Activity scopes of work, required resource types, estimated resource quantities, and resource calendars are used to inform duration estimates
Element: Develop Schedule		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Create the project schedule model	Leads activity development process	• Schedule baseline • Schedule data • Project schedule and calendars	• Project schedule represents full scope of work and represents an achievable execution of work • Project schedule is created and accepted by key stakeholders

Table X3-3. *(continued)*

Element: Control Schedule		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Monitor status of project activities to update project progress	• Monitors project progress against baseline schedule • Addresses delays and performance issues	Work performance information; schedule forecasts	Project schedule and other relevant artifacts are updated as appropriate on a timely basis as defined by the project plan
Manage changes to the schedule baseline	• Leads discussions to review and disposition scope change requests • Documents, by signature, approval or rejection of all change requests • Processes and implements changes, if approved, in a timely manner • Follows change control process in accordance with organizational	• Signed change requests • Documented implementation of approved changes • Updated schedule, as needed	• Dispositioned change requests include sufficient level of detail of change and approval or rejection to allow for future understanding of basis • Change request documentation is completed and maintained as part of project records

X3.1.4 Project Cost Management

Project Cost Management covers the processes required to manage a project within the approved budget.

The elements for this unit are:

- Plan Cost Management
- Estimate Costs
- Determine Budget
- Control Costs

Table X3-4. Project Cost Management—Project Manager Performance Competence

Element: Plan Cost Management		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Create and define plan for cost management	• Leads and manages the development of cost management plan • Develops guidance and direction on how the project costs will be managed throughout the project	Approved cost management plan	• Plan addresses policies, procedures, and documentation for planning, managing, expending, and controlling project costs • In accordance with organizational expectations and complexity of the project the plan establishes the following: ◦ Resource units of measurement ◦ Level of precision ◦ Level of accuracy ◦ Organizational procedures links ◦ Variance thresholds for monitoring ◦ Earned value management rules

Element: Estimate Costs		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Estimate the cost of completing project activities	• Leads and monitors the cost estimation process • Ensures costing alternatives, cost trade-offs, and risks are considered as part of the development of cost estimates	• Activity cost estimates • Basis of estimates	• Estimates results in cost to complete full scope of work • Basis of estimates provides sufficient detail for future evaluations and determination of change request validity • Estimating process results in achieving optimal costs for the project
Element: Determine Budget		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Develop authorized project cost baseline	Leads and monitors the budget definition and approval process	• Approved cost baseline • Project funding requirements	Cost baseline is time-phased and represents cost for complete scope of the project
Element: Control Costs		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Monitor status of project activities to update project costs	Variances are identified early allowing corrective actions to be taken in a timely manner resulting in minimization of risk	• Work performance information • Cost forecast	• Work performance information includes cost/schedule variance, cost/schedule performance index, to-complete performance index and variance at complete values • Calculated EAC or a bottom-up EAC is documented
Manage changes to cost baseline	• Leads discussions to review and disposition change requests affecting project costs • Documents, by signature, approval or rejection of all change requests • Processes and implements changes, if approved, in a timely manner • Follows change control process in accordance with organizational	• Signed change requests • Documented implementation of approved changes • Updated cost baseline, as needed	• Dispositioned change requests include sufficient level of detail of change and approval or rejection to allow for future understanding of basis • Change request documentation is completed and maintained as part of project records

X3.1.5 Project Quality Management

Project Quality Management covers management of the performing organization's work that determines the quality policies, objectives, and responsibilities to satisfy a project's requirements. Quality planning, quality control, and quality assurance processes should be understood and implemented.

The elements for this unit are:

- Plan Quality Management
- Perform Quality Assurance
- Control Quality

Table X3-5. Project Quality Management—Project Manager Performance Competence

Element: Plan Quality Management		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Create and define plan for quality management	• Leads and manages the development of quality management plan • Leads identification of applicable quality standards and/or requirements	• Approved quality management plan • Process improvement plan	• Quality management plan provides guidance and direction on how project quality will be managed and validated • Process improvement plan includes steps for analyzing project management processes
Document how project will demonstrate quality compliance	Leads development of quality metrics and quality checklists	• Quality metrics • Quality checklists	• Quality metrics describe project/product attribute and how attribute will be measured by control quality process • Project uses organization's standardized or tailored checklists as appropriate for project scope and complexity
Element: Perform Quality Assurance		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Audit quality requirements and results from quality control measurements	• Ensures audits of quality process are executed in accordance with quality management plan • Implements changes to project documents based on audit reports	• Final audit reports • Project management plans and other project document updates	• Audits are performed as planned • Audit reports provide a clear description of what was reviewed, results of the review, and actions to be taken to resolve issues • Corrective action plans clearly articulate action, owner, expected outcome, and relevant time and cost metrics • Project management plans and other project documents are updated in a timely manner
Element: Control Quality		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Identify causes of poor quality and take action to eliminate	• Monitors execution of quality activities to assess performance • Leads assessment of quality activity performance • Identifies necessary changes • Initiates lessons learned sessions	• Quality control measurements • Work performance information • Assessment reports • Documented lessons learned	• Quality control measurements are documented in accordance with quality management plan • Work performance information addresses compliance to requirements and includes causes for rejections, rework, process adjustments • Lessons learned document includes both best practices and recommended improvements and is readily retrievable for use on future projects
Validate project deliverables and work meet requirements	Ensures project deliverables and work meet key stakeholders' requirements necessary for final acceptance	Accepted project deliverables and work	Formal acceptance documents project deliverable(s) and/or work completed

X3.1.6 Project Human Resource Management

Project Human Resource Management covers performance of the work to organize, manage, and lead the project team.

The elements for this unit are:

- Plan Human Resource Management
- Acquire Project Team
- Develop Project Team
- Manage Project Team

Table X3-6. Project Human Resource Management—Project Manager Performance Competence

Element: Plan Human Resource Management		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Create guidelines outlining overall approach to managing human resources	Leads and manages the development of cost management plan	Approved human resource management plan	Plan provides guidance on how human resources will be defined, staffed, managed, and eventually released In accordance with organizational expectations and complexity of the project the plan establishes the following: • Roles and responsibilities • Project organization charts • Staffing management plan
Element: Acquire Project Team		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Confirm human resource availability and staff project team	• Leads development of project organization chart • Ensures project is adequately staffed • Adheres to organizational policies such as equal opportunity, lack of bias, and fairness	• Approved project organization chart • Resource allocation sheet	• Project staffing is based on roles required to complete project scope and not constrained by organizational resource limitations • Resource allocations are leveled • Resources are not over-allocated • Relationship between resources and their line/functional managers versus the project is clearly defined for matrix organizations
Issue new hire requisitions	Oversees and facilitates preparation of requisitions and obtains approval	Approved requisitions	New hire requisitions are descriptive of the role, reporting lines, and time allocations
Procure contractor services	• Leads and facilitates procurement process for contracted services • Ensures contracts are signed and executed in a timely fashion	Executed contracts	Service contracts include a clear statement of work including, but not limited to, scope, heuristics, schedule of work, deliverables, place of work, and other terms and conditions
Secure assignment of internal resources to the project	• Approves/oversees internal requisition • Successfully negotiates project assignments for internal resources line/functional managers	Internal resources assigned to the project	• Agreements with line/functional managers for assignment of resources is documented • Agreements define scope to be performed by resources, resource types, number of resources needed, and period of performance • Agreements allow for resources to be returned to the function, to the extent possible, in accordance to project staffing needs

Table X3-6. *(continued)*

Element: Develop Project Team		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Mentor team	• Leads development of mentoring program • Provides mentoring to team members and engages senior project team members to do the same • Evaluates effectiveness of program and makes changes as needed to improve	• Approved mentoring program • Mentor/mentee assignment matrix	Mentoring program provides the structure for productive mentor/mentee interactions and includes: • Training for both mentors and mentees • Tools to support the program (e.g., forms to evaluate progress, role-play examples or other methods for use in sessions)
Sponsor team-building activities	• Leads planning and holding team-building activities • Utilizes a variety of activities based on team makeup, stage of the project, and other factors	• Team-building activities plan • Documented feedback • Team performance assessments	• Team-building activities plan includes a variety of activities ranging from a single agenda item to an off-site facilitated experience • Feedback identifies team-building activities are considered effective and beneficial by the team • Negative feedback is addressed in a timely manner and adjustments to the plan are made as necessary • Team performance assessments are based on predefined criteria that address project objectives (being met), project schedule (on time), project cost (within budget), and other pertinent criteria
Element: Manage Project Team		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Track team member performance and provide feedback	• Conducts performance appraisals on an annual basis • Provides feedback (positive and negative) in a constructive manner that encourages continued development	Manager and individual signed performance appraisals	Performance appraisals include: • Activities completed during appraisal period • Planned activities for upcoming period • Accomplishments • Areas for development • Career goals and activities to achieve • Manager assessment and feedback
Manage team changes	• Monitors and controls allocation of resources • Reassigns team members to provide new and challenging assignments • Obtains new/additional staff as needed to support project deliverables	• Team organization charts • Turnover packages • Staffing agreements	• Team organization charts are maintained and provided to the team • Reassignments provide adequate time for individuals involved to prepare and review turnover packages with incoming individual • Staffing agreements are pre-established, maintained/updated as needed, and include: o Number or full-time equivalents of resources needed o Period of performance o Scope to be performed o Allocated budget and applicable charge codes
Resolve conflicts	• Takes action to minimize conflict • Recognizes when conflict has occurred • Identifies source of conflict • Resolves conflicts	• Posted team ground rules • Team communications • Differing professional opinion process	• Team ground rules are clear and concise; senior project leadership ownership of rules is demonstrated by their signatures on the posted rules • Team communications, as appropriate, are widely distributed to minimize multiple messages being received • Differing professional opinion process defines steps for inputs from two or more individuals to be heard by an established group for resolution

X3.1.7 Project Communications Management

Project Communications Management covers performance of the work to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information.

The elements for this unit are:

- Plan Communications Management
- Manage Communications
- Control Communications

Table X3-7. Project Communications Management—Project Manager Performance Competence

Element: Plan Communications Management		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Create and define plan for communications management	• Leads and manages the development of communications management plan • Develops approach and plan for project communications	Approved communications management plan	Plan describes how communications will be planned, structured, monitored, and controlled. Plan addresses items including: • Who needs what information • Who is authorized to access information • When is the information needed • Where will the information be stored • How will the information be stored (format) • How the information will be retrieved • Other considerations (e.g., time zone, language, cross-cultural)
Create communications policies	• Leads and facilitates development of communications policies • Oversees execution	Approved communications policies	Communications policies contain sufficient detail for use by the project team
Element: Manage Communications		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Create, collect, and distribute project information	• Manages creation, collection, and distribution of project information to project team and stakeholders • Approves, including authorship as appropriate, formal communications to project team, senior management, or stakeholders • Ensures communication needs are met	Project communications (e.g., performance reports, deliverables status, schedule progress, issues resolution status, project presentations, meeting minutes, project announcements)	• Project communications utilize appropriate methods and models (e.g., incorporation of feedback loops, written versus oral, writing style) based on the message and recipient • Project communications provide information in a timely and relevant manner • Project communications demonstrate compliance to the communications management plan
Store project information	• Manages storage of project information • Ensures project information is readily retrievable	Stored project communications and documents	Project communications and documents are: • Captured, stored, and distributed utilizing established information management system and in accordance with the communication management plan • Readily retrievable
Disposition project information	Ensures project information is properly dispositioned at the end of a project phase or at project	Retrievable project communications and documents	• Project documents are clearly identified and stored in organization's archival system • Complete accounting of archived project documents

Table X3-7. *(continued)*

Element: Control Communications		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Monitors communications to identify gaps and breakdowns	Manages communications throughout project life cycle	• Feedback from project team, senior management, or stakeholders • Revisions to communications management plan	• Issue log captures negative feedback and includes responses and corrective actions as well as closure of items • Plan revisions address and correct causes and opportunities for future communications gaps and breakdowns
Provide timely and accurate responses to communications gaps and breakdowns	• Restores communications whenever incidents of miscommunication occur • Restores and/or disseminates the intended message	Documented responses addressing communication gaps and breakdowns	• Responses are addressed timely and professionally • Responses fully address miscommunications and clearly communicate intended message
Conduct ad hoc meetings	Initiates and leads ad hoc meetings, as appropriate, to address gaps and breakdowns	Documented meeting minutes	• Content of ad hoc meetings is clearly communicated with attendees • Meeting actions are captured and tracked to completion

X3.1.8 Project Risk Management

Project Risk Management includes the processes of conducting risk management planning, identification, analysis, and response planning and controlling risk on a project.

The elements for this unit are:

- Plan Risk Management
- Identify Risks
- Perform Qualitative Risk Analysis
- Perform Quantitative Risk Analysis
- Plan Risk Responses
- Implement Risk Responses
- Monitor Risks

Table X3-8. Project Risk Management—Project Manager Performance Competence

Element: Plan Risk Management		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Create and define plan for risk management	• Leads and manages development of risk management plan • Develops guidance and direction on how the project risks will be managed throughout the project	Approved risk management plan	In accordance with organizational expectations and complexity of the project the plan addresses the following: • Risk management methodology • Defines roles and responsibilities • Protocols for application of contingency and management reserves • Timing (when and how often) for performance of risk management processes
Element: Identify Risks		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Determine which risks may affect the project and document their characteristics	Oversees the risk identification and definition process	Risk register	• Risk register includes list of identified risks and potential responses • Risks are described in as much detail as is reasonable • Root causes of risk are recorded
Element: Perform Qualitative and Quantitative Risk Analysis		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Prioritize risks for further analysis or action by assessing their probabilities of occurrence and impact	Oversees the risk analysis process	Updated risk register and assumptions log	Updates to risk register could include: • Assessments of probability and impacts • Risk ranking/scores • Risk urgency • Risk categorization • Watch list Assumptions log is updated with new information identified through qualitative risk analysis process
Numerically analyze the effect of identified risks on overall project objectives	Oversees the risk analysis process	Updated risk register	Updates to risk register could include: • Probabilistic analysis of the project • Probability of achieving cost and time objectives • Prioritized list of quantified risks • Trends identified from quantitative risk analysis results
Element: Plan Risk Responses		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Develop options and actions to enhance opportunities and reduce threats to project objectives	Oversees the development of the risk responses	• Risk register updated with risk responses • Updated management plans	• Level of detail included in the risk register corresponds to the priority ranking and planned response to each risk • Project management plan and subsidiary plans, as appropriate, are updated to reflect changes based on this process

Table X3-8. *(continued)*

Element: Control Risks	*Indicative competence level required: 4*		
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Implement risk response plans	• Initiates risk response plans when necessary • Monitors project for secondary risks from the risk response	• Change requests • Updated risk register • Updated management plans	Change requests that implement contingency plans or workarounds address recommended corrective or preventive actions as appropriate Risk register updates may include: • Outcomes of risk reassessments, risk audits, and periodic risk reviews • Actual outcomes of the project's risks and risk responses • Management plans updated, as required, to reflect approved changes
Monitor status of project risks	• Tracks identified risks • Monitors residual risks • Identifies new risks • Conducts ongoing risk assessments	• Results of risk assessments performed • Risk status reports	Risk assessments, utilizing project status reports, are performed periodically throughout the project Assessments determine: • Presence of trends in project status reports • Continued validity of project assumptions • Existing risks that can be changed or retired • Whether risk management policies and procedures are being followed • Whether contingency reserves should be modified • New risks that should be documented
Evaluate risk process effectiveness	Ensures risk audits are performed periodically, in accordance with risk management plan, to examine and document effectiveness of risk responses	• Risk audit schedule • Risk audit reports	• Risk audit reports demonstrate that the schedule for performance has been followed • Risk audit reports address the effectiveness of the risk reporting, evaluation, and response process • Changes to the risk documents are made to address results of the audit

X3.1.9 Project Procurement Management

Project Procurement Management covers performance of the work necessary to purchase or acquire products, services, or results needed from outside the project team.

The elements for this unit are:

- Plan Procurement Management
- Conduct Procurements
- Control Procurements
- Close Procurements

Table X3-9. Project Procurement Management—Project Manager Performance Competence

Element: Plan Procurement Management		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Create and define plan for procurement management	• Leads and manages the development of procurement management plan • Develops guidance and direction on how the project team will acquire goods and services	• Approved procurement management plan	In accordance with organizational expectations and complexity of the project the plan includes: • Type of contracts planned • Constraints and assumptions • Approach for long-lead items • Approach for handling make-or-buy decisions • Procurement metrics for evaluating sellers and managing contracts • Other items as identified in the *PMBOK® Guide*
Document procurement decisions	• Leads and manages procurement discussions • Approves procurement decisions • Identifies opportunities for economies of scale, value for monies, time, and cost-efficient procurement approaches	• Make-or-buy analysis results • Source evaluation/selection criteria including weighting factors	Source selection criteria are reflective of complexity of product, service, or results. Those with more complexity include other criteria in addition to purchase price such as: • Seller's understanding of SOW • Life cycle costs • Seller's management/technical approach • Seller's financial/production capacity • Past performance • Other items as identified in the *PMBOK® Guide*
Develop procurement statements of work (SOW) and documents to solicit proposals from prospective sellers	• Leads development of SOWs and procurement documents such as requests for information (RFIs), invitations for bid (IFBs), requests for proposal (RFPs), and requests for quotation (RFQs) • Ensures SOWs and procurement documents are structured such that sellers can provide complete and accurate responses and to facilitate easy evaluation of responses	• Procurement statements of work • Procurement documents (e.g., RFIs, IFBs, RFPs, RFQs)	• SOWs are written to be clear, complete, and concise. They include items such as specifications, quantity desired, quality levels, performance data, period of performance, work location, and collateral services required • Procurement documents are written with the appropriate level of detail consistent with the procurement value and associated risks • Procurement documents demonstrate compliance with the procurement management plan and other organizational procurement processes
Element: Conduct Procurements		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Obtain seller(s) responses	• Sends RFIs/RFPs to seller(s) and receives responses • Leads bidder conferences and other meetings with potential providers • Leads development of uniform responses to seller(s) questions	• Seller responses to RFIs and RFPs • Documented results of bidder conferences and other meetings with potential seller(s) (e.g., product demonstrations) • Documented responses to seller(s) questions	• Seller responses, supported by bidder conferences and/or responses to questions, demonstrate the seller(s) have a clear and common understanding of the procurement requirements • Documentation demonstrates that all sellers received the same information, responses to questions, etc.
Select seller(s)	• Leads objective evaluation of seller responses • Documents result of evaluation • Leads selection of "short list" of sellers • Leads determination of selected seller from this short list	• Documented results of objective evaluation of seller responses • "Short list" of sellers • Selected seller along with evaluation results, justification, and rationale	Documentation demonstrates that evaluations were performed in accordance procurement management plan and were fair to all sellers

Table X3-9. *(continued)*

Element: Conduct Procurement		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Award contract(s)	Supports and monitors seller contract negotiations Approves award of contracts	Executed procurement agreements with selected sellers Seller resource calendars	Procurement agreements meet specific needs of the project while adhering to organizational procurement policies Procurement agreements include the following: • Statement of work • Schedule baseline • Period of performance • Pricing • Payment terms • Inspection and acceptance criteria • Other items as identified in the *PMBOK® Guide*
Element: Control Procurements		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Manage procurement relationships	• Manages interfaces with seller(s) • Ensures both project and seller(s) meet contractual obligations	Documented communications (letters, memos, emails) addressing seller interactions, status, and performance reports	Communications with seller(s) demonstrate that interfaces are conducted within the boundaries of the contract
Monitor contract performance	• Evaluates seller performance according to contract and scope of work (SOW) or service level agreement (SLA) • Performs periodic reviews of seller's performance • Tracks seller's deliverables against SOW • Executes change requests in a timely manner	• Seller performance review reports • Signed change requests	• Review reports include corrective actions when necessary and plan for implementing • Subsequent reviews address if corrective actions were implemented and effective; follow-on corrective actions identified if required • Change requests that involve constructive changes are uniquely identified and documented • Details for managing early terminations (for cause, convenience, or default) are captured as necessary
Make changes and corrections to contracts	• Manages contract modification process • Executes contract modifications in the best interest of the project • Manages negotiations for changes with seller(s)	Executed contract amendments and supporting procurement documentation	• Contract amendments demonstrate compliance to the project's established process including documentation, tracking systems, dispute resolution procedures, and necessary approval levels • Contract amendment documentation includes details of need and justification for changes
Element: Close Procurements		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Close procurements	• Confirms contract deliverables have been successfully met and scope of work is complete • Approves closure of contracts	• Procurement audits • Documented acceptance of seller-provided deliverables • Notice of contract closure	• Acceptance of seller-provided deliverables and closure is formally documented in accordance with the contract terms and conditions • Notifications of early terminations are formally documented, based on details previously captured, and in accordance with the contract terms and conditions
Archive procurement information	• Leads lessons learned reviews • Ensures archival tasks are completed	• Indexed set of contract documentation • Documented results of lessons learned reviews	• Contract documentation is complete, well organized, and readily retrievable for future use • Lessons learned document includes both best practices and recommended improvements and is readily retrievable for use on future projects

X3.1.10 Project Stakeholder Management

Project Stakeholder Management covers performance of the work required to identify the people, groups, and/or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholders in project decision and execution.

The elements for this unit are:

- Identify Stakeholders
- Plan Stakeholder Management
- Manage Stakeholder Engagement
- Control Stakeholder Engagement

Table X3-10. Project Stakeholder Management—Project Manager Performance Competence

Element: Identify Stakeholders		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Create comprehensive list of stakeholders identifieda	• Leads identification of appropriate focus for each stakeholder or group of stakeholders • Ensures register is consulted and updated on a regular basis to address changes in stakeholders through the life cycle of the project	Stakeholder register	• Stakeholder register includes identification information, assessment information, and stakeholder classification • Stakeholder directory includes pertinent information, including name, organizational position, location, project role, and contact information • Assessment addresses major requirements, main expectations, potential influences, and identification of project phase where stakeholder has most interest • One or more classification models are used for stakeholder analysis (e.g., power/interest grid, power/influence grid, influence/impact grid, salience mode)
Document procurement decisions	Oversees collection of stakeholder information		
Create stakeholder organizational chart	Leads development of stakeholder organization chart		
Perform stakeholder analysis	Leads assessment and classification of stakeholders		
Element: Plan Stakeholder Management		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Create and define plan for stakeholder management	Leads and manages development of clear, actionable plan to interact with project stakeholders to support project interests	Approved stakeholder management plan	• Plan identifies management strategies to effectively engage stakeholders through project life cycle • Management strategies consider stakeholder needs, interests, and potential impact on project success • In accordance with organizational expectations and complexity of the project plan provides: o Engagement levels o Scope and impact of changes o Stakeholder interrelationships and overlaps o Communication requirements Plan for distribution of information Plan for performing plan reviews and updates

Table X3-10. *(continued)*

Element: Plan Stakeholder Management		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Evaluates and documents engagement level of stakeholders	Leads development of engagement matrix	Completed stakeholder engagement assessment matrix	• Assessment compares current to planned engagement level of all stakeholders • Actions and communications are identified to address gaps between current and desired engagement levels
Element: Manage Stakeholder Engagement		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Communicate and work with stakeholders throughout project life cycle	• Engagement results in increased support and minimization of resistance from stakeholders • Number of identified issues and change requests resulting are minimized as a result of proactive and ongoing stakeholder engagement • Stakeholder feedback and lessons learned reflect generally positive inputs to the project and are readily available for use on other projects • Communication, interpersonal, and management skills are appropriately applied to all engagements with stakeholders	• Issue log • Change requests • Feedback from stakeholders • Documented lessons learned	• Issue log tracks issues from cradle to grave and documents timely resolution • Change requests fully identify change, basis, and identify project corrective or preventive actions as appropriate • Feedback from stakeholders is documented and distributed appropriately for use in improving project performance and stakeholder engagement • Lessons learned database or other means includes root cause analysis of issues and rationale for selected corrective actions
Element: Control Stakeholder Engagement		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Develop and execute responses and countermeasures to maintain appropriate level of stakeholder engagement throughout project life cycle	• Control strategies result in maintaining or increasing the efficiency and effectiveness of stakeholder engagement activities • Issues are addressed proactively • Stakeholder feedback and lessons learned reflect generally positive inputs to the project and are readily available for use on other projects	• Documented work performance information • Document updates (management plans, stakeholder register, issue log) • Feedback from stakeholders • Documented lessons learned	• Performance information includes deliverables status, change request implementation status, and forecasted estimates to complete • Document updates capture changes in stakeholder engagement approach or strategy • Feedback from stakeholders is documented and distributed appropriately for use in improving project performance and stakeholder engagement • Lessons learned database or other means includes root cause analysis of issues and rationale for selected corrective actions

X3.2 Units of Project Manager Personal Competence

X3.2.1 Communicating

Communicating involves the effective exchanges of accurate, appropriate and relevant information with stakeholders using suitable methods.

The elements for this unit are:

- Actively listens, understands, and responds to stakeholders
- Maintains lines of communication
- Ensures quality of information
- Tailors communication to audience

Table X3-11. Communicating—Units of Personal Competence

Element: Actively Listens, Understands, and Responds to Stakeholders		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Actively listens	• Team members and stakeholders are satisfied that concerns are addressed • Communication is adapted to audience • Interpretation and assessment of stakeholder needs that are not well defined or understood are translated back to ensure understanding	• Survey results from stakeholders and team members • Documented observations from communications	Feedback on empathy and understanding toward others' point of view
Understands explicit and implicit content of communications	• Develops and adapts communication strategies • Includes formal updates/changes to stakeholder analysis and project communications plan as relevant • Matches level and formality of communication to stakeholder	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	Confirmation that messages were received and understood
Responds to and acts upon expectations, concerns, and issues	Undertakes analysis, evaluation of options (as appropriate), and takes/recommends appropriate actions	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Responses to issues important to others (e.g., issue log) • Change requests
Element: Maintains Lines of Communication		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Engages stakeholders proactively	• Establishes regular forums for interaction with stakeholders, including various formal and informal media that facilitate proactive communications • Addresses issues and documents in minutes and action item log	• Survey results from stakeholders and team members • Documented observations from communications	Confirmation that stakeholder needs have been met proactively
Disseminates information effectively	• Establishes regular forums for interaction with stakeholders, including formal and informal media • Uses appropriate communications method for information disseminated	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Effective communications through conversation, survey, notes, presentations, or observation
	• Communication distribution matches with stakeholder register • Response time and method matches with communication plan		• Relevant and timely communication shared with appropriate stakeholders
Maintains formal and informal communications	• Establishes regular forums for interaction with team and stakeholders, including various formal and informal media • Documents minutes from both scheduled and ad hoc sessions • Appropriately matches level of formality to session and audience	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Minutes from planned and unplanned meetings, brainstorming sessions, etc. • Correspondence • Notes and follow-ups from discussions • Feedback on availability to stakeholders
Element: Ensures Quality of Information		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Uses appropriate information sources	Engages with team leads and members in developing reports, analyzing issues, evaluating progress, and options analysis	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Timely action based on information • Identified risks • Change requests • Feedback on project reports

Table X3-11. *(continued)*

Element: Ensures Quality of Information		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Provides accurate and factual information	Engages with PMO and other stakeholders for health checks, audits, and review of reporting metrics *Additional expectation for experienced project manager:* shares relevant information with program manager or senior management for use on other projects/overall program	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Documents show that factual information is provided • Documented feedback on accuracy of the information
Seeks validation of information	• Engages with PMO and other stakeholders for health checks, audits, and review of reporting metrics • Ensures key decisions are documented with supporting information and analysis as appropriate	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Documentation of input from subject matter experts (e.g., interest groups, professional bodies) • Meeting minutes
Element: Tailors Communication to Audience		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Provides relevant information	• Regularly conducts follow-up with audiences • Able to effectively summarize key points and issues in a clear and concise manner *Additional expectation for experienced project manager:* project manager is able to present to different levels of audience with ease	• Survey results from stakeholders and team members • Documented observations from communications	• Documented feedback from recipient confirming information relevance • Demonstrated strong presentation skills
Uses suitable communication methods for the audience	• Conducts and regularly reviews/updates stakeholder analysis • Routinely solicits feedback on communications • Responds to issues and concerns. *Additional expectation for experienced project manager:* feedback rarely identifies significant issues with communication methods	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Preferred communication methods identified in stakeholders' analysis • Notes from meetings demonstrating suitability of method selection • Feedback from stakeholders regarding suitability of method selection
Aligns communications with environment or setting	• Utilizes templates and guidelines for formal and informal communications with internal and external stakeholders • Routinely solicits feedback from team and stakeholders *Additional expectation for experienced project manager:* provides feedback on templates and guidelines including examples and methods based on experiences and lessons learned for use by team and other projects	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Sensitivity to others' specific communication needs and context • Appropriate use of formal, informal verbal, nonverbal, and para-lingual components • Minutes from team meetings or presentations • Examples of various choices of location, time, participants, and privacy settings

X3.2.2 Leading

Leading involves guiding, inspiring, and motivating team members and other project stakeholders to manage and overcome issues in order to effectively achieve project objectives.

The elements for this unit are:

- Creates a team environment that promotes high performance
- Builds and maintains effective relationships
- Motivates and mentors project team members
- Takes accountability for delivering the project
- Uses influencing skills when required

Table X3-12. Leading—Units of Personal Competence

Element: Creates a Team Environment That Promotes High Performance		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Expresses positive expectations of team	• Regularly seeks opportunities to highlight individual team members' achievements and abilities to the individual and senior management • Actively supports decisions made by the team to senior management and stakeholders • Sets expectations for individual team members, the team, and self • Openly shares expectations for team and self	• Survey results from stakeholders and team members • Documented observations from communications	• Documented feedback from team on recognizing abilities of team members • Documented feedback from team on supporting decision making • Documented feedback from team on setting positive expectations
Promotes team learning and advocates professional and personal development	• Sets expectations for preparation and use of development plans • Routinely reviews plans with individuals • Provides thoughtful assessments including achievements and opportunities for development • Includes discussions of individuals' career objectives and development activities to achieve • Documents discussions and maintains completed plans for future reference and reviews • Routinely reviews team members' skills • Discusses results with individual • Documents skills achieved and ongoing skill development in development plan • Routinely solicits feedback on project manager's ability to educate, influence, and persuade team members in the areas of learning and professional/personal development • Reviews feedback and identifies areas for development • Shares with team for use in future feedback sessions • Identifies opportunities for professional development to senior management • Recommends candidates • Develops appropriate funding request	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Individual development plans • Documentation of new skills gained by the team members • Funding for development

Table X3-12. *(continued)*

Element: Creates a Team Environment That Promotes High Performance		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
	Additional expectation for experienced project manager: • Develops multiyear professional development program • Processes requests to secure funding		
Encourages teamwork consistently	• Leads by example and sets expectations that every team member's input is important and to be respected • Fosters teamwork through team-building activities • Engages team through participation in planning and execution of activities • Routinely solicits feedback from team • Responds to issues and concerns • Flows clear and consistent goals to team leads • Shares feedback from stakeholders and senior management about team's work and accomplishments	• Survey results from stakeholders and team members • Documented observations from communications	• Examples of creative actions taken to encourage teamwork and respect for different opinions and personalities • Documented feedback on acknowledgement of unique skills and abilities • Identified responsibilities of team leaders in giving clear, consistent goals
Demands and models high performance	• Identifies standards (plans, procedures, etc.) for use by the team that establish performance and quality expectations *Additional expectation for experienced project manager:* recommends revisions to existing standards based on past experiences and lessons learned • Routinely solicits feedback from team • Feedback indicates the project manager exhibits commitment to the project and team, is a positive role model, and meets or exceeds standards • Sets expectations for team and individual team members • Recognizes team members' strengths and areas for development • Assigns areas of responsibility appropriately including stretch assignments • Monitors progress and discusses commitments regularly to maintain focus on accountability	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Documented standards for individual performance and quality • Documented results of project manager performing to standards • Documented feedback that the project manager is acting as a role model • Holds project team members accountable for their commitments
Element: Builds and Maintains Effective Relationships		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Confines relationships to work-related matters appropriate to the project and local culture	• Demonstrates leadership for the project team. Behaves professionally and in accordance with expected norms in all stakeholder interactions • Separates fact from emotion • Earns respect of stakeholders • Establishes and follows meeting rules and guidelines • Sets expectation for project team to do the same	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Maintaining formal working relationship with stakeholders • Guidelines for formal and informal discussion

Element: Builds and Maintains Effective Relationships		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Builds trust and confidence with stakeholders	• Establishes a professional rapport with stakeholders built on trust and mutual respect • Demonstrates integrity and earned trust, enabling stakeholder confidence to be maintained during difficult situations	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Acting with integrity • Keeping commitments • Providing consistent messages • Supporting team members when confronted with unjustified criticism • Maintaining composure • Demonstrating fair treatment of all stakeholders
Creates an environment that encourages openness, respect and consideration of stakeholders	• Establishes a professional rapport with stakeholders built on trust and mutual respect • Uses communication to drive project management practices • Regularly communicates and demonstrates availability to stakeholders • Routinely solicits feedback from team on team environments • Responds to issues and concerns	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Feedback from stakeholders on openness of issues analysis and resolution • Project manager maintains open door policy and is approachable at all times • Examples of sensitivity and genuine interest in feelings and values of others • Documented evidence of fair and fact-based decisions
Element: Motivates and Mentors Project Team Members		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Establishes and communicates to the team the project vision, mission statement, and strategic value	• Establishes clear communications and tactics to ensure that all team members have understanding of project vision, mission, and strategic value to the organization • Educates team members on impact of project on business, alignment of objectives, and team's role in achieving the project's vision and mission • Routinely solicits feedback from team • Responds to concerns/issues	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Presentations with clear focus on vision, mission, and strategic value • Rallying support behind the strategy and sharing the strategy with team members • Documented feedback from team regarding awareness of program's strategic value
Rewards performance according to organization guidelines	• Establishes and facilitates implementation of rewards and recognition program • Ensures functional managers/senior managers are aware of high performance of individuals • Understands the value of individuals' and team's contributions • Communicates individuals' and team's achievements to management	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Rewards and recognition records • Plans for success of team members • Celebrating individual accomplishments on a frequent basis • Assures credit is given to the individual
Establishes mentoring relationships for team members' development	• Establishes a mentoring program for the project • Acts as mentor to individual team members • Uses lessons learned to guide team to optimal solutions • Project manager is recognized as someone who provides valuable and meaningful mentorship experiences • Routinely solicits feedback from team on mentoring activities • Responds to issues and concerns • Reviews individual performance with functional manager in order to aid development plans	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Examples of mentoring relationships • Examples of being sought out as a mentor for others • Documented feedback on mentoring activities • Examples of progress on individual development plan

Table X3-12. *(continued)*

Element: Takes Accountability for Delivering the Project		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Demonstrates ownership of, accountability for, and commitment to the project	• Engages team and stakeholders to participate in regular project reviews • Regularly reviews project risks with team, including identification of emerging risks • Secures resources needed to mitigate • Appropriately fosters and supports development of relationships between team members and senior management/client while demonstrating ownership of team issues and outcomes	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Active involvement with all stakeholders and project team members • Quickly addressing possible project hindrances, delays, or risks • Reports or meeting notes where the project manager takes responsibility for mishaps • Taking ownership for adverse outcomes
Aligns personal activities and priorities toward increasing likelihood of achieving project goals	• Assesses and understands actions required to achieve project goals • Sets and adapts priorities to best serve the project • Uses issues priority list to direct the team's focus	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Documented priority planning • Lists of prioritized action items • Active event management
Supports and promotes team's actions and decisions	• Routinely solicits feedback from team on actions to support and promote the team. Responds to issues and concerns • Engages project team regularly in meetings that provide a forum for reviewing team's activities • Obtains sufficient knowledge and understanding of actions taken by team • Documents team's actions and decisions as part of regular team meetings • Personally supports actions taken to senior management	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Documented feedback from team members that project manager acts assertively on their behalf • Keeps abreast of project team activities and maintains accountability for delivery of work • Takes a stand in front of higher authorities to support team's actions • Takes meeting notes that reflect project manager's support for team's actions and decisions
Element: Uses Influencing Skills When Required		*Indicative competence level required: 2*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Applies appropriate influencing techniques to stakeholders and team members	• Demonstrated use of multiple approaches and styles for influencing stakeholders and team members • Understands the role of influence in guiding project team and stakeholders to optimal outcome *Additional expectation for experienced project manager:* Demonstrated ability to influence management and senior stakeholders • Project documentation includes approaches to be applied to stakeholders to gain support throughout project execution • Ability to confront issues and reach a solution in a tactful and respectful manner • Ability to separate emotion from logic and promote value of a solution • Uses knowledge, lessons learned, and team's errors in a positive manner to educate the team	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Examples of different styles on different occasions • Document describing alternative approaches used to influence • Examples of strong facilitation and negotiation skills • Examples of the ability to educate the team
Uses experts or third parties to persuade others	• Builds networks of influence to support the project outcome • Accepts own limitations and employs input from SMEs as needed • Demonstrated ability to promote value of project to team and stakeholders	• Survey results from stakeholders and team members • Documented observations from communications	• Using positional power of others to influence • Using a third party's knowledge power to influence • Networking and gathering support for the project while not manipulating for personal gain

X3.2.3 Managing

Managing involves the effective administration of the project through appropriate deployment and use of human, financial, material, intellectual, and intangible resources.

The elements for this unit are:

- Builds and maintains the project team
- Plans and manages for project success in an organized manner
- Resolves conflict involving project team or stakeholders

Table X3-13. Managing—Units of Personal Competence

Element: Builds and Maintains the Project Team		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Ensures expectations and responsibilities are clear to team members and they understand their importance to the project	• Routinely solicits feedback from team on roles and responsibilities • Clarifies ambiguities • Documents project goals and responsibilities and widely communicates • Conducts regular team meetings, briefs, reviews, and one-on-one sessions • Develops individual scope and task plans • Communicates overall project scope and individuals' plans to the team • Establishes RAM at initiation of project and maintains throughout • Conducts regular team meetings and briefs that engage each member in discussions on activities • Conducts one-on-one sessions as needed	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Documented feedback from project team on clarity of roles and responsibilities • Team correspondence • Documented project directives, tasks, and assignments • Published resource assignment matrix • Active participation of each member in team activities
Maintains a positive attitude and effective relationships among team members	• Resolves or facilitates resolution of conflicts • Supports team leads and members in meeting their goals and objectives • Routinely solicits feedback from team on team attitude and effectiveness • Responds to issues and concerns • Understands importance of team rapport • Creates and seeks opportunities that will facilitate collaboration within the team • Actively seeks and finds opportunities to reward the team	• Survey results from stakeholders and team members • Documented observations from communications	• Examples of effective conflict resolution • Respect for others by appealing to reason • Genuinely values input and expertise of others on the team • Willingness to learn from others • Examples of team events to facilitate bonding and rapport within the team • Celebration of teamwork and achievements

Table X3-13. *(continued)*

Element: Builds and Maintains the Project Team		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Identifies, evaluates, and selects internal and external talent	• Understands and documents current and future human resource needs of the project • Builds a network of talent to meet current and future human resource needs *Additional expectation for experienced project manager:* • Works with program manager to build network of talent from outside the project and organization • Uses standard methods to determine project human resources needs • Demonstrates ability to determine project needs and matches with human resource pool	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Project resource requirements documentation • Inventories of suitable team members identified from internal talent pool • Predefined selection criteria applied to resources acquisition
Promotes healthy work-life balance	• Develops and promotes a culture and environment for a healthy work-life balance for team members while sustaining individuals' performance • Routinely solicits feedback from team • Responds to issues and concerns • Routinely surveys team to understand activities that are consuming too much time, alternative approaches, and suggestions to improve efficiency • Provides feedback to team on input received	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Documented plan of action to achieve balance • Meeting notes documenting balance issues • Examples of actions taken to improve job efficiency and productivity
Element: Plans and Manages for Project Success in an Organized Manner		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Works with others to clearly identify project scope, roles, expectations, and tasks specifications	• Solicits feedback from team and stakeholders on the planning process • Responds to issues and concerns	• Survey results from stakeholders and team members • Documented observations from communications	Feedback on level of involvement of others in the planning process
Applies organization or industry standards and generally accepted practices to the project	• Establishes governance and quality standards appropriate to project • Utilizes PMO and/or corporate standards • Solicits feedback from team, stakeholders, and SMEs on practices employed • Responds to issues and concerns • Tailors corporate or PMO standards to meet or exceed stakeholder expectations • Develops project plan which draws upon PMI, industry, and corporate standards *Additional expectation for experienced project manager:* Uses past experiences and lessons learned as input to project plan	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Examples and feedback from project team, stakeholders, and subject matter experts on following industry generally accepted practices • Proposed measures and improvements intended to achieve or exceed industry generally accepted practices • Project plan that incorporates industry standards
Tailors generally accepted practices for successful completion of the project	• Tailors corporate or PMO standards to meet or exceed stakeholder expectations • Uses SMEs where relevant to the project *Additional expectation for experienced project manager:* Recommends tailoring of procedures based on lessons learned and best practices	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Documented change of generally accepted practices • Approved changes to project management procedures to accommodate generally accepted practices

Element: Plans and Manages for Project Success in an Organized Manner		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Organizes project information, emphasizing appropriate levels of detail	• Methodologies align with PMI and/or PMO/corporate policy • Captures or delegates capture of key project information • Develops and utilizes database or document to capture	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	Examples of standard methodologies used in projects: • Meeting minutes • Project status reports or updates • Repository for project artifacts • Examples of knowledge management
Insists on compliance with processes, procedures, and policies	• Conducts audits and reviews of process, procedure, and policy compliance • Establishes, updates, and utilizes key performance indicators • Regularly reviews metrics with team • Shares relevant information with program manager for use on other projects and overall program • Reviews results of project audits and reviews with team and discusses deficiencies and opportunities for improvement	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Monitored compliance of processes, procedures, and policies • Examples of enforcing policies and procedures • Documented use of performance metrics to manage project
Element: Resolves Conflict Involving Project Team or Stakeholders		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Ensures that the team and stakeholders are fully aware of team rules	Establishes project policies, processes, and procedures in accordance with the PMO or organizational standards at project initiation	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	Documented team rules
Recognizes conflict	• Resolves or facilitates the removal of conflict where it arises within the project • Recognizes areas for potential conflict and seeks to minimize • Routinely solicits feedback from team on conflict resolution • Responds to issues and concerns	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Examples of conflict occurring within the project • Team survey results • Issue log
Resolves conflicts	Routinely solicits feedback from team on conflict resolution Responds to issues and concerns	• Survey results from stakeholders and team members • Documented observations from communications	• Examples of conflict resolution techniques used • Feedback from team and stakeholders on satisfactory resolution of conflict

X3.2.4 Cognitive Ability

Cognitive ability involves the application of an appropriate depth of perception, discernment, and judgment to effectively direct a project in a changing and evolving environment.

The elements for this unit are:

- Takes a holistic view of project
- Effectively resolves issues and solves problems
- Uses appropriate project management tools and techniques
- Seeks opportunities to improve project outcome

Table X3-14. Cognitive Ability—Units of Personal Competence

Element: Takes a Holistic View of Project		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Understands project stakeholder needs, interests, and influence for project success	• Analyzes project stakeholders to develop appropriate communication strategies to engage them as needed to ensure project success • Develops communication plan that includes meetings and reports based on stakeholder analysis and input • Seeks input from stakeholders to ensure their needs and objectives are appropriately captured	Project documents	• Stakeholder analysis • Communication plan aligned with stakeholders' needs • Stakeholders' needs and objectives documented in project charter and plan
Understands how project actions impact other areas of the project, other projects, and organizational environment	• Considers project objectives and goals when analyzing specific issues and options in determining appropriate action to take *Additional expectation for experienced project manager:* • Shares relevant information with program manager for use on other projects and overall program • Able to understand and evaluate relations and impact of project on the organization • Evaluates relations and impact of project-to-project and project-to-program, advises program manager appropriately	• Documented observations from communications • Project documents	• Relates external events to project execution • Documented impacts of project on organizational environment
Understands both the formal and informal structure of organizations	• Builds networks of influence across the stakeholders • Routinely solicits feedback from stakeholders • Responds to issues and concerns	• Survey results from stakeholders and team members • Documented observations from communications	Project manager uses formal and informal organizational knowledge
Understands organizational politics	• Builds networks of influence across the stakeholders • Routinely solicits feedback from stakeholders • Responds to issues and concerns	• Survey results from stakeholders and team members • Documented observations from communications	Project manager able to operate within organizational politics
Uses emotional intelligence to understand and explain others' past actions and current attitudes, and anticipate future behavior	• Routinely solicits team on ability to understand and effectively interact with them; uses past experience and emotional intelligence to anticipate/diffuse situational behavior and provides guidance to individuals on team • Identifies personality and traits of key individuals in order to match persuasion and motivation techniques	• Survey results from stakeholders and team members • Documented observations from communications	• Project manager able to capture verbal and nonverbal cues of the team • Project manager displays appropriate behaviors • Project manager appropriate selects and applies persuasion and motivation techniques to each individual
Element: Effectively Resolves Issues and Solves Problems		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Simplifies complexities for a complete and accurate analysis	• Demonstrated ability to understand, depict, and explain project interdependencies • Ability to evaluate and develop visual aids for addressing complex problems and to define clear steps for problem resolution	• Project documents • Documented observations from communications • Project documents	• Visual representations of project issues and interdependencies (lists, diagrams, relationship maps etc.) • Analysis documents indicating use of techniques to break apart complex problems to find solutions

Element: Effectively Resolves Issues and Solves Problems		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Applies complex concepts or tools when needed	Involves SMEs, project team, and specific techniques where required and appropriately maintains issue log for capturing problems, analyzes, and path to resolution	• Project documents	• Issue log that provides methods proposed for analysis of complex issues • Documented root cause analysis, portfolio analysis, expert judgment, etc. • Documented analysis supporting issues resolution
Applies lessons learned to resolve current project issues	Documents reviews and provides routine updates to lessons learned	• Project documents	Documentation of application of lessons learned to current project issues
Aggregates multiple related issues to understand the complete picture	• Considers project objectives and overall outcomes in analyzing specific project issues and identified options in determining appropriate action to take • Demonstrates project knowledge to identify related trends that link to specific issues	• Project documents	Summary reports or project scorecards outlining the relationships and linkages between issues
Observes discrepancies, trends, and interrelationships in project data	• Recognizes and questions inconsistent project data; uses judgment to request validation of data when necessary • Analyzes project metrics and takes action where required	• Documented observations from communications • Project documents	• Requests for information validation or confirmation • Documented trend analysis
Element: Uses Appropriate Project Management Tools and Techniques		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Understands project management tools and techniques	Knows and understands corporate and industry standards, tools, and techniques	• Project documents	List of available tools and/or techniques
Selects appropriate tools and/or techniques	Defines set of tools and techniques in accordance with established process that will best support successful project performance	• Project documents	• List of selected tools and/or techniques • Documented selection process and results
Applies selected tools and/or techniques to project management	Achievement of successful project outcomes is attributed to use of selected tools and techniques	• Survey results from stakeholders and team members • Documented observations from communications	Outcomes achieved through use of tools and/or techniques
Element: Seeks Opportunities to Improve Project Outcome		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Provides a framework to address opportunities and concerns	• Establishes a framework to identify and address issues and improvement opportunities and empowers team to employ • Utilizes input from team members to populate risk, opportunity, and issues tracking	• Documented observations from communications • Project documents	• Lists of issues and associated opportunities or concerns distributed to all team members along with a clearly communicated update process • Maintains issue log current and communicates changes/additions in it to all the stakeholders • Meeting notes where issues were addressed documenting approaches and solutions identified • Comparison between actions proposed and results obtained
	Additional expectation for experienced project manager: • Shares relevant information with program manager for use on other projects and overall program		
Looks for opportunities to improve project value or execution	• Establishes a framework to identify and address issues and improvement opportunities and empowers team to employ • Utilizes input from team members to	• Documented observations from communications • Project documents	• Risk register showing opportunities • Notes from group activities (e.g., brainstorming sessions, meetings) where new opportunities were identified

Table X3-14. *(continued)*

Element: Seeks Opportunities to Improve Project Outcome		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
	populate risk, opportunity, and issues tracking *Additional expectation for experienced project manager:* • Demonstrated history of capitalizing on opportunities that result in project improvements		• Documented suggestions in a project or actions taken in a project related to the results obtained
Seizes relevant opportunities as they emerge	Maintains documentation of actions taken to identify and recommend improvements to the project sponsor	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Meeting notes where opportunities were analyzed • Entries in change control process • Examples of opportunities related to the moment they are presented during the evolution of the project
Consolidates opportunities and passes them to the organization	• Maintains documentation of opportunities that may add value to the program • Demonstrated ability to analyze opportunities and evidence of prioritizing and selecting those opportunities with the highest potential for identification to the organization	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Emails, meeting notes, and other communication artifacts regarding project opportunities • Documented proposals to clients or internal stakeholders indicating added value for pursuing identified opportunities • Number of opportunities identified and pursued

X3.2.5 Effectiveness

Effectiveness involves the production of desired results by using appropriate resources, tools, and techniques in all project management activities.

The elements for this unit are:

- Resolves project problems
- Maintains project stakeholder involvement, motivation, and support
- Changes at the required pace to meet project needs
- Uses assertiveness when necessary

Table X3-15. Effectiveness—Units of Personal Competence

Element: Resolves Project Problems		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Employs appropriate problem solving techniques	• Establishes issue log that documents resolution and includes criteria to evaluate effectiveness of solutions • Feedback from stakeholders indicates agreement with techniques and tools used	• Project documents	• Issue log with resolution documentation
		• Survey results from stakeholders and team members • Documented observations from communications	• Agreement with problem solving techniques • Project manager used proper knowledge management tools
Validates that proposed solutions resolve the problem and are within the project boundaries	Reviews the recommendations and analysis from team leads and members; accepts or amends recommendations with appropriate justification	• Survey results from stakeholders and team members • Documented observations from communications	Project manager used proper knowledge management tools
	Establishes issue log that documents resolution, demonstrates resolution is within project scope, and includes criteria to evaluate solution	• Project documents	Issue log with resolution documentation
	Project problems are adequately and appropriately resolved; feedback rarely requires project manager to resolve concerns/issues that problems were not solved	• Survey results from stakeholders and team members • Documented observations from communications	Stakeholders' agreement that problems were resolved
Chooses solutions that maximize project benefit and minimize negative impacts	Project problems are adequately and appropriately resolved; feedback rarely requires project manager to resolve concerns/issues that problems were not solved	• Survey results from stakeholders and team members • Documented observations from communications	Stakeholders' agreement that problems were resolved
	Evaluates project post implementation of solution for effectiveness *Additional expectation for experienced project manager:* Shares relevant results and lessons learned with program manager for use on other projects and overall program	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Documented impact of solution on project • Documented external and/or environmental impact of solution
Element: Maintains Project Stakeholder Involvement, Motivation, and Support		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Uses stakeholder communications to maintain stakeholder motivation	Establishes regular forums for interaction with stakeholders, including various formal and informal media; responds to issues and concerns	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Communication plan • Updates to stakeholder analysis • Stakeholders feel motivated
Constantly seeks opportunities to communicate project status and directions to meet the needs and expectations of stakeholders	• Establishes regular forums for interaction with stakeholders, including various formal and informal media • Responds to issues and concerns • Feedback indicates communications are acceptable and needs are being met	• Survey results from stakeholders and team members • Documented observations from communications	• Examples where the project manager took an opportunity to communicate status • Stakeholders' feedback that their needs were met
Includes experts in meetings and discussions to influence and obtain stakeholder support	• Builds networks of influence across the stakeholders • Includes SMEs to enhance credibility • Documents inclusion of SMEs in project records to achieve issues consensus and support	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Consensus and support achieved on issues • Minutes from meetings where subject matter experts were invited for consultations with stakeholders

Table X3-15. *(continued)*

Element: Maintains Project Stakeholder Involvement, Motivation, and Support		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Uses objectivity for consensus building	• Establishes a professional rapport with team and stakeholders built on trust and mutual respect • Demonstrates decisions are made based on facts and logic • Possesses record of understanding behaviors of individuals and team and utilizes to obtain optimal solution	• Survey results from stakeholders and team members • Documented observations from communications	• Documented use of best practices for making team decisions • Examples of influencing biased team members toward objective position
Element: Changes at the Required Pace to Meet Project Needs		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Adapts to changes in the project environment to minimize adverse impacts	• Adapts to changes • Responds to issues and concerns	• Survey results from stakeholders and team members • Documented observations from communications	• Project manager displays a "can-do" attitude despite changes
	Establishes regular forum to assess risks; reviews mitigation activities and documents in the risk register for their impact on minimization of adverse impacts	• Project documents	Documented risk mitigation activities
Demonstrates flexibility toward changes that benefit the project	• Embraces continual review, analysis, and change to support project outcomes • Solicits input from team members to populate risks, opportunities, and issues • Prioritizes and selects opportunities that can impact the project *Additional expectation for experienced project manager:* • Advises program manager regarding risks and opportunities that may impact other projects	• Project documents	• Risk registry updates identifying new opportunities • Documented opportunities analysis • Change requests
Takes positive actions to capitalize on opportunities or to resolve present problems	• Embraces continual review, analysis, and change to support project outcomes • Engages stakeholders in opportunity analysis	• Survey results from stakeholders and team members • Documented observations from communications	Project manager demonstrates an action-oriented and proactive approach
	Resolution of outstanding problems captured in project documentation for future reference and lessons learned *Additional expectation for experienced project manager:* • Uses past experiences and lessons learned to aide resolution of problems	• Survey results from stakeholders and team members • Documented observations from communications	Project manager resolves outstanding problems
	Actively promotes use of the project library resources to aide in addressing and adapting to changes	• Project documents	Project library with relevant documentation of technologies, techniques, or methods used during the project execution
Enables a change-friendly environment by fostering continuous learning	• Actively promotes team and personal development as part of the project culture • Works with functional managers to recommend personal development opportunities for individuals	• Project documents	Documented training recommendations for team members
	Ensures individual development plans and develops project timeline to allow for adequate time for development and investigations	• Project documents	Project schedule includes time for team members to study new solutions, situations, or technologies

Element: Changes at the Required Pace to Meet Project Needs		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
	Actively promotes use of the project library resources to aide in addressing and adapting to changes	• Project documents	Project library with relevant documentation of new technologies, techniques, or methods used during the project execution
Acts as a change agent	• Change program established and appropriately used • Project manager responds to issues and concerns	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	Feedback from stakeholders indicates changes appropriately initiated or facilitated by project manager
	Feedback from stakeholders rarely requires response by project manager for issues and concerns	• Survey results from stakeholders and team members • Documented observations from communications	Project manager demonstrates positive self-esteem and self-confidence
Element: Uses Assertiveness When Necessary		*Indicative competence level required: 2*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Takes initiative when required, assuming calculated risks to expedite project delivery	• Project manager takes initiative to drive project forward • Responds to issues and concerns	• Survey results from stakeholders and team members • Documented observations from communications	Feedback from stakeholders that the project manager took initiative when required
	Maintains documentation of issues and resolutions that demonstrates timeliness	• Project documents	• Issue log with documented resolutions • Issues escalation reports showing timely decision path
Prevents inconclusive discussions, makes decisions, and takes appropriate actions	Able to tactfully decline or redirect inconclusive suggestions for benefit of team and willingness to make concise decisions in interest of moving project forward *Additional expectation for experienced project manager:* Uses past experiences and lessons learned to aide decision making abilities	• Survey results from stakeholders and team members • Documented observations from communications	• Feedback from team on actions taken • Project manager able to decline a proposal without causing an argument and while maintaining cooperation • Project manager able to resolve a crisis by assessing the situation and offering decisive action
Shows persistence and consistency in actions	Project manager able to respond to issues and does not leave issues unresolved	• Survey results from stakeholders and team members • Documented observations from communications	Documented feedback from stakeholders stating that the project manager showed persistence and consistency
	Establishes regular forums to drive timely decisions on issues in order to meet stakeholders needs	• Project documents	Meeting minutes, action item notes, or status reports showing decisions made
	Ability to motivate at all stages of the project independent of climate	• Survey results from stakeholders and team members • Documented observations from communications	Project manager maintains motivation when faced with challenges
Makes timely decisions based on facts while managing ambiguity	• Decisions are made and communicated in a timely fashion, based on information and appropriate analysis • Risks and issues are not left unmanaged or ignored • Issue log demonstrates timeliness *Additional expectation for experienced project manager:* past experiences and lessons learned are used to aide decision making	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Decision memoranda or decision analysis documents demonstrating factual analysis of issues and prompt decision making • Issue log showing time from recording to resolution • Issues escalation reports showing timely decision path

X3.2.6 Professionalism

Conforms to an ethical behavior governed by responsibility, respect, fairness, and honesty in the practice of project management.

The elements for this unit are:

- Demonstrates commitment to the project,
- Operates with integrity,
- Handles personal and team adversity in a suitable manner,
- Manages a diverse workforce, and
- Resolves individual and organizational issues with objectivity.

Table X3-16. Professionalism—Units of Personal Competence

Element: Demonstrates Commitment to the Project		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Understands and actively supports the project's and organization's mission and goals	Defines project goals that are based on corporate mission and goals *Additional expectation for experienced project manager:* Identifies project improvements to project sponsor and program manager for consideration	• Project documents	• Alignment of project goals and objective with organization's missions and strategy • Project activities that support organizational goals
	Demonstrated ability to steer team in direction of organization even in the face of differing personal preference	• Survey results from stakeholders and team members • Documented observations from communications	Examples where support was given when project goals differ from personal preferences
Cooperates with all stakeholders to achieve project objectives	• Establishes a professional rapport with stakeholders built on trust and mutual respect • Demonstrated ability to set common goals that help align team and stakeholders	• Survey results from stakeholders and team members • Documented observations from communications	Specific cooperative efforts to achieve project objectives
	Demonstrated ability to develop team with adequate support and direction through relevant stages of life cycle to a high-performing team	• Survey results from stakeholders and team members • Documented observations from communications	Team-building techniques were used to foster cooperation
Makes sacrifices where necessary to move project forward	Demonstrated ability to separate personal gain from overall program gain *Additional expectation for experienced project manager:* Recommends to program manager where benefits to another project or the overall program may be achieved	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	Options taken for effective project execution while giving personal benefits a lower priority
	Demonstrated ability to put aside setbacks while continuing to drive to a positive overall outcome	• Survey results from stakeholders and team members • Documented observations from communications	Positive attitude while dealing with project challenges

Element: Operates with integrity		*Indicative competence level required: 4*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Adheres to all legal requirements	• Engages lawyers and SMEs when legal boundaries are not well understood • Ensures team understands ability and right to escalate legal issues through communications channels	• Survey results from stakeholders and team members • Documented observations from communications	All legal requirements were met
	Identifies and documents legal requirements at initiation of project; obtains stakeholder buy-in and approval	Project documents	Log of legal requirements applied to a project with written stakeholder approval
Works within a recognized set of ethical standards	• Project conducted within ethical standards as defined by project documents • Employs independent SMEs to address issues and concerns • Ensures team understands their ability and right to escalate ethical issues through communications channels	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	Project manager ensured project followed ethical standards Project manager neither offered nor accepted inappropriate payments or other items from any stakeholders
Seeks to avoid and discloses any possible conflict of interests to all stakeholders	• Completely and truthfully reports potential conflict of interests • Ensures team understands ability and right to escalate issues and concerns through communications channels	• Survey results from stakeholders and team members • Documented observations from communications	Truthful reporting of potential conflict of interests
	Ensures organizational conflict of interest (OCI) statement and OCI plan are incorporated in project policies	Project documents	Organizational conflict of interest (OCI) statement and OCI plan
Maintains and respects confidentiality of sensitive information	Able to handle confidential matters; responds to issues and concerns	• Survey results from stakeholders and team members • Documented observations from communications	Project manager maintains confidentialities
	Utilizes data templates that contain proper confidentiality, export, or security classification based on end use *Additional expectation for experienced project manager:* Provides feedback on templates based on experiences and lessons learned for use by team and other projects	Project documents	Project documentation that includes the confidentiality or security level classification notice (e.g., nondisclosure agreement [NDA])
Respects the intellectual property of others	• Ensures agreements for reuse of protected intellectual property are incorporated in project policies, processes, and procedures • Engages lawyers/SMEs to define intellectual property at project initiation	Project documents	Agreements for reuse of protected intellectual property Searches for potentially applicable patents, trademarks, or copyrights
	Engages lawyers/SMEs to ensure copyrights are respected and intellectual property is used in accordance with project requirements	Project documents	Copyright notices with source indication whenever protected intellectual property was used

Table X3-16. *(continued)*

Element: Handles Personal and Team Adversity in a Suitable Manner		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Maintains self-control in all situations and responds calmly	Ability to handle difficult situations; responds to issues and concerns	• Survey results from stakeholders and team members • Documented observations from communications	• Times where the project manager felt strong emotions (such as anger or extreme frustration) but controlled them • Uses stress management techniques to control response, prevent burnout, and deal with ongoing stress both personally and with other project personnel • Project manager displays self-control
Admits shortcomings and explicitly accepts responsibility for failures	• Self-identifies and addresses issues • Demonstrates self-awareness and personal ownership of issues or failures	• Survey results from stakeholders and team members • Documented observations from communications	• Project manager actively listens to constructive feedback and acts on it • Project manager accepts responsibility for failure
Learns from mistakes to improve future performance	Establishes and implements regular forum to review and update lessons learned	Project documents	Documented lessons learned
	Openly communicates about areas for development and actions being taken	• Survey results from stakeholders and team members • Documented observations from communications	Project manager learns from mistakes
	• Self-reflects on appropriateness and effectiveness of actions • Transparent in addressing concerns and areas for development	• Survey results from stakeholders and team members • Documented observations from communications	Examples where the individual analyzed his or her own performance to understand causes of mistakes and failures
Develops elements of trust and respect within the project environment	Establishes a professional rapport with stakeholders built on trust and mutual respect that is evident on a daily basis	• Survey results from stakeholders and team members • Documented observations from communications	Project manager displays an awareness of, respect for, and willingness to accommodate cultural differences
	• Recognizes and rewards team • Promotes positive team member achievements with management and clients	• Survey results from stakeholders and team members • Documented observations from communications	Team celebrates achievements
Ensures team's adherence to cultural issues, legal requirements, and ethical values	• Sets expectations of project team's adherence to organization's ethics standards • Establishes and promotes a culture of respect and ethics in line with the organizational culture *Additional expectation for experienced project manager:* Provides real-life examples to team to enhance understanding based on past experiences and lessons learned	Project documents	Document describing ethical standards and stakeholders' value systems
	• Adheres to *Code of Conduct* and high standards in daily interactions with team and stakeholders • Holds team accountable for the same high standards	• Survey results from stakeholders and team members • Documented observations from communications	Project manager consistently exhibits good moral judgment and behavior
	Engages program management resources and SMEs at project initiation to ensure project plan is aligned to applicable standards and legislation	Project documents	Documented analysis of applicable legislation, standards, and local customs relevant to the project

Element: Resolves Individual and Organizational Issues with Objectivity		*Indicative competence level required: 3*	
Performance Criteria	**Expectation**	**Sources of Evidence**	**Examples**
Respects personal, ethnic, and cultural differences	• Establishes and promotes organization's culture of respect and ethics • Understands personal, ethnic, and cultural diversity of team and stakeholders so that scheduled forums and communications accommodate them	• Survey results from stakeholders and team members • Documented observations from communications	Project manager respects personal, ethnic, and cultural differences
	• Project manager demonstrates understanding of individual personalities and communication styles • Utilizes appropriate methods to solicit input from each team member	• Survey results from stakeholders and team members • Documented observations from communications	Project manager values the contribution of each team member
Creates an environment of confidence and respect for individual differences	• Establishes and promotes organization's culture of respect and ethics • Positively promotes personal, ethnic, and cultural differences of stakeholders so that team members are aware and accept them as the norm	• Survey results from stakeholders and team members • Documented observations from communications	Team has confidence that the project manager respected individual differences
	Understands individual personalities and strengths and creates a tailored environment that enables/motivates members to perform at their best	• Survey results from stakeholders and team members • Documented observations from communications	Project manager creates the conditions to motivate and enable others to contribute their best
Respects the organizational framework for management of the project	• Establishes and enforces standards and processes consistent with the PMO • Establishes and promotes a culture of respect and ethics in line with the organizational culture • Recognizes and respects the authority of other project managers	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	• Project manager respects the management framework established by the organization • Project manager follows rules of collaboration and reporting within the programs or portfolio of projects
Balances individual interests with organizational interests	Able to balance individual versus organizational interests; responds to issues and concerns	• Survey results from stakeholders and team members • Documented observations from communications	Project manager sees clear distinctions between individual and organizational interests
	Project manager holds PMP® certification and demonstrates professionalism consistent with designation at all times	• Survey results from stakeholders and team members • Documented observations from communications • Project documents	Project manager adheres to PMI's *Code of Conduct*
Assigns team members in an unbiased way to appropriate tasks	• Works with functional managers along with own observations to assess and identify project team members' strengths and weaknesses • Assigns areas of responsibility including stretch assignments	Project documents	• Skills assessment documentation indicating each team member's strength and weaknesses • Responsibility assignment matrix aligned with team members' skills assessment • Examples of personnel assignments that allow individuals to grow by doing more than status

BEST PRACTICES FOR HUMAN RESOURCE MANAGEMENT IN PUBLIC-SECTOR PROJECTS

Best practices for human resource management in public-sector projects include the following:

- Develop a human resources management plan
- Regard the human resource department as an asset rather than animpediment, and build an effective relationship with it
- Be demanding but respectful in getting the resources you need
- Assume that the necessary resources for the project will be available,document that assumption in the project charter, and make that assumption visible in status reports
- Give the project team as much latitude as possible in defining theirown activities
- Engage project team members in project planning and project decision making
- If necessary, make a real commitment to engaging in the progressive discipline process, with the intention of improving performance
- Assume that your team members are Theory Y employees, unless given solid reasons to believe otherwise
- Give team members the chance to experiment, learn, and grow if possible
- Remember that the project manager has the ultimate responsibilityfor project success, but that success cannot be obtained without thesupport of the team
- Build a diverse team and respect that diversity
- Make good on your commitments as a means of building confidencethat the work of the team will be rewarded
- Engage team members by reminding them of the importance of theproject
- Protect the team from outside interference if possible
- Fix problems, not people.
- Never try to resolve conflict on the basis of positions
- Remember that emotions are also a factor in resolving conflict
- Identify the factors for creating high-performing project teams, anddetermine which of those factors can be applied

BEST PRACTICES IN PUBLIC-SECTOR PROJECT COMMUNICATIONS MANAGEMENT

Best practices for managing communications in public-sector projectsinclude the following:

- Identify the project's stakeholders and their varied interests

- Create a communications plan
- Enlist allies for communicating with senior-level stakeholders, including legislative affairs experts, if appropriate
- Create short project status report formats and carefully consider themost important information to present
- Create multiple reporting formats if appropriate but ensure consistency among them
- Recognize the important role of aides, assistants, and secretaries ingetting information to senior persons
- Employ redundant communications and proactively address noise inthe communications channel
- Maintain an issue log
- Use more formal communications strategies for high-riskcommunications
- Use creative techniques for communicating with stakeholders
- Build knowledge management into the project plan

Create strategies for capturing explicit and tacit knowledge

BEST PRACTICES FOR PUBLIC-SECTOR PROJECT RISK MANAGEMENT

Best practices for managing risks for public-sector projects can include:

- Adopt a proactive strategy with regard to risk
- Engage as broad a group as possible in risk identification andresponse planning
- Identify the risk tolerances of your organization
- Keep in mind that risk can be reduced but not eliminated; be alert tosecondary risks
- Give special attention to those points in the project at which control passes out of the hands of the project team and into the hands of otheroffices or processes
- Create risk categories that include political and media risks and therisk of failing to deliver a product that will satisfy customers
- Use risk analysis methods that fit the project and the organization(i.e., methods that are neither too rigorous nor too informal)
- Put the consideration of risk on the agenda at every team meeting
- Assign responsibility for the management of specific risks
- Build a plan for managing legal and administrative constraints
- Include time and resources in the project plan for the implementation of the plan for managing legal and

administrative constraints guaranteed that Willowbrook residents would forever remain in community facilities.

PERFORMANCE MANAGEMENT

The process of developing an outsourced service relationship or a plan for managing an off-site employee requires the development of a performancemanagement system. That system requires that we:

- Identify the current state of affairs
- Identify the desired state
- Identify the difference
- Create a plan to close that gap

That gap is sometimes referred to as a performance improvement zone.As we create a work plan for a vendor in a public-sector project, we mightidentify a current state in which we have the internal capability duringthe term of the project to create seven specific software modules of the total of eleven required for the project. The desired state is the delivery of all eleven modules at levels of quality that satisfy the project and on datesthat meet the project schedule. The gap is the creation of four modules. Our contract with the vendor and the resulting service-level agreement becomes the plan for delivering the four modules and closing the gap between what we have the capability to create and our need.

Performance management can also be applied to project team members.We could identify the current state of affairs with regard to the employee'sperformance, compare that performance to the desired state, and, with theassistance of human resource staff, create a performance improvement plan for the employee. That plan, in order to be effective, would require performance metrics so that both the employee and managers could knowwithout a doubt that the goals had been met.

We can employ a variety of tools to identify the existing state of affairs.

Those tools include:

- Process mapping
- Customer surveys
- Benchmarking
- Identification of performance metrics
- Requirements analysis of the types described in the chapter onproject quality management
- Make-versus-buy analysis

Table 12.1 Performance Planning Template

Current state of affairs	Desired state of affairs	Gap	Performance improvement plan (measurable outcomes)

A template for creating a performance management plan is includedin Table 12.1.

MANAGING THE CULTURAL CHANGES NECESSARY FOR SUCCESSFULLY MANAGING VENDORS

Making the move to outsourced services, project vendors, or even distantemployees and partners requires cultural as well as management changes. Those cultural changes can be as difficult as the operational challenges.

Some of the cultural changes necessary are:

- Helping managers understand that providers operating under con-tract may not be as responsive to crises as employees
- Helping managers understand that employees may not have themeans to meet requests, particularly if processes and data are under the vendor's control

- Helping managers understand that requests for information orperformance will have to be preplanned or anticipated
- Making the change from managing activities to managing outputsand outcomes
- Building trust within the constraints of contracts rather than build-ing trust over years with colleagues
- Working through cultural differences that may extend across ethnicgroups and nations
- Working with employees who may not want to give up functions ordata

Managing the cultural changes and the emotions that accompany out- sourcing may be harder than creating contracts and service-level agree- ments. To create those cultural changes, there is no substitute for vigorousand frequent dialogue.

THE LEGAL FRAMEWORK FOR OUTSOURCING PROJECT PRODUCTS AND SERVICES TO VENDORS

Even when internal employees were used for services, the relationship between the employer and the employee was governed by a legal frame- work. In this section, the legal frameworks applied to outsourced servicesare examined.

Why is it difficult to create prenuptial agreements? Although this sounds like a joke, the problem with creating prenuptial agreements isthat good intentions to build a lasting, close relationship are mixed withlegal issues. The same thing is true of outsourcing.

Although the goal is to create a win-win relationship with the vendorthat can grow over time and blossom into a true partnership, that relationship has to be defined with legal documentation.

Most outsourcing arrangements consist of two fundamental documents:

- *The contract*, which is the basic governing document of the agree-ment. Any other documents are subordinate to the contract. The advice and assistance of an attorney is required for creating the contract.
- *The service-level agreement*, which defines in greater detail the services to be performed. The service-level agreement is examinedin the next section. The service-level agreement is sometimes also

called the statement of work, though a statement of work is more oftenused to describe physical items to be purchased. The service-level agreement is designed to allow easier changes than the contract.

Both documents are designed to form the basis of the relationship between the parties. Therefore, they have to balance flexibility with accountability and clarity. That is a challenge that some organizations fail to meet. Keep in mind that vendors, when asked to perform duties notclearly specified in the documents, will have to fit those extra duties into the agreement and determine what constraints the agreements create. That requires a culture shift in that, before outsourcing, management could have asked full-time employees to just work harder or work overtime.

A systematic approach for monitoring and evaluating the construction project progress

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A SYSTEMATIC APPROACH FOR MONITORING AND EVALUATING THE CONSTRUCTION PROJECT PROGRESS

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ABSTRACT

A persistent problem in construction is to document changes which occur in the field and to prepare the as-built schedule. In current practice, deviations from planned performance can only be reported after significant time has elapsed and manual monitoring of the construction activities are costly and error prone. Availability of advanced portable computing, multimedia and wireless communication allows, even encourages fundamental changes in many jobsite processes. However a recent investigation indicated that there is a lack of systematic and automated evaluation and monitoring in construction projects. The aim of this study is to identify techniques that can be used in the construction industry for monitoring and evaluating the physical progress, and also to establish how current computer technology can be utilised for monitoring the actual physical progress at the construction site. This study discusses the results of questionnaire survey conducted within Malaysian Construction Industry and suggests a prototype system, namely Digitalising Construction Monitoring (DCM). DCM prototype system integrates the information from construction drawings, digital images of construction site progress and planned schedule of work. Using emerging technologies and information system the DCM re-engineer the traditional practice for monitoring the project progress. This system can automatically interpret CAD drawings of buildings and extract data on its structural components and store in database. It can also extract the engineering information from digital images and when these two databases are simulated the percentage of progress can be calculated and viewed in Microsoft Project automatically. The application of DCM system for monitoring the project progress enables project management teams to better track and controls the productivity and quality of construction projects. The use of the DCM can help resident engineer, construction manager and site engineer in monitoring and evaluating project performance. This model will improve decision-making process and provides better mechanism for advanced project management.

Keywords: *AutoCAD, Construction Management, Database, Digital Monitoring Photogrammetry*

1. INTRODUCTION

Project progress monitoring and control is one of the most important tasks of construction project management. Every team-member needs to know, in a timely and accurate manner, how is the project progressing, where they are currently in comparison to the initially set plans, whether deadlines are met, budgets are safely measured and followed. It is mainly the responsibility of the general contractor to update the Architect/Engineer, who, in turn, updates the owner. Figure 1 shows the traditional project progress monitoring process and the progress reports are updated on a periodic printed form; issued in most of the cases on a monthly basis. These reports discuss the current project progress with planned schedule of work in terms of time and budget to forecast the project finish date. These reports also mentioned the constructability problems, quality issues including test results, contract changes including modification in design and increase/decrease in quantities, pending issues from progress meetings. The photos are attached to these reports to show the achievement of milestones. This traditional construction management system provides a project manager with the various reports such as progress control, earned value management and resource management. Project manager spend most of his time for developing and updating of these reports instead of execution and to take in-time decision to finish the work within prescribed time scale.

The successful project completion requires the concerted effort of the project team to carry out the various project activities, and it is the project manager who at the centre of the project network is responsible for orchestrating the whole construction process. The project manager has to maintain the project network and monitor against slippages in cost, time and quality for the duration of project. In achieving this, the project manager relies heavily on a reliable monitoring system that can provide timely signalling of project problems, whether they are real or potential.

In practice little has been done to address the problem of project progress monitoring and control. The most of the research efforts in the field of project control still focus on the development of cost control models [1]. This paper describes the current status of an ongoing research project which aims to develop an easy to use tool or expert system to monitor and control the construction progress at the construction stage. A different class of computer application system are discussed in this paper, which will be used for monitoring and updating the project progress by incorporating engineering information from digital images and AutoCAD drawings. To achieve this object a prototype system was proposed namely called Digitalising Construction Monitoring (DCM) system. This is authors' believe that this system can assist project manager to develop the project progress reports with speed, within time

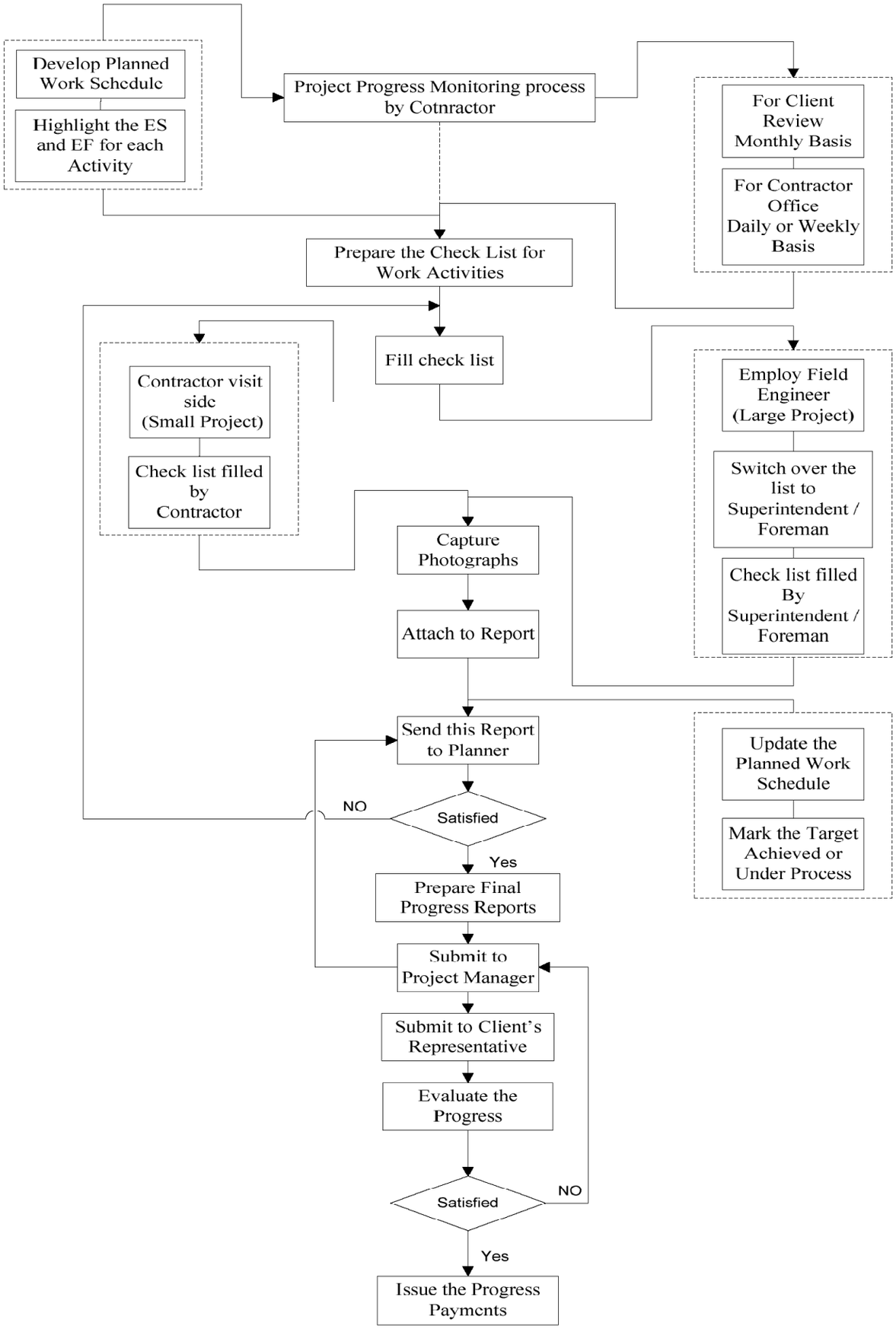

Figure 1: Flowchart for traditional project progress monitoring practice

and accurate to pursue for successful completion of construction work according to clients demands.

2. BACKGROUND OF STUDY

This section provides a brief overview of studies reported in the literature relating to digitalising the construction monitoring for construction project. A number of commercial software packages that relate to this topic are also listed. The sources outlined here provide the basis of the analysis of project monitoring and the system development presented in the following sections.

The existing computer-based construction tools seem to provide a wide of functions to manage design and construction information. The researchers attempted and developed the systems such as; ESSCAD by Wang [2], PPMS by Cheung [3], VIRCON by Dawood [4], PHOTO-NET II by Abeid [5], CADCIMS by Stumpf [6], OSCONCAD by Maria [7], DIPAD by Streilein [8] and ADC by Sacks [9]. From the intensive review, researchers developed the integration model for project progress and the ideas for developing automated real-time monitoring systems are rapidly growing with the advancement in the information technology. However, the information integration has not been ideal in current practice. From the literature it has been cited that very few have given concern to develop the actual physical progress bar chart by capturing the information from digital images. This study uses the close range photogrammetry to develop the 3D Model from digital images with the help of PhotoModeler pro version software, which is requirement for accurate photogrammetry. This system enables the project manager to simulate the traditional practices and Artificial Intelligence to evaluate the physical progress of construction activities and develop the progress bar chart in Microsoft project.

Most construction project employ scheduling methods to monitor and control the progress of work and develop progress reports, which involves the recording of construction achievements for detection of deviations from actual plan and for forecasting project performance. The primary control system used by project managers to obviate or mitigate time-based claims in construction industry is construction schedule [10]. The current practice of project control is entirely dependent on cost, schedule, and quality reports and personnel performance reviews [11]. Monitoring project time is one of the many challenges for the project manager. Time monitoring seeks to assess how well the project adheres to the planned schedule over a period of time. There are a variety of ways in which a construction schedule can be presented. The more common types of construction schedule include: Gantt chart, activity on the arrow, precedence network and line of balance. Bar charts or Gantt charts are a powerful communication tool and an extremely useful, visual and graphical medium in construction scheduling.

A persistent problem in construction industry is to develop the as-built physical progress schedule of construction scene. The as-built project information presents how construction is actually performed. The research reported in this paper focuses on the issue related to developing the digitalised actual physical progress report during the construction stage. As-built schedules are costly to prepare because of the amount of research necessary to determine the actual dates and considerable judgment is also required. Since detailed records are not always available and even if they are, work on the site does not necessary confirm the planned schedule. This state of affairs leads authors to propose the prototype system for developing as-built schedule automatically.

In addition the scenario discussed in above paragraph, a questionnaire survey was conducted within Malaysian Construction Industry. Zhang [12] stated that questionnaire survey is an effective, convenient, economical investigation tool for obtaining data and sampling the opinions of individuals in spatially diverse locations. Al-harthy [13] listed that the questionnaire survey usually provides large amount of data in a short time with relatively ease of preparation, distribution and tabulation of answers and responses can be given easily and quickly. Therefore, a close-end questionnaire was designed for this study; to identify the current practice. The result of survey supports the authors to propose the system, as MCI utilising the traditional practice for monitoring and progress reporting. The following sections discuss the result of questionnaire survey and propose a framework model to overcome the limitation of current practice in the MCI.

3. QUESTIONNAIRE SURVEY WITHIN MALAYSIAN CONSTRUCTION INDUSTRY

The questionnaire survey form was designed to verify the existing methods and processes which are related with the project progress monitoring. It is important at early stage to decide for analysing method before developing any system of data collection. So, Statistical Analysis method has been considered to analysis the collected survey form. The data was collected by using measurement or likert scale method. Five scale rating was used to determine the severity of influence on project progress monitoring techniques by client, consultant and contractor. Al-Hammad [14], Abd.Majid [15] and Al-harthy [13] used and explained the Average Index Method to analysis data in the ordinal or ranking scale. This study also uses Average Index Method to analysis data of survey and explained as follows:

$$\text{Average Index} = \left[\frac{\sum_{i=1}^{5} a_i x_i}{5\sum_{i=1}^{5} X_i} \right] \text{for five scale rating.} \qquad (3)$$

Where,

a_i = Constant expressing the weight given to i,
X_i = variable expressing the frequency of the response for;
i = 1, 2, 3, 4, 5 and illustrated as follows:
X_1 = frequency of the 'very rare' response and corresponding to $a_1 = 1$;
X_2 = frequency of the 'rare' response and corresponding to $a_2 = 2$;
X_3 = frequency of the 'slightly frequently' response and corresponding to $a_3 = 3$;
X_4 = frequency of the 'frequently' response and corresponding to $a_3 = 4$; and
X_5 = frequency of the 'very frequently' response and corresponding to $a_5 = 5$.

Table 1 shows the result of questionnaire survey which were conducted within Malaysian Construction Industry (MCI). The table 1 highlighted a need to propose a digitalise system for construction monitoring and progress reporting. The

Table 1: Result of questionnaire survey within MCI

Techniques / Options	Clients		Consultants		Contractors	
	MS	R	MS	R	MS	R
Factor (1) Methods of Project Progress Monitoring						
(a) The money Plan (Cost weightage)	4.429	1	3.923	2	3.909	2
(b) The time Plan(Time weightage)	4.143	2	4.077	1	4.182	1
(c) The Resource Plan (Manpower weightage)	2.571	3	3.000	3	3.068	3
Factor (2) Process of Project Progress Monitoring and Evaluating						
(a) Traditional Approach	4.000	1	3.769	2	3.477	2
(b) Software for scheduling	3.286	2	4.077	1	4.023	1
(c) Real-time Monitoring System	1.429	3	2.154	3	2.136	3
(d) Field Inspection Reporting System (FIRS)	1.000	4	1.692	4	1.952	4
Factor (3) Computerized Application Systems for Project Progress Monitoring						
(a) Digital Hardhat (DHH) system	1.143	3	1.692	3	1.977	2
(b) SKALA System	1.429	1	1.769	2	2.000	1
(c) PHOTO-NET II	1.286	2	1.385	4	1.955	3
(d) A web-based construction Project Performance Monitoring System (PPMS)	1.000	4	1.923	1	1.614	4

result of survey shows that traditional or paper-based information flow on construction projects still dominate; as computers are increasingly becoming a central component of project information systems and used for developing the planned schedule. The several areas in construction management, such as scheduling, estimating, cost control, and accounting, employ well-established computer applications. To carry-out the laborious calculations and data tracking for these tasks, they represent a small portion of the day-to-day construction management activities. The result of survey also highlighted that the updating the project progress still carried out manually, no computerised system is used for developing the project progress automatically.

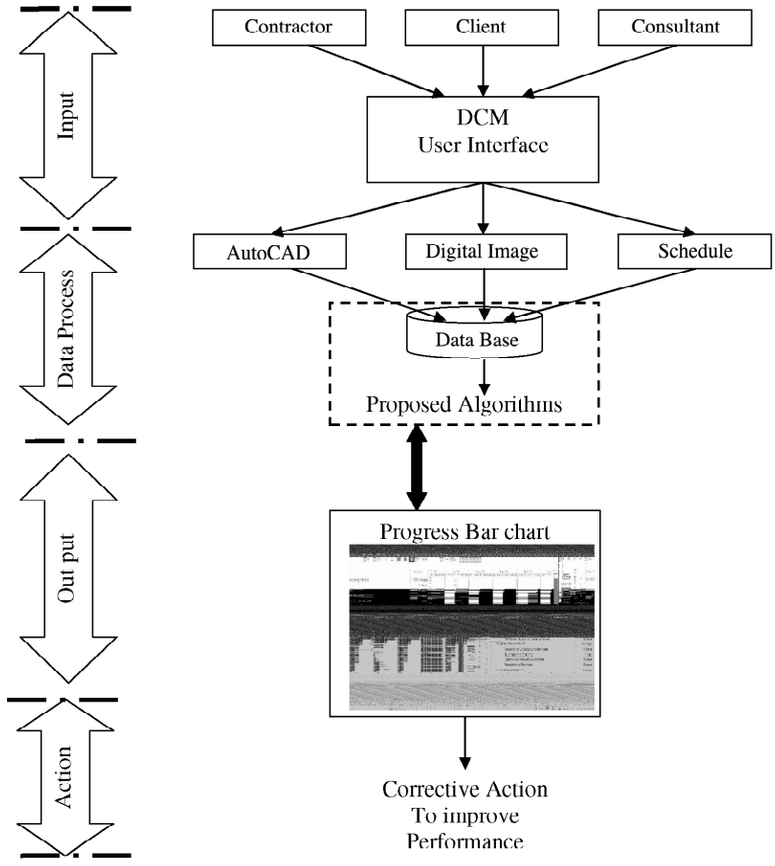

Figure 2: Developed frame work of digitalising construction monitoring

4. THE PROPOSED PROTOTYPE SYSTEM

The basic theory behind developing the model is to extend the traditional approach to represent the dynamic and simultaneous construction operations by incorporating inter-relationships between hierarchical processes of evaluating. The objective of developing a Digitalised Construction Monitoring (DCM) model is to systematise the construction monitoring and evaluation of a project. DCM is implemented using object oriented concepts and event driven programming. The object-oriented concepts were utilised in the graphical user interface of constructing the DCM processes. Graphical interfaces were created in the Photogrammetry and photomodeler environment and then exported into Visual Basic TM (event driven programming). Relational Data base was implemented using Micro Soft Access TM engine to store project related information. The simulation concept of DCM model is currently being used to test and check the validity. The main goal of DCM model is to propose an interface process model between the 2D digital photo and detail design drawings and update the physical progress chart by integrating the information.

Figure 2 shows the framework model for the proposed system. The proposed system is divided into four different phases. In phase-I, the input information will be browsed by the user in the

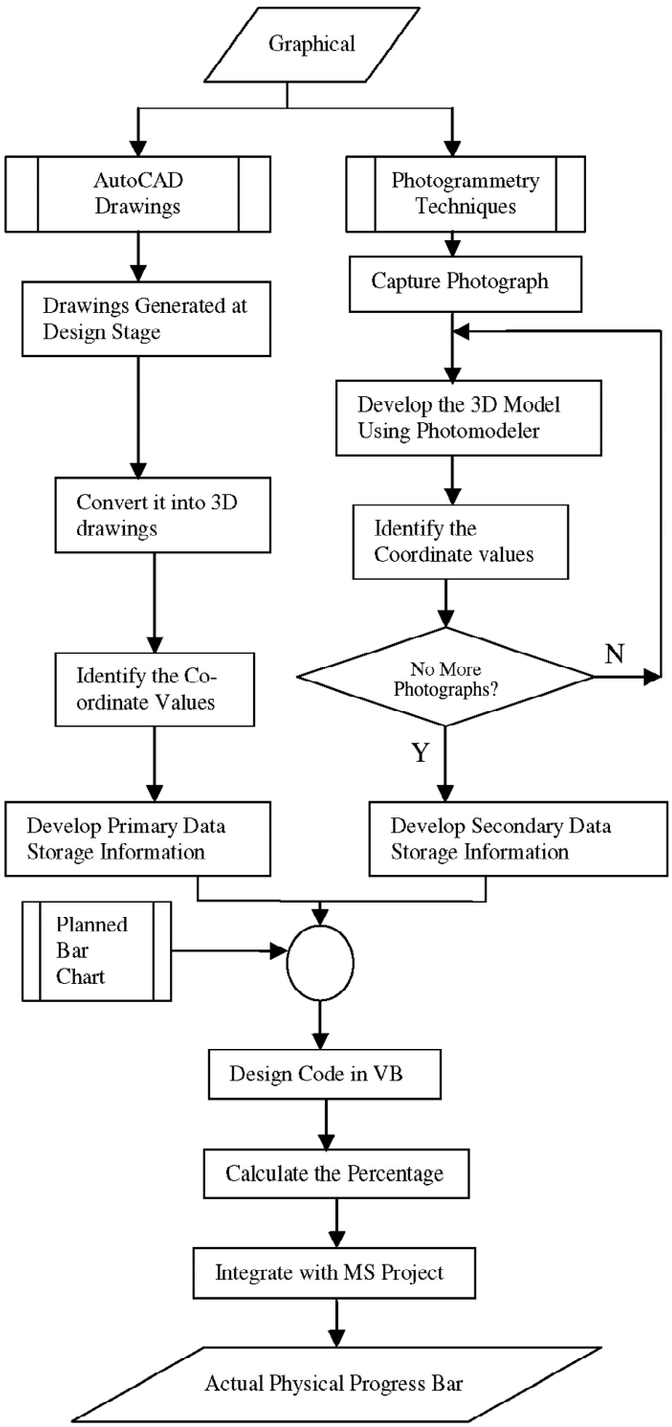

Figure 3: Process flow diagram

format of planned schedule of work, txt file and 3DAutoCAD file. Once user browsed all the information, phase-II start, which is to process the information. The process is done by automatically, as DCM user interface was designed, developed and computer programme are written in Visual Basic. During this phase, the percentage of progress will be calculated by integrating the database. These databases were developed during the Phase-II as user browsed the required information and content the 3D co-ordinate values from digital images and 3DAutoCAD drawings.

The phase-III will show the result interface of the system. This phase also shows the result in graphical format. As seen in Figure 2, the graphical information is shown in Microsoft Project Gantt chart. The next and last logical step of prototype system is to take Action as a remedial measure. This step activated when project manager realises the delays are happening and required to boot the progress and to take decisions for successful completion within prescribed time.

5. ARCHITECT OF THE DIGITALISING CONSTRUCTION MONITORING

The major task of developing this model is to develop the link between existing methods of evaluating and monitoring the physical progress of construction scene with modern technology. The main aim of DCM is to develop the project progress monitoring system that improves construction management methods in project progress reporting and control.

Figure 3 shows the process flow diagram for the DCM, in which digital images will be captured from site and 3D model will be developed by using Photomodeler software and AutoCAD used to display 3D information of the intended design. All the design parameters are stored in the primary and secondary data base and code are designed to calculate the percentage of actual progress. This percentage will be integrated with the Micro Architecture of the DCM Model, which shows a dynamic connection between the database and graphical information. The DCM model will be integrated with existing commercial or research prototype systems. The graphical information is created from 3D Model by using professional prototype system namely Photomodeler and AutoCAD 3D drawing. The primary data base from AutoCAD drawing has been developed at the start of the project by developing an Expert system and will be reluctant as any change order will be corrected in the data base. Secondary data base will be developed as construction work constructed and the source of information will be using photos. Visual basic will be used to build interfaces between the database developed from AutoCAD and Photos by using Photomodeler. By simulating both data base, it will calculate the percentage of progress considering the updating date and will transfer this information to Microsoft Project to show the actual physical progress in bar chart.

6. ALGORITHM FOR USER INTERFACE OF DCM SYSTEM

As discussed under the heading of Architectural of DCM, this system integrate the information from Microsoft Project, AutoCAD drawings and digital images and produce the end result in the format of Gantt chart in Microsoft Project. The figure 4 shows the detailed Algorithm for the proposed system. As figure shows, to start working on DCM, user needs to install the setup initially on his system and for successful running, user must be equip with AutoCAD to develop 3DAutoCAD model, planned work schedule in Microsoft Project and PhotoModeler software to develop the 3D Model. These three were considered the basic tools for DCM system.

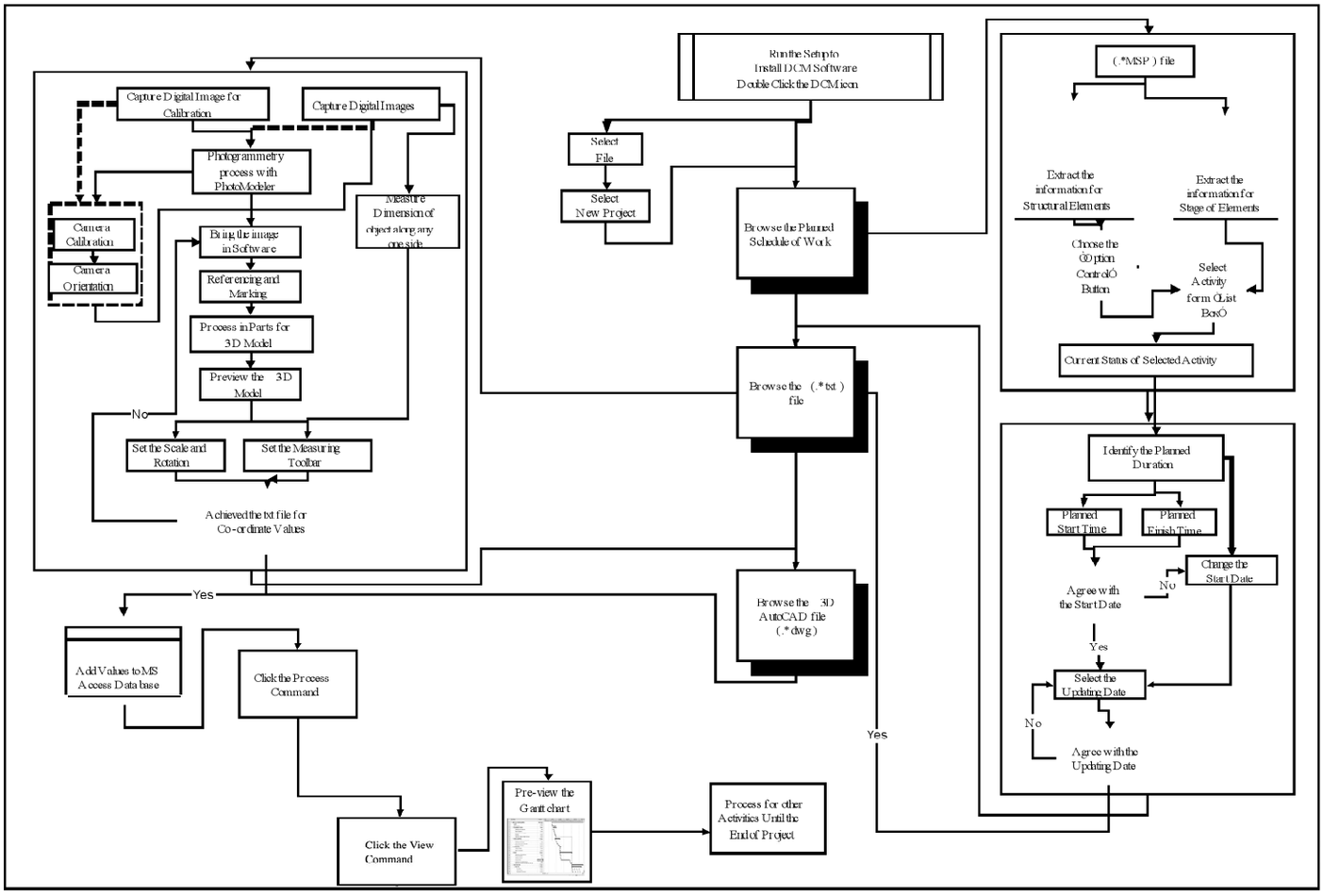

Figure 4: Algorithm of DCM user interface

The first logical step after installing and running the DCM system is to browse the planned schedule of work in Microsoft project. The figure shows the detail algorithm for browsing the work schedule. Once successfully complete this step, next step is to browse the {*.txt} file. This file is created from digital images by running with PhotoModeler Pro version. The detail of developing the 3D model from digital images is shown in figure. This algorithm is carried out before running the DCM for measuring the progress. Once {*.txt} file exported from PhotoModeler, then it is suggested to run the DCM system. As soon as {*.txt} file browsed the information will be grouped in Microsoft Access database to store the information.

The next logical step is to browse the 3DAutoCAD drawings as can be observed from the figure. As 3DAutoCAD file is browsed, the information is stored into database and user can start the process. By clicking on process command, it starts integrating the information in the database and calculates the percentage of progress. This percentage of progress can be viewed into the Microsoft Project. The algorithm is designed for this to show the view of comparison of progress between planned and actual progress.

Algorithm of user interface of DCM model is successfully designed. By implementing this algorithm model, it is authors' believe the efficiency of construction industry will be improved. The successful implementations of DCM will speedup the process of developing the progress reports and will help the project manager in decision making process. From the view of professionals in Malaysian Construction Industry, they suggested additional remarks for the usability of DCM especially when the contract dismantled during the contract period, DCM will be more effective and efficient as this stage also. They also suggested for the improvement of the model, which will be incorporated at the time of developing prototype system.

7. CONCLUSIONS

The research described in this paper attempts to overcome the limitations of the previous research development in the area of evaluating the construction phase. The main focus of this paper is to design a methodology for the monitoring and evaluation of construction project and developing a systematic model considering Malaysian construction industry's view point. A questionnaire survey was carried out within MCI and analysed and the result identify the need of digitalise system for MCI. In this regard this study proposes a system and discusses the methodology for designing the prototype model to systematising monitoring and evaluation of a project. The model allows users to document and retrieve project information in the form of digital images and close-range photogrammetry techniques are used to create 3D Model.

An integrated simulation model, named DCM (Digitalising the Construction Monitoring) is developed to integrate digital images of construction scene with AutoCAD drawings and it resolves the existing project progress reporting problems. Based on traditional approach, actual physical progress reports is developed manually by comparing the planned with actual

performance measured on site. The Digitalising the Construction Monitoring (DCM) model is developed by using the Relational Database Management System (RDBMS). The integration of digital images and drawings will enable construction mangers to develop progress reports in a more consistent and accurate manner and more accurate as-built project schedules can be transferred to facility managers for operation, maintenance, renovation and demolition. The DCM model will improve the decision-making and productivity of the construction activity.

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REFERENCES

[1] Hastak, M., Halpin, D. W., and Vanegas, J., *COMPASS-New Paradigm for project cost control strategy and planning* Journal of Construction Engineering and Management, ASCE (1996) 122(3):254-264.

[2] Wang, S.Q., *ESSCAD: Expert System Integrating Construction Scheduling with CAD Drawing*. Construction Information Digital library http://itc.scix.net/ paper w78-(2001)-46.Content

[3] Cheung, S.O., Suen, H.C.H. and Cheung, K.K.W PPMS: *a web based construction Project Performance Monitoring System*, Automation in construction 13 (2004):361-376.

[4] Dawood, N. Sriprasert, E., Mallasi, Z. and Hobbs, B., *Development of an Integrated Information Resource base for 4D/VR construction processes simulation*, Automation in Construction, 12 (2002): 123-131.

[5] Abeid, J.N., Allouche, E., Arditi, D. and Hayman, M., *PHOTO-NET II: a computer-based monitoring system applied to project management*. Automation in construction, ASCE (2003). 12(5): 603-616.

[6] Stumpf A. L., Chin, S., Liu, L.Y. and Ganeshan, R. *Use of a Relational Data-base System to Integrate Product and Process Information during Construction.* Construction Information Digital Library http;//itc.scix.net/paper W78-(1995)-316-326.

[7] Maria F. Dr., Aouad, G. Dr. and Cooper G. Dr. *OSCONCAD: A model-based CAD system Integrated with Computer Applications*. Information Technology in Construction (ITcon), 3(1998):25-43.

[8] Streilein, A., *Utilisation of CAD Models for the object oriented Measurement of Industrial and Architectural Objects*. International Archives of Photogrammetry and Remote Sensing, Vol. XXI, Part B5, Vienna pp.548-553 (1996).

[9] Sacks R., Navon R. and Goldschmidt E. *Building Project model support for Automated Labour Monitoring*. Journal of Computing in Civil Engineering, ASCE (2003). 17(1):19-27.

[10] Conlin, J. and Retik, A. *The applicability of project management software and advanced IT techniques in construction delays mitigation.* International Journal of Project Management (1997). 15(2):107-120.

[11] Sanvido, V.E. and Paulson B. *Site level Construction Information System*. Journal of Construction Engineering and Management ASCE (1992). 118: 701-715.

[12] Zhang, X. *Concessionaire Selection: Methods and Criteria*. Journal of Construction Engineering and Management, ASCE, (2004). 130(2):235-244.

[13] Al-harthy, A.S.H. *The Consultancy Fee for Structural Design Changes of Reinforced Concrete Building in Oman*. Faculty of Civil Engineering, Universiti Teknologi Malaysia, Skudai, Johor, Malaysia (2006): Ph.D. Thesis.

[14] Al-Hammad, A., Assaf, S. and Al-Shihah, M. *The effect of faulty design on building maintenance*. Journal of Quality in Maintenance Engineering. (1997) 3(1): 29-39.

[15] Abd.Majid, M.Z. *Non-Excusable Delays in Construction*. Department of Civil and Building Engineering, Loughborough University Loughborough, Leicestershire, UK (1997): Ph.D. Thesis.

MID TERM EVALUATION REPORT

ON

ENHANCING LIVELIHOOD THROUGH LOCAL EFFORTS PROJECT

SUBMITTED TO:

Group of Helping Hands (SAHAS) Nepal

SUBMITTED BY:

Dr. Neeraj N. Joshi

Consultant to SAHAS-NEPAL for MTE of ELLEP

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Annexes

ACKNOWLEDGEMENT

I would like to express my deep sense of gratitude and heartfelt appreciation to Group of Helping Hands (SAHAS-Nepal) for entrusting me to carry out the Mid-term Evaluation (MTE) of the Enhancing Livelihoods through Local Efforts Project (ELLEP) being implemented in Dhading, Gorakha and Tanahu districts of the Western Development Region Nepal. In particular, I would like to profoundly thank Dr. Surendra Kumar Shrestha, Executive Director of SAHAS-Nepal for his presence during the workshop being organized to gather the information related to the project, and for providing comments and feedback on the draft version of the MTE Report.

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Novermber 1, 2012

ENHANCING LIVELIHOOD THROUGH LOCAL EFFORTS PROJECT

1. Introduction

1.1 Background

Enhancing livelihood through local efforts project (ELLEP) is an integrated project that aims at sustainable development in all the aspects (internal and external) of the focus community. The objective of ELLEP is to support 'sustainable livelihood' of marginalized groups of the society through food security transformation and to lobby for equal access to/by all, so that the focus groups become capable of participating in political, economic and social spheres. This project is divided into two phases. Phase I starts from 2009 till 2012, and Phase II starts from 2013 and end by 2016. The major components of the project are: (1) Food Security, (2) Income generation (3) health and sanitation, (4) Education (5) Institutional Development and (6) Network Development of Community Based Organisations. The thematic areas covered by the project included: livelihood improvement: food security; income generation activities; institutional development; small infrastructure development (renovation/new construction of irrigations systems; drinking water scheme and micro-hydro-power scheme; health, and sanitation; hygiene and nutritional education; and advocacy activities such as capacity enhancement, lobbying from addressing the communities pertinent issues/agenda (human rights, food sovereignty, and support for communities' strategic planning and documentation campaigns.

SAHAS Nepal followed an integrated approach to implement this project, with a start from the mobilization of focus groups and with gradual organizational development and registration as a network organisation of CBOs at the end of the project phase I. This local network organisation will finally take over the responsibility for the development activities in the community.

1.2 Rationale of the Midterm Evaluation

A mid-term evaluation to be conducted after the completion of about two project years and six months was also envisaged in the project document, and that the result of the evaluation should be shared with the donor agency and would be taken as guidance for other development activities of SAHAS-Nepal. It is also that the successful activities might be replicated during the second phase of the project. Therefore, this mid-term evaluation was undertaken to assess the project design, achievements, efforts and impacts, and to provide recommendations for possible revision, design and implementation for the second phase of the project.

2. Midterm Evaluation of the Project

2.1 Study Objectives and Scope

The Terms of Reference (ToR) for the study envisaged that the focus of evaluation would be on efficiency and effectiveness, relevance, sustainability and gender perspective. As set forth by the TOR (Annex II), the following are the focus of the mid-term evaluation.

- The present status of the project
- The implementation process of the project, and
- Propose recommendations for completing the remaining activities of Phase I and upcoming Phase II.

Even though the ELLEP covers a total of 16 VDCs of four districts, namely, Udaypur, Dhading, Gorakha and Tanahu, this evaluation report is based on the information related to three districts only, i.e., Dhading, Gorakha and Tanahu.

2.2 Mid-Term Evaluation Methodology

The evaluation has been undertaken in line with the terms of reference prepared for the assignment, and the framework of the Action Programme. It is obvious the quality of the study, in terms of validity and reliability, would have been further enhanced, had it covered more number of VDCs, schools and the project beneficiaries. However, the evaluator believes the study has not been affected in any manner.

2.3 Approach

The MTE study adopted quantitative and qualitative approaches to review the overall performance of the project. Most of the quantitative information was obtained from the project related documents provided SAHAS-Nepal. Enquiries were carried out based on the 'checklists' prepared for the purpose of focus group discussions (FGDs) with the target groups in their villages.

The duration available for the field visit was five days, including the travel days. The methodological procedures employed for undertaking this assignment basically comprised of three aspects: (i) Pre-fieldwork (Review of the project related documents and consultation) (ii) Field reconnaissance which include (a) FGD with the project beneficiaries, (b) On-spot observation of

selected home gardens in the project districts and (iii) Consultation with the SAHAS-Nepal personnel working in Kathmandu and project districts, and project's partner organizations.

2.3.1 Pre-fieldwork consultation

Prior to going to the selected project districts (Dhading, Gorakha, and Tanahu) for the field study, the basic preparation was done by reviewing the documents related to the project, and in consultation with the concerned personnel of SAHAS-Nepal in Kathmandu. The review of the documents provided with an opportunity to understand the project context, in which it was implemented.

2.3.2 Desk study

The desk study involved review of the project documents such as project proposal, progress reports, documentation of case studies, etc. It must be mentioned here that the MTE did not repeat the investigation of the matters on which the secondary information are already available. However, the team verified some of the findings during their field visits with different stakeholders including direct beneficiaries. The desk study involved the collection and review of the project related documents obtained from SAHAS-Nepal and other relevant published materials as sources of information for the preparation of this report.

2.3.3 Field Reconnaissance

The field reconnaissance for the External Review included (i) FGD with the project beneficiaries; (ii) On-field observation of the project activities and interaction with individual project beneficiaries; (iii) Consultation with the SAHAS personnel working in the project districts.

2.3.3.1 FGD with the project beneficiaries

FGDs were conducted with the target beneficiaries of the project in all the three project districts, i.e., Dhading, Gorakha and Tanahu.. During the field visits, open discussions were conducted with the project target groups/beneficiaries in order to collect additional relevant information in line with the MTE objectives. At the end of discussion with each group, the conclusions (results) of the discussions were also presented to them in order to confirm that the information gathered was valid and meaningful.

For the purpose of the discussion, the communities gathered whenever and wherever they felt convenient, e.g., tea-stalls, in the project sites like the water sources for drinking and irrigation schemes, and porches of their residents. The discussions were enthusiastically participated by

both men and women community members. Most of the discussions were held either in the early morning or in the nights, as the time of visit coincided with the rice planting season. This, however, did not affect the information gathering activity, nor did this interfere with the rice planting activity in any way.

During the field visits, open discussions were held with the program target groups/beneficiaries about the project activities so far implemented focusing mainly on the following aspects.

- Relevance of the project activities to their needs and socio-economic benefits of the project (activities)
- Changes (social, economic, institutional) brought in the community by the project
- Stakeholders' participation including the partner organisations' participation
- Gender and social inclusion/exclusion related issues
- Current status/progress/performance (vis-à-vis the target) and achievements made so far
- Issues/problems encountered during project implementation
- Perceptions of the beneficiaries about the project (whether contributing to overall development of the area/region, motivation/incentive for involvement in project activities, their satisfaction, etc.)
- Perspective of the community beneficiaries about the sustainability aspects of the project
- Suggestions/recommendations for achieving the project objectives within the remaining project period.

For each of the field data collection methods (observation and FGD), a general checklist was developed to be used during the FGD to capture the information required. At the end of discussion with each group, the conclusions (results) of the discussions were also presented to them in order to confirm that the information gathered is valid and meaningful. The participants of these discussions provided some very useful and important suggestions for the future steps to be taken by the implementing agency. The list of the persons and their organizations who participated in the discussions and interviews are presented in Annex I.

2.3.3.2 The workshop

A two-day workshop was organised in Lalitpur district. The MTE process also availed the opportunity to gather relevant information during the workshop. The workshop was participated by the Kathmandu based SAHAS personnel and field-based staffs working in the project areas of all three districts. A list of workshop participants is provided in Annex II. The workshop provided an

opportunity for the consultant to gather detailed information about the project. Participatory assessment of the programme was the key activity of the workshop. The workshop came out with important information generated through district-wise group exercises being done separately by the filed based project staffs. The assessment by the participants was done in line with the project's output, effectiveness, relevance and areas for improvement. Two key tools (Format 1 and 2) especially designed to collect the information during the workshop are given in Annex III.

3. The Midterm Evaluation Findings

3.1 Implementation Mechanism

The MTE study also looked into the implementation mechanism adopted by SAHAS-Nepal to ensure the provision of required services to the target groups. The field work and review of the relevant documents reveal that SAHAS-Nepal has a comprehensive implementation scheme (detail planning and annual work plan) which is being followed during the implementation of the project activities for selected communities in the project to ensure that the project is effectively implemented.

SAHAS-Nepal has implemented the project in selected in areas of three project districts. The project areas have been selected and prioritized based on the consultations with VDC and DDC personnel as well as the potential beneficiary communities. The criteria set for the selection of the project areas were as follows:

- Baseline data and situation analysis
- Existence of marginalized cluster of communities with (i) low income level, (ii) high level of illiteracy, (iii) insufficient food and (iv) lack or absence of development services; and
- with openness of community people towards change and development; and

For the human resource required to implement the project, the existing staff SAHAS-Nepal befitting their competencies and job responsibilities, have been involved at all levels. At the grassroots levels, the project area teams are being employed to facilitate in the community level planning, devising requests and providing assistance in the implementation of the intervention needed in the project areas.

After the project areas have been selected, the appropriate project activities for these communities were determined based on the results of the baseline studies, which formed the basis for identifying the nature and the types of intervention needed for a particular project area. More importantly, some specific activities have been implemented mainly based on the requests or resolutions (based on the real needs and genuine problems facing the communities) received from the communities.

For effective implementation of ELLEP, it is being supported by the Kathmandu based staffs of SAHAS-Nepal. SAHAS-Nepal basically made the project plans to be implemented and initiated necessary process for the institutional coordination with other stakeholders. Besides, it also supported for monitoring to be undertaken from the beginning of the project implementation.

3.2 Project Approaches and Modalities

The project adopted a systematic approach for implementing the activities, which involved consultation and collaboration with the stakeholders including partner organizations, selection of target beneficiaries, capacity building of the project staffs and the beneficiaries (through transfer of technology and training) and regular supervision & monitoring of the project's activities through (i) Regular visit to project district: by senior level staff, other stakeholders (line ministries/departments, line agencies, political party representatives and local leaders), (ii) Stakeholders meeting and visit to the project, (iii) Annual and Semi-annual VDCs level review and planning meeting, (iv) District level annual review and planning meeting, (v) Monthly/bi-monthly Team meeting at district /Ilaka levels, etc.

The review of project documents and FGDs conducted during the field visit revealed that the project followed a bottom up approach for implementing the activities. Therefore, the implementation modalities are based on the real needs of the beneficiary farmers. Before the implementation of the project personnel made consultations with the potential beneficiaries and the stakeholders. Additionally, analysis of local situation (household socioeconomic, and feasibility for undertaking home gardens) was also done. During the design stage of the project, the appropriateness of the project activities to the community groups and their members and sustainability aspects were seriously considered.

3.3 Efficiency of the Project

The efficiency of the project has been assessed mainly based on the major components set by the project, targets set and the indicators of achievement due to implementation of various project

activities. As of the reporting period, the project has successfully completed about 90 percent of the total activities, and it is guesstimated that the remaining activities will be completed within the project period, i.e., by December 2012. In terms of the target beneficiary coverage, the project has already covered a total of about 4387 (88.0%) households out of a target of 5000 households in three project districts.

3.3.1 Food Security

The project lunched various and relevant activities with a view to improve the food security situation in the project areas. In assessing the overall progress of the project at this point of time, it was found, that about 94 percent of the total food security related activities have successfully been completed. The project coordinator and the field staffs working in the project districts, based on their working experience gained so far, guesstimate that the remaining nine percent would be completed within the given time frame. The reason for completion of the project activities to such a higher extent is due to timely implementation with the coordination and cooperation (institutional, financial, material, etc.) from the relevant stakeholders including the beneficiary communities' organisations.

Under some of the activities, the project has covered a little more than the set target. Such an increase in activities is reported to be due to the demand received from the communities for their inclusion in the project as beneficiaries. However, the project managed such actions in such a way that it did not have to bear any additional burden, e.g., cost and other resources in the middle of the project implementation process. The activities being launched to improve the food security situation in the project areas/districts are as follows.

- Mushroom farming training and seed support
- FYM and urine management training and input support
- Integrated Pest management training
- Waste-water collection and management training
- Forage production and management training
- Organic vegetable farming training and seed support
- Home garden training
- Agricultural fair and demonstration
- Improved variety seed (maize and cowpea) support
- Training on agricultural crop production to marketing
- Training on Fruit tree pruning, management and sapling support

- Seasonal, off-season and organic vegetable farming training and seed support
- Sustainable soil management and hedge row management training and seedling support
- Chilly nursery management training
- Goat farming training
- Leader-farmers training and support
- Waste-water collection and management training
- Training on fruit tree pruning, management and sapling
- Training on value addition of food items
- Support for irrigation scheme construction and rehabilitation
- Support for construction of farm produce collection centre
- Immediate relief (food grain) support to the fire victims

The implementation of above mentioned food security related activities resulted in enhancement of practical knowledge and skills on the part of the target beneficiaries. The training on various activities has strengthened the capacities of the communities in different aspects of agriculture and livestock such as (i) soil fertility management, (ii) plant nursery management and seed production, (ii) crop (vegetable, cereal, etc,) and livestock production and management, (iii) farm produce storage and marketing, (iv) crop pest management, (v) animal health management (vi) irrigation water management (vii) home gardening, etc.

3.3.2 Income Generation

The project has successfully completed about 95 per cent of its activities until the reporting period. The beneficiaries were involved in various agricultural and non-agriculture economic based activities. Together with this, they were also provided with the relevant training as well material financial support (to some people) with a view to develop skills in them and enhance their economic capacity. Under this output, the following income generation activities have already been carried out in the project districts during the reporting period.

- Training on seasonal and off-season vegetable and support for production
- Bamboo rack and stool making training
- Goat farming training and goat support for small farmers
- Bee keeping training and support for bee-keeping (hive)
- Support for breeding he-goat
- Ginger cultivation training and seed support for production
- Pig-raising training and support for pig-raising (shed)

- Skill and capacity development (radio, TV, mobile phone) training
- Revolving fund support (NRs 5000 per person)
- Animal health worker training
- Training on vegetable farming and support for seed
- Vegetable seed (bitter gourd) support
- Banana-seedling support
- Leader-farmers training and support
- Training on mushroom farming
- Collective ginger farming training and support for production
- Support for collective banana farming
- Support for collective vegetable farming
- Bio-briquette making training and support
- Animal health worker training

The evaluation found that due to launching of the above activities the target communities have been benefited in the following ways: (i) access to materials (briquette-making machine, veterinary related medicines, seeds, tools, bee-hives, goats and pigs for multiplication and breeding purposes, etc.), (ii) access to financial support for investing in operation of small scale-scale businesses such as vegetable selling, grocery shop, poultry and pig farming, and (iii) developed skills for enterprise creation and management of income generating skills through training activities.

3.3.3 Health and Sanitation

The project facilitated to raise awareness on the significance of health and sanitation aspects for living a healthy life. The project also organised health camps to the needy community people in the project districts. The project also organised health programs in some of the schools with a view to improve the health and sanitation status of the students thereby improving their school performance. The following health and sanitation related activities were carried by the project.

- Support for drinking water scheme construction and maintenance
- Smokeless cooking stove training and support for the stove
- Health, nutrition and first-aid
- Training on health, sanitation and nutrition (even in the schools)
- Rainwater harvest and reservoir construction
- Toilet construction
- Support for hydropower scheme (peltric set)

- Improved cooking stoves training
- Fortified food formal-nourished children
- Relief material distribution
- Health camps

With the advent of the project, water is now readily available in abundance and easily accessible for household use, health and sanitation. Learned practical knowledge and skills related to first-aid through training activities. With such knowledge and skills, the communities have made stretchers using the locally available materials. They have also engaged in the treatment of people who met with the accidents in their villages. Using the stretchers they have made, they have also taken the pregnant women to the health posts. At the same time the construction work of toilets are also going on speedily. The health and sanitation activities have enhances the awareness level of the communities about the significance of health and sanitation aspects in their life. They have also been using improved cooking stoves for preparing their meals. With the use of smokeless stoves, they have been able to save not only fire-wood but also their time used for collecting fire-wood. It is interesting to note that they have been using their free time for other productive activities.

3.3.4 Education

The project provided educational, games/sports materials and furniture to 6 primary schools located within the project area. These supports helped in improving the greatly improved the academic environment of the schools. Besides, the NFE classes provided the adults to be literate and numerate, which made their life easier, as they are now able to read, write and understand the printed materials like letters, meeting minutes, books, etc.).

- Training to NFE class facilitator
- Training to child literacy class facilitator
- Adult literacy class
- Support for child class conduction
- Educational materials support
- Refresher training to NFE class facilitator
- Refresher training to child class facilitator
- Quiz-contest and children dance competition
- Support for celebrating children's day (lower secondary school level quiz contest)
- Support for Quiz-contest and essay-writing competition
- Support for school building construction/ and maintenance

- Support for school furniture

Before the introduction of the project, the school-going age children were hesitant to go to schools regularly, and some of them never went to schools. Due to lack of furniture, the school children used to sit on the moist floor. It is now that, because of provision of furniture, the children are being prevented from possible attack by the pneumonia, because they do not have sit on the moist floors. The schools did not have adequate of educational materials. There were also many drop-outs due to lack of resources to support their education. These days the schools have better academic environment with the furniture, educational materials and extra-curricular activities like quiz-contest, essay competition, and celebration of children's day. There has been improvement in the teaching-learning environment with the use of educational materials in the class-rooms.

The conduction of adult literacy classes also contributed to making the literate communities somewhat literate. Before the project intervention, the illiterate communities used to put their thumb-prints to mark their presence in the meetings, as they were not able to write their names. Similarly, the conduction of child literacy classes by involving the trained facilitators also created a favourable environment for the children to become habitual of going to schools.

3.3.5 Institutional Development

In the process of institutional development, SAHAS Nepal also provided information about the project's working areas; project period, implementation mechanism, etc. to the district level stakeholders and the beneficiary communities. SAHAS Nepal also provided information to all categories of communities about the need for formation of groups, through which the project management works. Besides, the project also imparted training on various institutional developments related subjects (group formation and mobilisation, gender awareness and women's legal rights, peace and reconciliation, group accountability in development projects, fund and account management, etc.) to build the capacity of the community based organizations. With a view to build the knowledge and capacity of the community based organizations, the project carried out the following institutional development related activities:

- Peace and reconciliation training
- Publication of collection of farmers' experiences
- Ward level orientation workshop
- VDC level orientation workshop
- VDC level review workshop

- District level project orientation and annual review workshop
- Group formation and mobilisation
- Fund mobilization and account management training
- Group concept and capacity building training
- Training on gender awareness and women's legal rights
- Consumers' committee management training
- Training on drinking water scheme maintenance and users committee management
- Training on concept of main committee
- Institutional development training (main committee)
- Bi-monthly meeting (main committee)
- Outcome orientated training
- Light Search and Rescue Training
- Social gathering and interaction program

3.3.6 CBOs' Network Development

So far, a total 183 community groups have been formed in 16 VDCs of four project districts. Of the 183 groups, 44 groups are composed of only women, 18 groups are of dalits and 110 groups are (mixed groups), i.e., composed of both men and women members. These groups were formed at the facilitation of SAHAS/ELLEP, and the process of such group formation is going on.

- Institutional development training (main committee)
- Honour to groups
- Awareness programme on rights to food
- Support to celebration of special days
- Support to celebration of special days
- VDC level annual review & coordination workshop
- District level advisory committee meeting
- District level annual review workshop
- Training on concept of main committee
- Main committee bi-monthly meeting

Many of the community groups have become capable of working on resource sharing basis with the other development organizations, particularly the local governments (VDCs and DDCs). Many of these have become capable of planning and the putting the plans into action. For example, Milijuli

group of Jogimara in Dhading has installed peltric set with the financial support (Rs. 10,000) they received from the VDC. Similarly, Jaleswari group has done maintenance of drinking water source with the financial assistance (Rs. 50,000) from the DDC. In Benighat, Dalit women group has been able to obtain Rs. 4000 from the VDC, and they constructed pig sheds with this money. The CBOs have been celebrating special days (in partnership with other organizations), and the members are participating in sharing meetings, workshops, seminars and making efforts to link themselves with the village, district and regional level agencies/organizations. Many activities such as organizing training on agriculture, construction of physical infrastructures: drinking water scheme, irrigation schemes, improved water-mills, and celebration of especial days have been undertaken on resource sharing basis (jointly by the ELLEP and other relevant stakeholders).

3.4. Effectiveness of the ELLEP

This section of the evaluation provides whatever the effects/impacts created thus far, as the project is still going on. The effectiveness of the project has been assessed in a broader social, technical and institutional context, while keeping in view the internal factors and limitations associated with the project. At the same time, relationship among overall objectives, activities and inputs have also been viewed in explaining the effects/impacts by the project. As for the efficiency of the project, the effectiveness of the project has also been described along the same aspects, i.e., food security, income generation, health and animation, education, institutional development, and network development of CBOs.

3.4.1 Food Security

The evaluation revealed that before the project intervention, the poor and excluded communities were suffering from the lack of opportunities and access and ownership to food. ELLEP interventions have brought significant positive changes in the socio-economic behaviour of the people. Before the advent of the ELLEP, the communities had only the traditional farming knowledge and skills. During the field work, it was also heard from some of the communities that they were using only the local seeds, and not even aware of the availability of improved farm technologies, and pest and soil management techniques.

The project activities brought substantial changes in the communities' farming behaviour that eventually contributed to improvement in their food security situation. The farmers applied the knowledge and skills gained from the training in their farming activities. The communities who

received training on mushroom farming and support for seeds have been able to grow mushrooms during the period when vegetables are not available. It is now that the farmers have made mind to continue to grow mushrooms even without the external support. They requested the project staffs to bring mushroom seeds for them. Some 33 farmers have been able to increase their production level by using human and animal urine as fertiliser and by reducing the extent of pest attack through the use of self-made pesticide in vegetable farming.

It is very interesting to note that 358 farm households in Dhading district alone have been able to increase the level of soil fertility by protecting the compost from the sun light and rainfall. They have also learned soil conservation practises even in the sloppy land by planting the forage (grass) using the technique called Slopping Agriculture Land Technology (SALT). With the use of SALT, they have been able to protect their lands from landslides, floods and other types of natural calamities.

Similarly, 356 farmers belonging to 33 groups have started consuming the vegetables being grown in their own farm. With the increase in production, these farmers have gradually stopped buying the vegetables from the market, besides improving their own nutritional status. Some farmers have also started growing seeds and distributed to their group members. Twenty-four farmers have been able to increase their rice yield from 215 Muri to 290 Muri from the same unit of land. By demanding from the project staffs, some farmers have also planted 2350 fruit saplings including orange saplings. With the knowledge and skills gained from the training, some farmers even started taking their produce being grown through their groups and cooperatives to the market, which gave them reasonable price.

It was articulated by the communities during the FGD (Dhading) that before the advent of the project they used to have inadequate supply of irrigation water for the dry season. With the coming up of the irrigation scheme (plastic irrigation pond), they have been able to grow vegetables even in the dry season.

3.4.2 Income Generation

The evaluation revealed that the project has been instrumental in bringing some immediate and tangible changes. With the receipt of these benefits while some communities have been undertaking their enterprises individually, the others are operating on collective basis.

The immediate and visible change in the project areas is that there is an increase in the number of goats including the improved breeds produced from crossing with local breeds. The beneficiary communities have increased their income level as a result of their engagement in some income generating activities like vegetable farming, beekeeping, goat and pig farming and by providing veterinary service to the needy people. They now bring the seeds for farming on their own, without relying on others. Besides fulfilling their nutritional needs through vegetable consumption with daily meals, they have also started earning cash from the sale of surplus vegetables in the local market. They have become aware of the fact that there is s need to grow vegetables for supplementing the nutritional requirement of human beings together with their regular meals.

The vegetable production scheme is found to be one of the important activities to enhance household income and promote nutritional aspects of the human diet through supply of adequate quantity of vegetables at the household consumption and marketing of the surplus produce. The communities have considered 'an access to financial sources is a powerful means for poverty reduction'. There are cases where the farmers have increased their level of income by engaging in other economically productive activities. For example, some beneficiaries in Tanahu district have been able to earn Rs. 2500 to 4000 individually from the sale of goats being raised by them. With such an income they have been meeting their household expenses. Similarly, there are also beneficiaries who have also started earning up to Rs. 12500 from the sale of bamboo-stools, by using the skills acquired from the training they have undergone.

It was also heard during the FGD in one of the project areas Tanahu district that after initiation of commercial vegetable farming, the Chepang (an ethnic group in Nepal) youth stopped going to foreign countries in quest of job opportunities, while they have been prevented from being cheated by the business companies and individuals who are dealing with the business of sending people abroad. It also came from the FGD that many farmers have stooped burrowing money from the local merchants at much higher interest rates, after they started earning from the income generation activities.

3.4.3 Health and Sanitation

The community people have started working collectively for keeping their locality neat and clean. They have been managing the garbage that area decomposable and non-decomposable separately. There is an improved health and nutrition, and reduced expenditure on medical care.

The use of smokeless cooking stoves by the communities has lead to relief from the smoke that affected their eyes. At the same time they have also been able to save time as well as the fuel-wood consumption. The communities also expressed that the use of smokeless stove would also reduce the likelihood of accidents due the fire.

The health and sanitation in the individuals and around household premises has also improved. They expect that with the coming up of private toilets, there will not be scattering of human waste in the surroundings. Similarly, the incidence of illnesses such as diarrhea, dysentery, fever skin diseases like scabies, and other water-borne diseases has also been reduced to a considerable extent due to availability of adequate water. The availability of water in abundance right in their locality has also provided them with opportunity to grow more vegetables for home consumption. This has contributed to improvement in their daily-diet, in nutritional terms. In Tanahu district, a total of 164 households have been benefited from the construction of seven drinking water schemes. The availability of water around their home premises has also reduced the burden on women by reducing the distance to be travelled to fetch the water from far away sources.

With regard to micro-hydro project, the communities have said that the basic necessary infrastructures (installation of polls, extension of wires and other materials) are already in place, and they expect that they would get the power supply very soon. Thus far, there seems to be no any output produced from the micro-hydro project. However, the project expects to bring the rich local water resources into use for electricity generation to the benefit of the communities.

3.4.4 Education

It is now that with the launching of the above mentioned activities resulted in the improvement of the educational environment of the school and the communities. The conduction of child classes contributed to creating an environment for the children to go to school. The students now go to the school regularly and eagerly, and happy with the desk and benches to study in their class-rooms. The children who have completed their child literacy class have been enrolled in the nearby primary schools. It is quite note worthy that those who stood in the class as first, second and third ranks are the child literacy class graduates (Dhading).

Similarly, due to participation in the adult literacy classes, the illiterate communities are now able to write their names and keep their group-accounts properly in black and white. It is also quite interesting to note that the level of coordination between school management and SAHAS-Nepal has been increased; thus resulting in initiation of some partnership activities for improving the educational environment of the school and communities.

3.4.5 Institutional Development

With the orientation/information given to the district level authorities and political parties about the project, SAHAS Nepal was granted permission to implement the project in the districts. The government as well as non-government organizations and political parties from the VDC level to district level have been giving their support and cooperation to the project. Communities' groups have been formed based on gender equality and social inclusion principles. The project implementation mechanism adopted by SAHAS-Nepal has been accepted by all the individual and organizations.

The community groups have been keeping their groups account in a proper way. These groups prepare their annual work-plan and implement accordingly. At the same time these groups have also been operating their saving and credit schemes. With the capacity they have built, they have started working by accessing the local level resources. The communities have been participating in the project organized training, workshop, meetings, and development activities. There has been significant level of women's participation in such activities. Women are given priority in decision-making activities. Women's participation accounts for 50 percent at the decision-making level.

Those who have gained knowledge and skill from the training programme have been utilizing these knowledge and skills in their every-day practical life. The communities have been working through their groups by making necessary policies and regulations to make the project activities sustainable. At the same, SAHAS-Nepal has been receiving necessary cooperation and commitments from the government agencies and the political parties and local governments. All the stakeholders have also been actively participation in the review programmes and meetings related to the project. The project staffs have also been performing better after they developed various skills in them from the training they have undergone. While they have improved in the working style, they have also become more committed towards the project.

3.4.6 CBOs Network Development

The project has been instrumental in mustering the unorganised communities through various activities towards the development of their own network. The project created an enabling environment and opportunities for individuals and CBOs for a unified action especially for the cause of their own community development. While the project has helped raise the awareness level of the communities through various activities, it has been an eye-opener for the communities in general about the significance of the network for their own development.

3.5 Spill over effect of the project

The non-target communities have highly appreciated the activities under the ELLEP. They also realised that various types of activities and support provided to the communities have, in fact, been a matter of great opportunity to the communities. This is because they never thought of improving their social and economic condition, as they do not possess the capacity to afford on their own to come to this status.

The non-target communities also realised the indirect influence of the project, which encouraged them to initiate some development activities, especially farming activities using the improved technologies. As was learnt during the field work, the non-target communities became highly motivated to initiate development activities when they saw their fellow residents engaging in development activities with social and economic benefits.

4. Relevance of the Project

The project carries a high level of relevance to development objectives at all levels, i.e. micro: responding to the needs of the poor and marginalized; meso: district level development programmes; and macro: Nepal government's national objective of providing the food and nutrition security and other development needs.

Response to the Millennium Development Goals: The project is contributing to achieving Millennium Development Goals, particularly Goal No. 1 (Eradicate extreme poverty and hunger), Goal No.2 (Achieve Universal primary education); Goal No. 3(Promote Gender Equality and Empower Women; Goal No. 4 (Reduce child mortality); Goal No. 5 (Improve Maternal Health), to some extent Goal 6 (HIV/AIDS, Malaria and other diseases); and Goal No. 7 (Ensure Environmental Sustainability).

Response to national development objective: The project is also in line with the national development objectives of the government of Nepal. This is because the Three Year Plan Approach Paper (2010/11 – 2012/13) aims to provide development opportunities by empowering the backward people and indigenous/ethnic communities, who are unable to participate actively in the

mainstream development programmes of Nepal. The project also aims at uplifting the socio-economic status of the poor and marginalised people.

Besides, the project activities are much in line with the development programmes of the DDCs and VDCs of the project districts. This is to say that the project activities have implemented as part and parcel of the district level and VDC level programmes. That is why, the activities of the ELLEP has been officially endorsed by the respective DDCs and VDCs as well.

Response to inclusive development: One of the significant aspects of the ELLEP is that it focuses mainly on the women, smallholders and near landless farmers who are often excluded by the mainstream agricultural programmes. During the field visit, the beneficiaries of the project reported that they have never been able to access the services available with the government and non-government development organizations in their districts. In this sense, this project's intervention responded to the needs of the resource-poor and un-reached segment of the rural society, when they are expecting some kind of peace dividend and development service delivery in the changed political context of the country. The project has selected the poor, excluded (especially so-called low-caste people), Janajati and women as its main target beneficiaries at the time when the country is striving for an inclusive development. The targeting of women, smallholders and near landless farmers who are often excluded by the mainstream development programmes by the project is in line with the government's commitment to bring them in the mainstream development.

Response to food and nutrition security: At the micro level, the project can be considered as one of the appropriate approaches towards the Nepal government's efforts to responding to ensure food and nutrition security. The challenge facing the Government of Nepal is to increase the growth rate of agriculture produces and a limit the soaring food prices. Due to these reasons the government experiences pressure on availability and accessibility of food and the task of ensuring food security to the poor and rural communities. In this context, the implementation of the project that has contributed, to some extent, to the food and nutrition security of the rural poor, small holders and marginalized people needs to be applauded.

In the above-mentioned context, the implementation of the ELLEP has immense relevance to the socio-economic upliftment of the poor and marginalized communities. The implementation of ELLEP appropriately responds to the appeal of the Government of Nepal to the donor and NGO communities to contribute for the development opportunity to the backward communities.

Additionally, the nature of the project, which is integrated and multi-sectoral in its approach to address the genuine socio-economic problems of the poor communities, is very much appropriate in considering their immediate needs and the problems of the community. Specifically, the implementation of the project indeed has also contributed towards preventing the vulnerability of the poor and excluded people, in particular. The project has succeeded in reaching the target groups in terms of directing the services to be delivered in bringing favourable socioeconomic changes in them.

5. Sustainability of the Project

The ELLEP seems to be well accepted and respected by the communities, besides the stakeholders. The project has contributed to formation and strengthening of community organization of groups. There seems to be a positive indication of sustainability, as the project's activities appeared to be very feasible due to wide social acceptance by the community beneficiaries including the others who are not (directly) part of the project. Due to the project's concentration on the poor living in the remote rural areas, the project cannot be expected initially to mobilize financial resources from the communities large enough to support the continuation of the project's activities.

From the FGDs with the communities during the fieldwork, it transpired that virtually the development project of this type can be self-sustaining only if the communities are capable of rising funds and accessing other resources from the development agencies. There for the project needs to focus some of its activities in such a way that the community organizations are able to successfully undertake even other income generation activities, eventually contributing to financial sustainability.

The sustainability of the community organizations has a substantial bearing on the sustainability of the project activities. As it appeared, the project has been forming the community organizations and strengthening their capabilities with the objective of forming a network of these organizations towards the end of the project phase. For the ELLEP activities to continue at the community level, strategic plans should be developed as to how the project activities could be sustained. This implies a need for SAHAS to create an enabling environment for the community organisations to continue with the ELLEP activities even after the phase out of the

programme. For this, institutional, social (human resource) and financial aspects of these community organizations need to be strengthened for the overall sustainability of these groups.

6. Success Factors of the Project Implementation

The MTE found that the project is moving ahead with high rate of success of implementation. There are various factors contributing to the success of the project. The key factors that have implications for future undertaking of the project are described as follows. These success factors are the aspects that need to be considered and prompted for the successful implementation of the next phase of the project as well.

(a) Communities' needs/problems based: The activities carried out under each of the expected output of the project are very much in line with the basic social, economic and institutional needs and problems of the beneficiary communities. The project has addressed the basic development needs of men and women from poor, marginalized and disadvantaged groups through implementation of various social and economic activities and support to them.

(b) Targeting and selection of beneficiaries: The careful selection of the beneficiaries (the women, poor and marginalized people) who are really looking forward for some development opportunities for improving the quality of their life (e.g., through increased food security, improving livelihood, health, education and institutional development). Given the nature and objective of the project and its activities, it is genuinely appropriate for the poor, and marginalized farmers, and disadvantaged segment of the society.

(c) Local capacity building: Capacity building of the beneficiaries through knowledge, skill, inputs, etc., project staffs and CBOs. The project supported to develop community based organizations; and their mobilization has contributed to successful implementation of the project activities.

(d) Communities' genuine participation and ownership: It is in fact the commitment and hardworking of the communities in general and women, the poor, marginalized and

disadvantaged group that contributed to keep the ELLE project alive and give continuity to the project.

(e) Ownership by local communities: The other factor for the success is the ownership feeling by the community people over the project activities. The communities have whole-heartedly felt that whatever activities launched by the project are for them and for their well being. They also have a feeling that it for them to manage and utilize these activities.

(f) Integrated approach: The project encompass an integrated approach of project implementation which allows incorporation of basic and essential components such food security, income generation, health/sanitation, education and institutional development that are required for improving their social and economic status. During the interaction with the beneficiaries in the project districts, they appreciated the project's various technical, financial, capacity development and institutional support provided to the community beneficiaries.

(g) Social acceptance: The ELLEP, irrespective of the caste/ethnicity, and gender and class, has been accepted by the communities as being very appropriate for meeting their food needs, besides improving their other aspects of life. The MTE, during the visit to the project districts, noted that the communities (both: project beneficiaries as well as non-beneficiaries) in the project districts have positive attitude towards the project.

(h) Optimistic Incentive to the households: There has been some level of increase in household food and nutrition security besides the cash income for some Home Garden project beneficiaries; a form of positive and quick incentive. This is one of the major reasons attributable to the success of the project.

(i) Resource sharing with the stakeholders: SAHAS-Nepal implemented the project in collaboration and coordination with the local governments, sectoral line agencies and other development agencies, rather than implementing it as a standalone project. The collaboration and coordination with these agencies provided an opportunity for the implementation of the project on resource sharing basis, which in turn created a kind of synergies to undertake the project activities more efficiently and effectively.

7. Issues/Challenges Related to Project Implementation

Even though the implementation of the project is moving towards its completion (of Phase I), the project came across some issues which need to resolved. The strategies adopted to resolve such issues can be taken as lessons for the implementation of the remaining activities of this phase of the project, as well as the next phase. The issues are as follows.

(a) Lack of resources

The project encountered some difficulty (hindrance) in the implementation of project activities. For example, as the facilitators gave up the job in the middle of the process, the conduction of child literacy class was delayed. This implies that there is a need to identify and recruit facilitators who are committed to completion of the assigned task. Similarly, due to lack of resources (financial) the communities are not able to contribute the committed resource as per the agreement; thus causing delay in project implementation.

(b) Communities' high expectation from the project

The communities have a very high level expectation form the project. This kind of attitude and expectation of the communities is making the project implementation difficult, because they think that the project is entirely responsible for all the development activities to be launched under the project. Some beneficiaries ask for the vegetable seeds again and again, even though there is no such provision from the project. This implies that, at the very outset, the project needs to clearly explain the nature of the project and the responsibilities of the stakeholders including the communities for the implementation of the project. This will help understand the roles and responsibilities to be taken and contributions to be made by the stakeholders.

(c) Withdrawal by the community groups

The project also noticed one group withdrawing from its engagement in the project activities. Such cases make it difficult for the project to achieve its target (in terms of number of households and community groups). While selecting the members for the formation of community groups, it must be confirmed that the members will not give up the group, and they would remain as group and continue to work under the project.

(d) Difficult work situation

Geographical remoteness and out-migration of the youth are causing a little difficulty in the implementation of the project. Such a situation is also demanding more time for monitoring and

meeting with the beneficiaries. Because of the out-migration of youth, i.e., youths are withdrawing from their groups, such groups are becoming less active.

(e) Inadequate utilization of skills resources

Some training participants have not been able to properly utilize their skills because of lack of the tools/implements for utilizing the skills. Similarly, some group members have not utilized the financial support being provided to them for income generation. There is a need for support for the tools/implements by the project under such circumstances.

(f) Lack of market linkage

Some project beneficiaries who grew ginger and vegetables could not get good market price due to geo-physical condition of the target VDCs and transportation facilities. There is need for development of market and linking the farmers with the market. The complaint is that the farmers are not able get genuine value for their products and instead the middle-persons are making more margin than the farmers. This implies an activity for market development, and marketing managing training to the farmers and collection centre.

(g) Mismatch in the programme cycle

There is mismatch between the government of Nepal's fiscal year and SAHAS's programme cycle. There is often difficulty in joint planning and implementation because of differential timing of budget release by the stakeholders. This was experienced in implementation of drinking water scheme, where the project could not be completed within the stipulated timeframe.

(h) Scaling up of the project activities

The project has already facilitated to provide the basic social, financial and institutional infrastructures in the project areas. It is now that the communities recognize the need to upgrade the existing activities for higher income and employment. For example, the farming beneficiaries in the project areas are demanding for green-houses to grow more and off-season vegetables.

(i) Capacity and turnover of the project staff: During the interaction with the project staffs, they clearly indicated that they would be in a better position to effectively implement the project activities, if their capacities are enhanced betting the activities to be implemented in the next phase of the project.

8. Conclusion and Recommendations

8.1 Conclusion

The MTE found the project is moving smoothly with its planned activities towards fulfillment of achieving its objectives. The progress and performance of the project is also highly satisfactory, as it has completed about 90 percent of its activities. The project is also highly relevant in terms of not only fulfilling their development needs, but also paved a path by supporting them for sustainability of their livelihoods to a considerable extent. The project has addressed the beneficiaries' problems through motivational and awareness activities thus encouraging them to be genuinely engaged in the project activities.

Despite limitations and deviations in some cases, there are many instances where achievements have exceeded expectations, and additional activities have also been carried out by the project. These achievements are commendable considering the present unstable political situation of the country. The project was found to be effectively managed by SAHAS-Nepal. During the field visit also, by nowhere did the beneficiaries raise any grouse concerning project implementation, which in itself is an indication of good work.

8.2 Recommendations

Based on the analysis of the project implementation, performance, effects/impacts and issues emerged, and taking into account the information gathered during the course of the study, the following recommendations are put forward for improvements for the on-going project and the subsequent second phase of the project.

- Capacity building efforts at the grassroots level should be group specific and tailored accordingly for enhancing livelihoods and special skills. It is advisable to conduct capacity analysis of the groups to understand their problems, issues and abilities to effectively raise their level of capacity. Since the groups visited in the project district demanded some more specific training activities (e.g., green-house farming, commercial vegetable farming, animal health, marketing management, conduction of cold store, etc.), this should be given more emphasis by the project.

- Since not all the members of the community groups are equally capable of contributing resources (labour, cash, kind, etc.), separate strategy should be developed to enable the most

deprived and so-called lower caste community to effectively participate in and benefit from development interventions.

- Keeping in view the efficient and effective implementation of the project, capacity building of the project staffs should be given priority in the areas of primary project activities before the initiation of the second phase of the project.

- The MTE noticed (from annual progress report of 2011), turnover of the project staff in the middle of the project implementation. Therefore, it is desirable that project would review its management policies in view of staff retention for longer periods since it can ensure quality service and commitment for the positive impact of the project.

- The need for market development and marketing management was realised by the communities for enhancement of competitiveness of their products. This implies that in future, the project would give emphasis to development of business plan, production planning, and promoting marketing of their products. The activities under marketing management would also include strengthening of producers' groups/collection centers and cooperatives for marketing of their products on their own. The project should also target for moving the activities upward from the stagnant or subsistence levels to enterprise levels by designing proper strategies.

- Further strengthen the link with various institutions and mechanisms like local governments and line agencies to ensure better implementation of Phase-II and the remaining project period. As far as possible, the project should make effort to match its activities with the budget release time of other development agencies for a particular project activity so that the project could be completed as per the plan.

- Given the fact that the process of male migration is on the increasing trend over time in the country, the project needs to think of some activities that would either prevent youth migration or their replacement in the community groups. The project requires community participation and hence there is a chance of being negatively affected by migration. Therefore, the project needs to think carefully while selecting the target beneficiaries.

- The sustainability of ELLEP is contingent upon the growth and development of the CBOs and its network organisations to be formed at the end of the project cycle. The project activities will continue to exist only if these network organizations are strong enough

financially, technically and institutionally. The issue in this respect is not that of capacity building of the network organizations but also linking these organizations with other development agencies for their official recognition at the district level. Therefore, this is where the project needs pay special attention before leaving the districts.

The next phase project formulation/planning team would need to contemplate the above-mentioned success factors, issues/challenges and recommendations for strategic project design and implementation framework.

ANNEXES

Annex I: A list of participants in the workshop

S.N.	Name	Designation
1	Jib Nath Sharma	Project Coordintor
2	Hari Ram Lohani	Team Leader – Dhading
3	Mina Shakya	Team Leader – Gorkha
4	Debindra Karki	Team Leader – Tanahu
5	Pampha basnet	JTA Agri.
6	Nabin Dhital	JTA Agr.
7	Anil Shrestha	Senior Community Dev. Worker
8	Ambika Shrestha	ANM
9	Hari Prasad Adhikari	Field Officer
10	Ganesh Thapa	Infrastructure technician
11	Pampha Gurung	Senior Community Dev. Worker
12	Uma Rana Magar	Administrative and Finance assistant
13	Nagina Shrestha	Infrastructure Technician
14	Menuka Shrestha	JTA agriculture
15	Bramha Dhoj Gurung	Chairperson- SAHAS- Nepal
16	Dr. Surendra Shrestha	Executive Director – SAHAS- Nepal
17	Claudia	Advisor

Annex II: Some Photographs during Mid Term Evaluation Workshop

Resource Person

Group Interaction

Participants attending in a workshop

Discussing in a meeting

A Women showing her fruit product

1.0 COMMITTEE SPONSORSHIP/GOVERNANCE

All projects have the potential of getting into trouble but, in general, project management can work well as long as the project's requirements do not impose severe pressure upon the project manager and a project sponsor exists as an ally to assist the project manager when trouble does appear.

Project problems requiring executive-level support may not be able to be resolved, at least easily and in a timely manner, by a single project sponsor. These problems can be resolved using effective project governance. Project governance is actually a framework by which decisions are made. Governance relates to decisions that define expectations, accountability, responsibility, the granting of power, or verifying performance. Governance relates to consistent management, cohesive policies, and processes and decision-making rights for a given areaof responsibility. Governance enables efficient and effective decision making to take place.

Every project can have different governance even if each project uses the same enterprise project management methodology. The governance function can operate as a separateprocess or as part of project management leadership. Governance is designed not to replaceproject decision making but to prevent undesirable decisions from being made.

Historically, governance was provided by a single project sponsor. Today, governance is a committee and can include representatives from each stakeholder's organization. Table 1–3

TABLE 1–3. TYPES OF PROJECT GOVERNANCE

Structure	Description	Governance
Dispersed locally	Team members can be full- or part-time. They are still attached administratively to their functional area.	Usually a single person is acting as the sponsor but may be an internal committee based upon the project's complexity.
Dispersed geographically	This is a virtual team. The project manager may never see some of the team members. Team members can be full- or part-time.	Usually governance by committee and can include stakeholder membership.
Colocated	All of the team members are physically located in close proximity to the project manager. The project manager does not have any responsibility for wage and salary administration.	Usually a single person acting as the sponsor.
Projectized	This is similar to a colocated team but the project manager generally functions as a line manager and may have wage and salary responsibilities.	May be governance by committee based upon the size of the project and the number of strategic partners.

shows various governance approaches based upon the type of project team. The membership of the committee can change from project to project and industry to industry. The membership may also vary based upon the number of stakeholders and whether the project is for an internal or external client. On long-term projects, membership can change throughout the project.

Governance on projects and programs sometimes fails because people confuse project governance with corporate governance. The result is that members of the committee are not sure what their role should be. Some of the major differences include:

- **Alignment**: Corporate governance focuses on how well the portfolio of projects is aligned to and satisfies overall business objectives. Project governance focuses on ways to keep a project on track.
- **Direction**: Corporate governance provides strategic direction with a focus on how project success will satisfy corporate objectives. Project governance is more operation direction with decisions based upon the predefined parameters on project scope, time, cost, and functionality.
- **Dashboards**: Corporate governance dashboards are based upon financial, marketing, and sales metrics. Project governance dashboards have operations metrics ontime, cost, scope, quality, action items, risks, and deliverables.
- **Membership**: Corporate governance committees are composed of the seniormost levels of management. Project government membership may include some membership from middle management.

Another reason why failure may occur is when members of the project or program governance group do not understand project or program management. This can lead to micromanagement by the governance committee. There is always the question of what decisions must be made by the governance committee and what decisions the project manager can make. In general, the project manager should have the authority for decisions related to actions necessary to maintain the baselines. Governance committees must have the authority to approve scope changes above a certain dollar value and to make decisions necessary to align the project to corporate objectives and strategy.

1.1 THE PROJECT MANAGER AS THE PLANNING AGENT

The major responsibility of the project manager is planning. If project planning is performed correctly, then it is conceivable that the project manager will work himself out of a job because the project can run itself. This rarely happens, however. Few projects are ever completed without someconflict or trade-offs for the project manager to resolve.

In most cases, the project manager provides overall or summary definitions of the work to be accomplished, but the line managers (the true experts) do the detailed planning. Although project managers cannot control or assign line resources, they must make sure that the resources are adequate and scheduled to satisfy the needs of the

project, not vice versa. As the architect of the project plan, the project manager must provide:

- Complete task definitions
- Resource requirement definitions (possibly skill levels)
- Major timetable milestones
- Definition of end-item quality and reliability requirements
- The basis for performance measurement
- Definition of project success

These factors, if properly established, result in:

- Assurance that functional units will understand their total responsibilities toward achieving project needs
- Assurance that problems resulting from scheduling and allocation of critical resources are known beforehand
- Early identification of problems that may jeopardize successful project completion so that effective corrective action and replanning can be taken to prevent or resolve the problems

Project managers are responsible for project administration and, therefore, must have the right to establish their own policies, procedures, rules, guidelines, and directives—provided these policies, guidelines, and so on conform to overall company policy. Companies with mature project management structures usually have rather loose company guidelines, so project managers have some degree of flexibility in how to control their projects.

Establishing project administrative requirements is part of project planning. Executives must either work with the project managers at project initiation or act as resources later. Improper project administrative planning can create a situation that requires:

- A continuous revision and/or establishment of company and/or project policies, procedures, and directives
- A continuous shifting in organizational responsibility and possible unnecessary restructuring
- A need for staff to acquire new knowledge and skills

If these situations occur simultaneously on several projects, there can be confusion throughout the organization.

1.2 PROJECT CHAMPIONS

Corporations encourage employees to think up new ideas that, if approved by the corporation, will generate monetary and nonmonetary rewards for the idea generator. One such reward is naming the individual the "project champion." Unfortunately, the project champion often becomes the project manager, and, although the idea was technically sound, the project fails.

Table 1–4 provides a comparison between project managers and project champions. It shows that the project champions may become so attached to the technical side of the project that they become derelict in their administrative responsibilities. Perhaps the project champion might function best as a project engineer rather than the project manager.

This comparison does not mean that technically oriented project managers-championswill fail. Rather, it implies that the selection of the "proper" project manager should be based on *all* facets of the project.

TABLE 1–4. PROJECT MANAGER VERSUS PROJECT CHAMPIONS

Project Managers	Project Champions
• Prefer to work in groups	• Prefer working individually
• Committed to their managerial and technical responsibilities	• Committed to technology
• Committed to the corporation	• Committed to the profession
• Seek to achieve the objective	• Seek to exceed the objective
• Are willing to take risks	• Are unwilling to take risks; try to test everything
• Seek what is possible	• Seek perfection
• Think in terms of short time spans	• Think in terms of long time spans
• Manage people	• Manage things
• Are committed to and pursue material values	• Are committed to and pursue intellectual values

मूल्याङ्कनका औजारहरू

परियोजना व्यवस्थापन प्रशिक्षण

पुर्व र पश्चात जानकारी

सहभागी विवरण

नाम: **संस्था:**

पद: **जिल्ला:**

अन्य विवरण

क. लिङ्ग: **ख. उमेर:**

ग. जाती **घ. शिक्षा:**

तलका प्रश्नहरु राम्रोसंग अध्ययन गरी सबै प्रश्नको जवाफ दिनुहोस् ।

तलका प्रश्नहरुको सही उत्तरको अगाडि (V) लगाउनुहोस ।

1. 4. The major difference between a project and a program is usually:

A. The role of the sponsor
B. The role of the line manager
C. The time frame
D. The specifications

2. Having too many life-cycle phases may be detrimental because:

A. Executive sponsors will micromanage.
B. Executive sponsors will become “invisible.”
C. The project manager will spend too much time planning for gate review meetings rather than managing the phases.
D. The project manager will need to develop many different plans for each phase.

3. In which organization form would the project manager possess the greatest amount of authority?

A. Classical/traditional
B. Projectized
C. Strong matrix
D. Weak matrix

4. A project manager is far more likely to succeed if it is obvious to everyone that:

A. The project manager has a command of technology.
B. The project manager is a higher pay grade than everyone else on the team.
C. The project manager is over 45 years of age.
D. Executive management has officially appointed the project manager.

5. Which of the following is not one of the sources of authority for a project manager?

A. Project charter
B. Job description for a project manager
C. Delegation from senior management
D. Delegation from subordinates

6. Project managers believe that the most commonly occurring conflict is:

A. Priorities
B. Schedules
C. Personalities
D. Resources

7. Which conflict resolution mode is equivalent to problem solving?

A. Compromise
B. Confrontation
C. Smoothing
D. Withdrawal

8. The most commonly preferred conflict resolution mode for project managers is:

A. Compromise
B. Confrontation
C. Smoothing
D. Withdrawal

9. You are performing a two-day quality audit of one of your suppliers. The supplier asks you to remain a few more days so that they can take you out deep-sea fishing and gambling at the local casino. You should:

A. Accept as long as you complete the audit within two days.
B. Accept but take vacation time for fishing and gambling.
C. Accept their invitation but at a later time so that it does not interfere with the audit.
D. Gracefully decline their invitation.

10. Lessons learned and best practices are captured:

A. Only at the end of the project
B. Only after execution is completed
C. Only when directed to do so by the project sponsor
D. At all times but primarily at the closure of each life cycle phase

11. The person responsible for the identification of a best practice is the:
    A. Project manager
    B. Project sponsor
    C. Team member
    D. All of the above

12. The primary benefit of capturing lessons learned is to:
    A. Appease the customer
    B. Appease the sponsor
    C. Benefit the entire company on a continuous basis
    D. Follow the Guide requirements for reporting

13. The role of the project sponsor during project initiation is to assist in:
    A. Defining the project's objectives in both business and technical terms
    B. Developing the project plan
    C. Performing the project feasibility study
    D. Performing the project cost-benefit analysis

14. The role of the project sponsor during the closure of the project or a life-cycle phase of the project is to:
    A. Validate that the profit margins are correct
    B. Sign off on the acceptance of the deliverables
    C. Administer performance reviews of the project team members
    D. All of the above

15. The change control board, of which you are a member, approves a significant scope change. The first document that the project manager should updated would be the:
    A. Scope baseline
    B. Schedule
    C. WBS
    D. Budget

16. The shortest time necessary to complete all of the activities in a network is called the:
    A. Activity duration length
    B. Critical path
    C. Maximum slack path
    D. Compression path

17. Which of the following generally cannot be validated using a work breakdown structure?
    A. Schedule control
    B. Cost control
    C. Quality control
    D. Risk management

18. The first step in the development of a schedule is a:

A. Listing of the activities
B. Determination of dependencies
C. Calculation of effort
D. Calculation of durations

19. Which of the following is not a commonly used technique for schedule compression?

A. Resource reduction
B. Reducing scope
C. Fast-tracking activities
D. Use of overtime

20. Which of the following is a valid way of evaluating the financial feasibility of a project?

A. Return on investment
B. Net present value
C. Internal rate of return
D. All of the above

21. Earned value measurement is an example of:

A. Risk communication planning
B. Risk identification planning
C. Risk response
D. Risk monitoring and control

परियोजना व्यवस्थापन प्रशिक्षण

दैनिक पृष्ठपोषण फाराम (.....दिन)

नामः मितिः

१. आजका प्रशिक्षण सत्रहरूबाट के के सिकाइहरू भए ?

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२. तपाईँ ती सिकाइहरूलाई व्यवहारमा कसरी प्रयोग गर्नुहुन्छ ?

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३. प्रशिक्षणलाई अझ प्रभावकारी बनाउन के गर्नुपर्ला ?

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परियोजना व्यवस्थापन प्रशिक्षण

प्रशिक्षण अन्तिम मूल्याङ्कन फाराम

प्रशिक्षणको नामः ..... **प्रशिक्षण मितिः .....**

कृपया तलका प्रश्नहरूमा आफूलाई उपयुक्त लागेको विकल्पमा चिह्न लगाउनुहोस् ।

१. यस प्रशिक्षणलाई तपाईं कसरी मूल्याङ्कन गर्नुहुन्छ ?
(क) उत्कृष्ट (ख) ज्यादै राम्रो (ग) राम्रो (घ) ठिकै (ङ) सुधार गर्नुपर्ने

टिप्पणी/सुझाव .....

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२. सहजकर्ताहरूलाई तपाईं कसरी मूल्याङ्कन गर्नुहुन्छ ? (विषयवस्तुको ज्ञान, सञ्चार क्षमता, प्रस्तुतीकरण शैली आदि)
(क) उत्कृष्ट (ख) ज्यादै राम्रो (ग) राम्रो (घ) ठिकै (ङ) सुधार गर्नुपर्ने

टिप्पणी/सुझाव.....

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३. प्रशिक्षणको विषयवस्तु तपाईंलाई कस्तो लाग्यो ? (कामसँग सम्बन्धी र उपयोगी, ज्ञानमा वृद्धि, सिप र दक्षताको विकासमा सहयोगी आदि)
(क) उत्कृष्ट (ख) ज्यादै राम्रो (ग) राम्रो (घ) ठिकै (ङ) सुधार गर्नुपर्ने

टिप्पणी/सुझाव.....

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४. प्रशिक्षणमा प्रयोग भएको प्रशिक्षण विधि तपाईंलाई कस्तो लाग्यो ? (विषयवस्तु बुझ्नका लागि सहयोगी आदि)
(क) उत्कृष्ट (ख) ज्यादै राम्रो (ग) राम्रो (घ) ठिकै (ङ) सुधार गर्नुपर्ने

टिप्पणी/सुझाव.....

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५. प्रशिक्षणमा उपलब्ध गराइएका पाठ्यसामग्री तथा सन्दर्भसामग्रीहरू तपाईंलाई कस्ता लागे ? (विषयवस्तु बुझ्नका लागि सहयोगी, भावी प्रयोजनका लागि उपयुक्त आदि)
(क) उत्कृष्ट (ख) ज्यादै राम्रो (ग) राम्रो (घ) ठिकै (ङ) सुधार गर्नुपर्ने

टिप्पणी/सुझाव.....

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स्थानीय तहको क्षमता अभिवृद्धिका लागि तयार पारिएका प्रशिक्षण सामग्री

मोड्युल २२	सार्वजनिक खरिद
मोड्युल २३	विद्युतीय खरिद प्रणाली
मोड्युल २४	स्थानीय कर
मोड्युल २५	सामाजिक उत्तरदायित्व र सामाजिक परिचालन
मोड्युल २६	सार्वजनिक वित्तीय व्यवस्थापन तथा स्थानीय सञ्चित कोष व्यवस्थापन प्रणाली
मोड्युल २७	अनुगमन तथा मूल्याङ्कन
मोड्युल २८	वित्तीय सङ्घीयता तथा वित्तीय सुशासन
मोड्युल २९	परियोजना व्यवस्थापन
मोड्युल ३०	नेपाली भाषा शुद्ध लेखन
मोड्युल ३१	कार्यालय व्यवस्थापन
मोड्युल ३२	नीति निर्माण

नेपाल सरकार
सङ्घीय मामिला तथा सामान्य प्रशासन मन्त्रालय

स्थानीय विकास प्रशिक्षण प्रतिष्ठान
(स्थानीय विकास प्रशिक्षण प्रतिष्ठान ऐन, २०४९ द्वारा स्थापित)
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