OPERATIONS AND QUALITY WORKBOOK

PLANNING SECTION

VERSION 1.2

Michael S. Lanham
Allan D. Strawhacker
Raymond E. Schrader

Eugene B. Lieb
Custom Decision Support, Inc.
P.O. Box 998
Chadds Ford, PA 19317

(610) 793-3520

genelieb@lieb.com

http://www.lieb.com

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PREFACE

This workbook is a part of a business development program. Its primary objective is to assist in the development of new business without large development staffs. We believe that this can be done with reduced risk and cost. While these workbooks are targeted toward the business development process, the workbooks within the Planning Section may be applicable to existing businesses as well.

The tools consist of a series of workbooks addressing key issues that need to be addressed during the development of most business concepts. We believe that the process of venture development is an active one. While much of the workbook's focus is on data collection, analysis and planning, we believe, most activities should be dedicated to "hands on work" with the product, the process, and the potential customers. We hope that these tools will act to focus activities on "what must be done".

We intend that this workbook and all others in the series will be "evergreen". New versions of the workbooks are expected to be published periodically, reflecting constructive comments by users. This workbook reflects the efforts of many individuals who have provided ideas and comments.

The philosophy expressed in this workbook reflects that of the authors and not of the organizations or corporations involved.

INTRODUCTION

This is a *Operations and Quality Plan Workbook*. It is designed as one of the tools for defining Venture Ideas as legitimate Business Venture Candidates and to assist in the preparation of the business plan. This workbook is compatible with the *Business Planning Guide*.

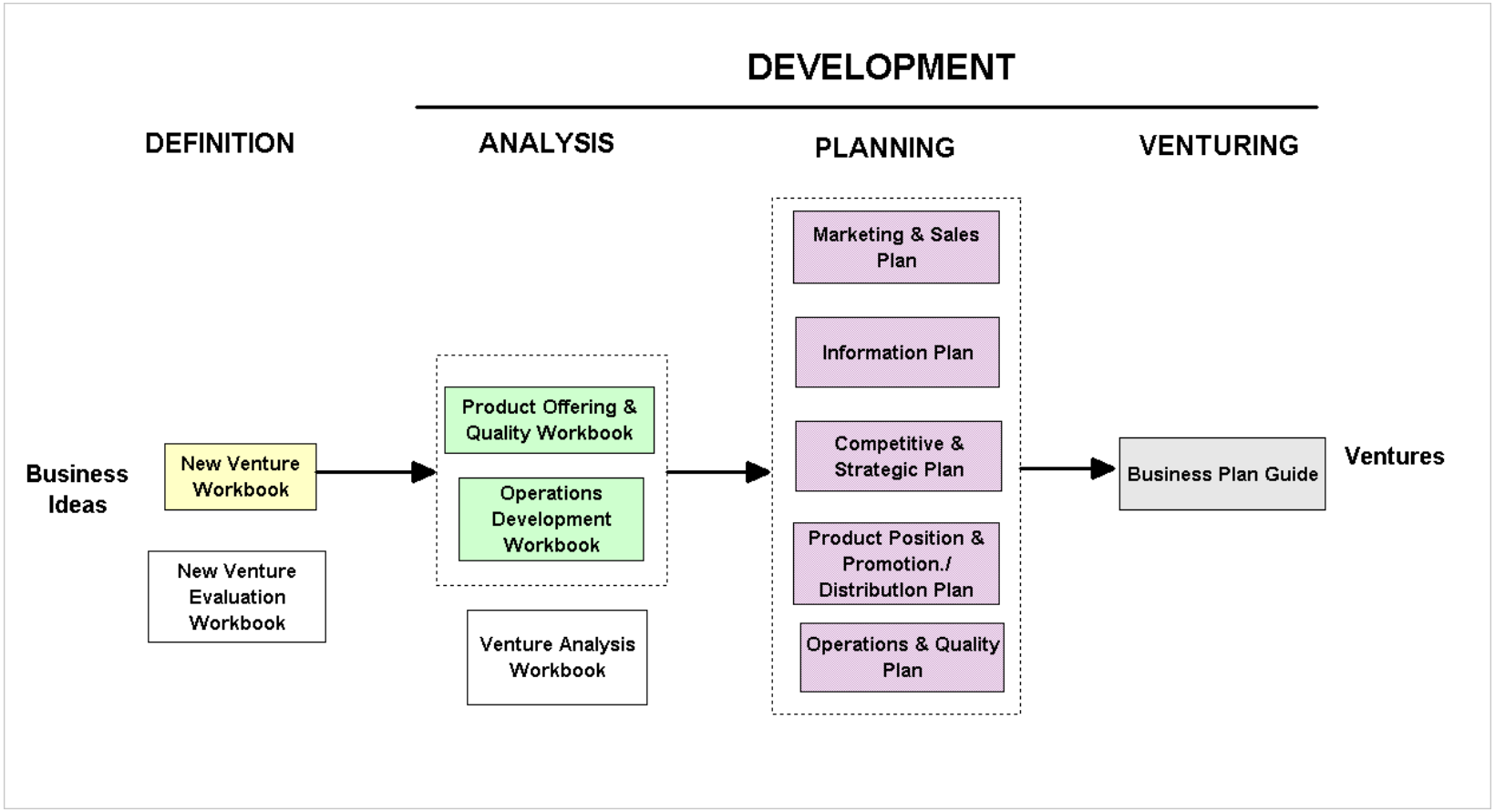
This *Operations and Quality Plan Workbook* represents a fifth of the Planning Section, or Step three of a detailed four-step process for taking an Idea to a Venture. The major steps are Definition, Analysis, Planning, Venturing. The other four workbooks of the Planning Section are the *Product Position, Promotion & Distribution Workbook, Marketing & Sales Planning, Competitive & Strategic Plan*, and *Information Plan Workbooks*.

The workbooks within the Planning Section take different perspectives on the planning process. This *Operations and Quality Plan Workbook* focuses on production and delivering quality. It is activity oriented. The *Marketing & Sales Plan Workbook* focuses on the actions of the customer. The *Product Position, Promotion & Distribution Workbook* focuses on the marketing activities required to bring the product to the customer. The *Competitive and Strategic Plan Workbook* focuses on competition and long term opportunities. The *Information Plan Workbook* focuses on the sources and needs for information and the systems to support its use.

No single perspective is likely to give a total picture of the business situation or the activities required for it be successful. Each workbook focuses on different aspects and approaches to planning critical business activities. It is the collection of approaches that should yield an overall view of planning.

It is not expected that you will have immediate answers to all the questions in this workbook. Developing adequate information is part of the analysis process.

Good luck. It is not supposed to be easy.


DEVELOPMENT
DEFINITION
ANALYSIS
PLANNING
VENTURING
Business Ideas
New Venture Workbook
New Venture Evaluation Workbook
Product Offering & Quality Workbook
Operations Development Workbook
Venture Analysis Workbook
Marketing & Sales Plan
Information Plan
Competitive & Strategic Plan
Product Position & Promotion./ Distribution Plan
Operations & Quality Plan
Business Plan Guide
Ventures

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I. BUSINESS DEFINITION

This section asks you to express the business concept as a refined Business Definition. There are four sub-sections, covering Products, Applications, Competitive Products , and Product Attributes

If you can clearly outline each of these items, you will have formed a Business Concept into a Business Definition.

In filling out this section, you might wish to refer to the other workbooks that have been completed. We have referred to specific workbooks in the footnotes where the items are covered in more detail. However, things change and businesses evolve. If the conditions of the businesses are now different, don't hesitate to make modifications.

You may need some assistance in filling out this section, since it deals with marketing and competitive information. Seek assistance with those individuals who are responsible and knowledgeable in those areas.

A. Products

What products and services do you intend to sell[1]?

This description can be as specific or as general as the present stage of development will permit. Try to be as specific as possible. The product definition limits the range of the business that will be considered. The more specific the product is, the easier it is to define the means of production. Recognize that the character of the products may change as the business is redefined during the development process.

At a minimum, specify the use of the product and expected service to the customer and user.

Product	Description

[1] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

B. Applications

What are the end-use applications and markets for the product?[2]

The market for the products consists of users and applications. The end-user of the product is located at that point or points beyond the direct customer where value is last obtained from the product attributes. Usually, the end-uses extend to the point where the product loses its identify.[3] This is often dictated by marketing, where the end-user is made aware of the product content in his purchase.

Application	Description

[2] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

[3] Alternatively, the end-use point can be associated as the condition beyond which liability and costs to the firm ends.

1. Primary Customer

Who are the primary customers of the product?[4]

Within a channel there is generally some customer that chooses the product. This is the primary customer. He tends to have principal control of the market. This control may not be with the end-user. In some cases, distributors and retailers have extremely strong influence on the market.

Primary Customer	Description

[4] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

2. Buyer Structure

How is the product purchased by the primary customers?[5]

Who are the principal decision makers for the product in the primary customers' organization? How is the decision made?

The structure of the decision process can greatly influence the importance of offering attributes and the preferred method of approaching the customer.

Primary Customer	Structure

[5] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

C. Competitive Products and Technologies

What are the competitive products and technologies?

There is generally some form of competition. In-kind competition consist of "drop-in" substitutes for your product. These include both generically equivalent products and those that can be used in the same way. Competitive technologies can extend to totally different approaches to satisfying the customers needs. Indicate the type competition and the name of the key competing firm.[6]

In-Kind Competition

Functional Competition

[6] The identity of the competition, both in-kind and technology are covered in the *Product Offering & Quality Workbook*. If any additional threats have material or may potentially arise, they should be noted.

D. Product Attributes

What are the relevant product attributes that contribute to delivering customer benefits?

The attributes are physical characteristics of the product that give value, i.e. dimensions, color, weight, viscosity, etc. In listing the attributes, focus on the customer benefits.

Attribute

1. Product Performance

How well does our product perform on those attributes?[7]

Indicate the performance of the product in terms of the key attributes for all major products. The way the performance is measured can be critical for verifying it. Indicate how the measurement is made and the criteria used to measure performance.

Product	Attribute	Measure	Criteria	Performance

[7] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

2. Competitive Performance

How well do our main competitors in each primary market compare?

Identify their strengths, weaknesses and characteristics. Indicate in what markets they have advantage and where they have weaknesses.[8] Note any difference in measure of performance from the previous section. Identify the source of information.[9]

Competitor	Attribute	Performance	Market	Source

[8] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

[9] This information can come from any number of sources including: marketing research, sales calls, management contacts with customers, or management perceptions.

II. OPERATIONS

Operations in this workbook covers manufacture, packaging, and product development. Marketing, Sales, Promotion, and Distribution are covered in other workbooks. Included in this section are the requirements of feed stocks and the "care" of suppliers. We recommend that input from the manufacturing team and Quality resource professionals be used. We suggest that manufacturing and packaging teams be brought into the process of filling out this section.

In filling out this section, you might wish to refer to the other workbooks that have been completed. We have referenced to specific workbooks in the footnotes where the item is covered in more detail. However, things change and businesses evolve. If the conditions of the businesses are now different, don't hesitate to make modifications.

A. Manufacturing Process

What process will be used to make the products and provide services?

Indicate and describe all major steps in the process from raw materials to the point where the product is ready for sale. If standard procedures are used, they may be grouped together. Cite any documents that give complete description of the process.

Indicate if the step is a continuous or a batch operation. There are some processes between an ideal continuous and batch process. Under these conditions, indicate how the process functions over time.

Steps	Description	Type

A. Manufacturing Process

1. Operations Flow Diagram

How are the steps interconnected?
Show on a diagram the connection between the key steps of the process and control points. Indicate the logical flow of processes to make the final products.

A. Manufacturing Process

2. Detail Process Description

How do the key processes work?
Describe the details of the key process elements. Indicate the types of processes needed and their criticality to the overall product.[1]

[1] Several pages may be needed to describe the details of the process. These should be attached to the workbook or referenced in a separate document that has been prepared.

A. Manufacturing Process

3. Unproven/New Technology

What areas in the process require proven new technology or use unproven innovations?

New technology and unproven innovations provide competitive advantage, but require greater effort to implement and may be the source of variability in product. New technologies are defined in terms of this organization implementing the knowledge. In general, any technology that is new to the firm should be considered new to this business. Indicate all such technologies as well as those new to the world (unproven innovations).

Technology	Description	Process Step

A. Manufacturing Process

4. Yield

What is the expected yield for the process?

For our purposes yield is defined as the ratio of the quantity of acceptable product produced to the quantity that could have been produced based on the largest amount of consumed raw material. Indicate expected yield for the first and third year, and the ultimate yield that we expect from this process.

Year	Yield
1	
3	
Ultimate	

What factors influence yield?

Where are the points where resources can be applied to improve yield?

Indicate the factors that reduce yield and the steps in the process that influence overall yield. The importance is measured by the yield reduction that is attributed to that step. Identify those points where the yield improvement is expected to be cost effective.

Step	Importance	Description

A. Manufacturing Process

5. Process Scaling

What capacities will be needed at each step of the process to assure quality delivery of the forecasted sales?

The capacity of the steps of the process usually varies to accommodate variation in yield, change over requirements and fluctuation in production. Indicate the capacity of each step necessary for this process. Indicate where removing "bottlenecks" might improve capacity.[2]

Step	Capacity

[2] This excess capacity may be used when the process is "debottlenecked" and the full yield and capacity is realized.

6. Power

a. Requirements

What are the energy sources and where will they be applied in the process?

How much will be needed for the product?

Step	Power Source	Quantity

5. Power

b. Recovery

Where can energy be recovered cost effectively?

Comment on energy recovery potential and if cost effective, how it could be done.

Step	Comment

A. Manufacturing Process

7. Materials

a. Flow Diagram

How does material flow about the process?

Indicate on the process flow diagram where materials and products enter and leave the process. Include waste materials that must leave as well as finished products. Show the expected quantities of all materials.

A. Manufacturing Process

b. Handling

How are materials separated?

How do we assure no product contamination?

What systems are required to assure proper handling of materials?

Maintaining the separation of similar materials used to make the variety of products can be critical for controlling the process and establishing high product quality. Indicate the procedures for establishing and maintaining separate material flows. Identify how materials will be handled and when shared facilities will be used.

A. Manufacturing Process

c. Tracing

How can we trace materials through the process?

Tracing and labeling materials are critical to trace problems and to identify opportunities for improvement. Indicate the techniques for tracing materials and finished products through the process.

A. Manufacturing Process

8. Supplies

a. Selection of Suppliers

How are the suppliers selected?
Indicate the criteria and process for the selection of suppliers and vendors. Identify who is responsible for their selection.

10. Supplies

b. Identity of Suppliers

Who are the suppliers of key inputs to the process?

Indicate the external suppliers of materials, parts, and services to the manufacturing process. Include the general reason for their selection.

Material/Part/Service	Supplier/Vendor	Reason

10. Supplies

c. Assurance of Supplies

What provisions have been made to assure a continuous inflow of supplies?

Indicate the contingency action that is in place to assure continuous supplies of materials, parts, and services. Indicate the procedure to determine which items might be single sourced.[3] If exclusive single sourcing is used, what assurance of supply is provided by the vendor.

Material/Part/Service	Contingency Action

[3] Techniques such as pareto analysis can be used to determine reliability of sources for delivery at specification.

9. Inventory

a. Determination

How do we determine the needed inventory levels to support this business?

For each key raw material and finished product indicate how inventory requirements are determined.[4] Identify the source of information and how might the inventory level be reduced with operations improvement.

Material/Part	Comment

[4] Inventory level determination is covered in the *Product Position, Promotion, & Distribution Workbook*. Refer to that workbook if it has been filled out.

11. Inventory

b. Level

What inventory levels will be needed for raw materials and finished product inventories to support this business?

For each key raw material and finished product, indicate the inventory requirements in terms of physical quantity.

Material/Part	Level

Where in the process will the inventories be needed?

How much?[5]

Step	Material/Part	Level

[5] You might wish to compare the inventory levels with the material flow diagram.

10. Direct Labor

a. Labor Needs

What direct labor will be needed to produce the products?

Direct labor consists of all wage and salaried labor directly associated with the production of product. Management, maintenance, and support are excluded from direct labor. Indicate the type of labor and special skills required.

Type	Skill Level	Description

Where in the process will the labor be applied

How much?

Indicate manpower in either hours per unit production or days/year.

Step	Quantity	Description

10. Direct Labor

b. Labor Supply

How is the labor force selected?

The selection of labor can be based on skill level, technical expertise, cost, and availability. Comment on the advantages and problems. Describe the nature of the labor supply including the organization of labor (union versus non-union) as well as the use of contract labor and outside vendors.

A. Manufacturing Process

11. Maintenance

What maintenance program is required to support the process?

Discuss the maintenance program in terms of objectives, structures and operations. Indicate preventive maintenance activities and how they will be monitored. Identify the economic issues and where feasible, the costs.

Objectives

Structure

Operations

12. Waste Control

a. Level

What are the waste materials from this process?

How much waste is expected?

Waste is any and every material that needs disposal, other than the products to be sold. Materials that are sold as by-products whose mill costs are taken at zero, are to be considered waste.

Waste Material	Quantity	Hazard

12. Waste Control

b. Special Handling

What special handling and storage is required for waste materials?

Indicate procedures, equipment, facilities, insurance and record keeping requirements.

Waste Material	Special Procedures

12. Waste Control

c. Disposal

How will the waste be disposed?

Waste Material	Means of Disposal	Vendor

How will disposal be monitored?

A. Manufacturing Process

13. Safety Issues

What critical potential safety issues exist in the process?

Item	Description
1	
2	
3	
4	
5	
6	

How will they be controlled?

Item	Control Plan
1	
2	
3	
4	
5	
6	

B. Packaging

1. For the End-User

How will the product be packaged for the end-user?

Products are typically packaged for use and for shipment. Indicate the packaging that will be used for the end-user. Often different packaging is used for different end-users. Indicate such variations.

Product	End-User	Packaging

B. Packaging

2. For Distribution

How will the product be packaged for distribution?

Packaging for distribution depends on the mode of transport and the needs of the distributors and retailers. Repackaging is often done by distributors and additional requirements may be imposed. Indicate the trans-shipment packaging that is used for the product.

Product	Distributor/Retailer	Packaging

B. Packaging

3. Labeling Requirements

How will the product be labeled for the customers?
Indicate any special considerations that are required for labeling and specific requirements for each type of customer.[6]

[6] Labeling is covered in the *Product Position, Promotion, and Distribution Workbook*.

B. Packaging

4. Costs of Packaging

How much will packaging cost during the next 5 years of the venture?

Indicate the cost of packaging for both shipment and end-use in terms of $/unit. Include all expenses not previously assigned to manufacture directed toward packaging. These should include both out-of-pocket expenses for materials as well as labor and equipment costs. Design and promotional costs should not be included here, as they are handled as a marketing and promotional expenses. Tooling and printing expenses should be included.

Year	Shipment Packaging	End-User Packaging
1		
2		
3		
4		
5		

C. Existing Products

1. Planning Process

What is the multi-function planning process for existing products?

The planning process for existing products should include input from all functions of the venture including: manufacturing, marketing, sales, and R&D as well as business management. Indicate how quality decisions are to be made regarding existing products. Indicate who is on the decision team. Identify when the process is undertaken and how often. Describe the process by which decisions are made and how customer input is obrained from those decisions.

C. Existing Products

2. Product Variations

How many and what variations of the product are or will be produced?

Why?

Multiple products are usually produced from a single facility. Some of these product variations are designed to meet customer needs. In some cases variations are created because of the nature of the process and are sold as different product grades. This is often a sign of poor quality control. Indicate the product variations that are expected.

Product Variation	Description	Explanation

C. Existing Products

3. Variable Cost

What are the expected variable costs for the products?

Variable costs are the unit costs that are incurred directly by the manufacture of a unit of product. They are directly assignable to the product and would not be incurred if the product were not produced. They include goods, materials and power, purchased for producing each unit of product and any incremental unit of labor directly associated, which could be withdrawn. Estimate these costs at typical production volumes.

Indicate the variables for each type of product expected over the next five years. Variable costs should be expressed as cost/unit.

Name:

Year	Product 1	Product 2	Product 3	Product 4	Product 5
1					
2					
3					
4					
5					

C. Existing Products

4. Fixed Costs

What are the fixed costs of producing the products?

Fixed costs are those costs associated with the operations of the manufacturing facilities. These usually include a minimum portion of the energy and labor costs that must be incurred to remain in operation. Management, basic operations, and site expenses are usually included.

Fixed costs are often assigned to the unit of manufacture. If so, indicate the charges against each type of product. Estimate these costs at typical production volumes.

Year	Fixed Costs
1	
2	
3	
4	
5	

C. Existing Products

5. Total Mill Costs

How much does it cost to make the products?

Indicate total mill costs as variable costs plus a charge for fixed costs. Express costs as cost/unit.

Name:

Year	Product 1	Product 2	Product 3	Product 4	Product 5
1					
2					
3					
4					
5					

How does the cost vary with production?

Indicate the variation of cost with scale. Do this as a fraction change in costs, against a 35% change in volume.[7]

Year	Product 1	Product 2	Product 3	Product 4	Product 5
1					
2					
3					
4					
5					

[7] 35% has been choicen to a major but feasible change in expected volume. Other volume differential may be more realistic for this business and could be used. Note if different reference is used.

C. Existing Products

6. Product Availability

What is the schedule for product availability for marketing and sales?

Indicate the quantities that should be available for sale for each of the key products. Comment on the total availability if overall supplies are constrained.

Name:

Year	Product 1	Product 2	Product 3	Product 4	Product 5
1					
2					
3					
4					
5					

What system will be used to provide a demand forecast?

D. New Product Development

1. Prototypes

a. Procedure

How will input from suppliers and customers be included in the development of prototype products?

A prototype product is a functional design or material that can be used for product testing. For this venture a prototype refers to a variation of the basic product concept. Initial prototypes generally are not manufactured using the process that will ultimately produce commercial product. Indicate the procedure by which prototypes will be initiated. Identify how communications with suppliers and customers will be assured.

How fast can the initial prototype be produced?

Indicate how fast first prototypes can be produced from the initial product concept and provided to the customer.

1. Prototypes

b. Speed

What process will be used to make prototypes?

How quickly can we produce prototype products for customer evaluation?

The speed at which a new product is accepted by the potential customer depends on the availability of prototype products. Indicate the speed at which duplicate prototypes can be made, the process to be used, and the preconditions for producing prototypes.

Facilities

Speed

Preconditions

1. Prototypes

c. Evaluation

How will the prototype products be evaluated?[8]

What kind of relationship will exist with the evaluating customers?

Indicate how the prototype or product concept will be evaluated prior to commercialization. Identify the conditions for evaluation with the customer. Will the customer be involved in a confidentiality agreement or a quality partnership.

[8] Evaluation of new product concepts are covered in the *Marketing and Sales Plan Workbook* and in the *Information Plan Workbook*. Refer to those workbooks if they have been completed.

2. Commercialization

a. Criteria for Commercialization

What are the procedures and criteria for deciding to commercialize a new product variant?

Indicate the method and key issues to be addressed. Identify who is responsible for that decision.

2. Commercialization

b. Speed of Commercialization

How quickly can we commercialize a new product for which the prototype has been accepted?

Speed of commercialization can be critical to success. Indicate how fast a new concept can be commercialized and the facilities to be used for initial commercial product.[9]

Facilities

Speed

Limitations

[9] Semi-works, pilot plant, market development facilities are often used to produce limited quantities of commercial materials. These facilities are usually smaller than world scale facilities typically put in place for full distribution activities. The availability of such facilities may be critical for speedy introduction of new variations.

D. New Product Development

3. Cost for New Variation

How much does it cost to develop a new variation of the product through commercialization?

Indicate the total cost for generating a new variant through the production of prototype products and expected costs of commercialization of a simple variation. Do not include production runs, but do include expected setup costs for commercial product. Identify how the variations will be obtained?

Cost

Prototype

Commercialization

III. CUSTOMER BENEFITS AND EXPECTATIONS

Quality is defined as meeting and exceeding customers' expectations. The key to developing Quality programs is knowledge of customers benefits and expectations. In this section, you are asked to identify those benefits and expectations.

In filling out this section, you might wish to refer to the other workbooks that have been completed, in particular the *Product Offering and Quality Workbook*. We have referred specific workbooks in the footnotes where the items are covered in more detail. However, things change and businesses evolve. If the conditions of the businesses are now different don't hesitate to make modifications.

You may need some assistance in filling out this section. Since it deals with customer expectations and Quality issues you may wish to seek assistance with people familiar with your customers (sales and marketing), and from professional resources in Quality and marketing research.

A. Customer Benefits

1. Primary Customer Benefits and Use Costs

What are the benefits and costs that are required by the customers?

Purchases are done to get benefits. List the key benefits for the main decision makers of the primary customers. This information should be obtained with direct customer involvement, preferably using marketing research.[1]

There are costs as well as benefits that are associated with using the product. List the all costs. Include both direct and indirect costs as they would be viewed by the customer.

Customer	Benefits	Costs

[1] Customer benefits and costs are covered in the *Product Offering & Quality Workbook*, however, further details are likely to have materialized since the preparation of that workbook.

A. Customer Benefits

2. Intermediate Customer Benefits

What value is obtained for the intermediate customers of the product?

The intermediate customers consist of the distributors, intermediate processors, and retailers of the product. If a purchase or ownership transfer takes place, these intermediate owners must derive some value from the product. That value is often a profit derived from resale. The nature and extent of the value to these customers should be identified on the product flow diagram. Indicate the sources of information, preferably from direct contact with the customer through marketing research.[2]

Customer	Benefits	Costs

[2] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

B. Sources of Customer Dissatisfaction

1. Consistency

What are the customers product specifications?

How well do the products meet them?

Consistency reflects ability of the product to meet customer expectations regarding specifications, apparent consistency, and presentation. These characteristics, ideally, are set cooperatively by the customer with his quality seller. Usually the perception of quality at the first inspection is the degree to which the customer perceives product quality and the capability of the supplier.[3]

Product Specifications Performance

[3] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

B. Sources of Customer Dissatisfaction

2. User Processibility

What attributes of our product affects the processibility of the customers process?

The ability of the product to consistently run under a range of conditions in the customers' process is a key measure of quality. Runability centers on the ability to process or use the product given an apparent consistent user operation. Flexibility is the ability of the product to run under a wide range of conditions.[4]

Indicate expected customer needs for technical assistance to begin using the product and to assist in problem solving on his line.

Customer	Process	Processibility Attributes	Assistance

How do we understand our customers' process?

[4] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

B. Sources of Customer Dissatisfaction

3. Process Disruption

How much process disruption will the customer accept during the introduction of a new product?

The introduction of any new product causes some process disruption for the customer. Indicate how much disruption will be tolerated and who the customer believes should be responsible for any costs during initial testing and qualification.

Customer	Process	Comments

B. Sources of Customer Dissatisfaction

4. End-User Quality Constraints

What offering attributes (product key characteristics) affect the quality of the customers' products?

What offering attributes operate to make the customer more competitive?

The offering may affect the quality of the customers' products directly through improved performance or indirectly by improved quality through the customers process. In either event, the quality of the customers' products has been improved. List all attributes that give rise to quality improvements of the customers' products from either source.[5]

Product/Customer	Quality Attributes	Customer Advantage

[5] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

B. Sources of Customer Dissatisfaction

5. Service

What services do your customers expect of you and by whom?

The product offering includes not only the product itself, but whatever service is required. Some service can be considered an extra offering with an associated price. Some service is expected with the offering. List the services that are considered inherent to the offering, and those that are expected at additional cost.

Indicate the speed of response to problems and the product assurance that are expected.[6]

Customer	Service Requirement	From Whom

[6] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

B. Sources of Customer Dissatisfaction

6. Safety

What safety assurances, both to his employees, to his customers, and society in general, does he expect of you?

It is reasonable for the customer to expect care in assuring that products are safe to use and safe to his customer. The conditions for safety depend on the nature of the product. List all conditions and requirements to assure safety.[7]

Customer Employee Safety Customer Safety

[7] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

B. Sources of Customer Dissatisfaction

7. Unique Sources

What are the unique issues that could make the customer dissatisfied with our offering?

Of what unique issues could we take advantage which could make customers more interested in your product?[8]

Customer	Unique Issues

[8] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation. Draw on the experience from other company businesses in assessing possible additional sources of potential customer dissatisfaction.

B. Sources of Customer Dissatisfaction

8. Interrelationship Among Expectations

How likely are the various expectations to interact?

Identify the key expectations that will most likely determine the customer's impression of the quality of the offering. Some of these expectations are independent; that is meeting one expectation will have no effect on any other. Some, however, will be interdependent. You will be unable to meet those expectations without meeting others to some extent. On the attached table indicate the key expectations and the interrelationship with each other, with 0 being independent and 6 being extremely dependent.[9]

Customer Expectations

Customer Expectations	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		

[9] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

B. Sources of Customer Dissatisfaction

9. Priority of Expectations

How important is the meeting of each of these expectations?

All expectations are important. Some are critical for continued business relationships. Failure to meet these expectations will lead directly to lost sales and potential loss of sales from other company production. Failure to meet other expectations might produce irritation that could lead to lost sales and reduction of price premium. In these cases time is available for correction. Indicate the importance of the expectations on a scale from critical to moderate importance.

Expectation	Importance

C. Defects (Non-Conformities)

1. Types

What types of complaints that are anticipated?

How does the organization respond to complaints?

Complaints includes any expressions of concern or potential concern from the customer. Include all aspects of the offering. Price should be included, as well as delivery terms. Concentrate on apparent product non-conformities.

Indicate how the business is organized to respond and to determine the root cause and crorective action.[10]

Expected Complaints	Root Cause	Planned Response

[10] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

C. Defects (Non-Conformities)

2. Levels

At what level of nonconformity (not meeting key expectations) will the customer consider changing suppliers?

Identify the defects (nonconformities) and unmet expectations which could cause the customer to change suppliers. Indicate the level of each defect that would produce that extreme response.

Indicate catastrophic level, where the customer will seek a new supplier; the minimum observable level, below which the customer can not see improvement; as well as the expected level.[11]

NonConformity/ Expectations	Catastrophic Level	Expected Level	Minimum Observable Level

[11] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

IV. QUALITY PROGRAM

This section deals with total Quality program. We consider Quality to be multi-functional and spans the totality of the business activities. You will need assistance in filling out this section. Since it deals with multi-levels of management and multi-functions we recommend that you seek out a team to compile the necessary information for this section. This is critical to assure that the program that is described is that which is also being implemented. Quality resource professional may also be needed in developing this plan. We again suggest that they be consulted and if feasible made part of the Quality Team.

In filling out this section, you might wish to refer to the other workbooks that have been completed, in particular the *Product Offering and Quality Workbook*. We have referred specific workbooks in the footnotes where the items are covered in more detail. However, things change and businesses evolve. If the conditions of the businesses are now different don't hesitate in making modifications.

A. Quality Partnerships

1. Quality Customer Partnership

What are the advantages and costs for customer partnerships?

Indicate the specific advantages, costs, and risks to the firm and to its potential customer partners to undertake this arrangement. These advantage may include the potential for sole sourcing.[12] Indicate any disadvantages, including shared price control and making cost data available to customers.

Advantages

Potential Costs

How we will establish trust and educate the appropriate organizations?

Partnerships are based on trust and close working relationships. Indicate how we will establish that working relationships. The working relationship will depend on common language and objectives. Education and training on quality are keys to the establishment of that commonality. Identify what resources will be available for training.

Who are the likely candidates for such partnerships?

Candidates for quality customer partnerships include direct and end-use customers. In some case both are necessary to assure a satisfactory transfer of information.

[12] The nature of quality partnerships are covered in the *Product Offering & Quality Workbook*.

A. Quality Partnerships

2. Quality Supplier Partnership

What are the advantages and costs for such partnerships?

Indicate the specific advantages, costs, and risks to the firm and to its potential supplier partners to undertake this arrangement. These advantages may include the potential for sole sourcing.[13]

Advantages

Potential Costs

What is the suppliers role and involvement?

Indicate the role and involvement of the suppliers in these partnerships. Indicate the type and extent of resources that they must commit to the partnership.

Who are the likely candidates for such partnerships?

[13] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

B. Product Quality

1. Determinants of Product Quality

How do we know the relationship between product characteristics and customer expectations?

Relating the product characteristics levels with meeting customers expectations can be complex. Identify the procedures that are being used to relate product attributes and characteristics to key customer expectations and relevant product attribute goals.

1. Determinants of Product Quality

a. Correspondence with Customer Expectations

How do product attributes relate to meeting customer expectations?

Relate the product characteristic levels with meeting key customers expectations. Indicate the key customer expectations and relevant product attribute goals. Note that there can be several attribute goals for a single characteristic, including performance and consistency.[1]

Customer Expectation	Attribute	Goal

[1] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

1. Determinants of Product Quality

b. Compliance

How do these measures of compliance correspond to each of the customers' expectations?

Indicate the importance of achieving each attribute goal on meeting or exceeding each key customer expectation, with 0 being unimportant and 6 being critical.[2]

Attribute Goal	Importance of Achievement

[2] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

1. Determinants of Product Quality

c. Methods of Measuring Compliance

How are the standards of compliance developed?

Describe the procedure for setting standards on the measurement of product characteristics. Identify who is responsible for setting standard measurement procedures.

1. Determinants of Product Quality

d. Standards of Measure

What are the measures of product characteristic compliance?

For each key characteristic goal, indicate the measurement and the technique to be used to determine compliance?[3]

Characteristic Goal	Measure	Technique

[3] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

2. Costs of Poor Quality

a. Costs Non-Standard Products

What is the cost of a product being out-of-spec?

Product that is non-standard (or out-of-specification) may be reworked or sold as a low grade product or discarded. In any case, a real and opportunity cost is incurred. This cost should be noted. Include in the cost any administration expense required to maintain the non-standard or derived "by-product" inventory and disposal fees.[4]

[4] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation. Costs of poor quality are part of the broader analysis of the Economics of Quality (EOQ).

2. Costs of Poor Quality

b. Market for Non-Standard Product

What are the advantages and business costs of selling non-standard product?

What are the added carrying costs of an non-standard grade?

If the product is unacceptable as a quality product it is often sold as a lower grade. Undertaking the sale of non-standard product incurs costs to the business in terms of its existing business and as well as carrying costs for the new products. Indicate the advantages and disadvantages of selling non-standard, lower grade products.

These non-standard, "off-spec" product grades incur costs of inventory, marketing, and processing. Indicate all such costs.

How much non-standard product can be sold and at what price?

Indicate the quantity of the lower grade product that can be sold. Identify the application and the likely discount that will be needed. Identify the costs of exiting from the business if or when non-standard product is no-longer available.

2. Costs of Poor Quality

c. Product Rejection

What are the costs incurred by products being rejected by the customer?

If the product is rejected by the customer, what is the cost? Include the direct quality costs of rehandling the product, reinspection, storage, disposal, and the potential loss of business. Include also the direct costs of material, shipment and return, reshipment and any payments and services needed to satisfy the customer.[5]

	Costs/Unit	Total Costs
Shipment		
Reshipment		
Handling		
Inspection		
Storage		
Rework		
Disposal		
Lost Business		
Reduced Product Premium		

[5] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation. The costs of poor quality is part of the overall evaluation of the Economics of Quality which combines the costs of delivering poor quality with the expenses of quality improvement.

2. Costs of Poor Quality

d. Return Policy

What factors determine the desire by customers to return product?

Identify those factors and issues which lead to product returns. Indicate which of these are under the control of this business.

What will be the return and warranty policies?

Warranty and return policy are the conditions under which product may be returned for refund. Consider only cases of non-performance. Returns for non-sale or non-sold consignments, such as returns from distributors, are not included since that product can be resold.

To what fraction of sales will they apply?

C. Quality Management

1. Quality Objectives

What are the long term Quality goals for the venture?

Indicate the long range Quality goals that will be necessary to meet the business objectives for this venture. Identify the Quality "vision" and focus for the business.

What are the immediate Quality objectives for the product and the organization?[1]

Indicate the organizational objectives regarding Product and Total Quality. Everything can not be done immediately. Indicate the short range objectives and the time horizon for their accomplishment.

[1] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

C. Quality Management

2. Quality Organization

How are manufacturing, marketing, and research functions designed to provide Total Quality for the product and services?[2]

In order to deliver quality in products and services the manufacturing, marketing, and research functions have to be coordinated. Ideally this should be both on a formal basis and operationally along the informal structure. Points for quality responsibility should be clearly identified and empowered. Indicate the type and level of resources required for Quality development.

Give the organizational diagram and indicate; (1) the positions of accountable quality responsibility (2) the lines of informal communications and (3) the level of authority for the business.

[2] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

2. Quality Organization

a. Responsibility for Process Quality Assurance

Who is responsible for process and product quality control and assurance?[3]

The only way to assure quality control is to educate the organization and foster individual responsibility. A system must be established with individual authority to make quality happen. Identify the individual with accountable responsibility for process quality assurance. Indicate his authority regarding product rejection and control.[4] Indicate his other duties.

[3] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

[4] The Quality authority may or may not act as resource assistance to the Quality program. If he is not, indicate the source that assistance.

2. Quality Organization

b. Responsibility for Total Quality Assurance

Who is responsible to assure that the entire business system is targeted to deliver total quality? [5]

The only way to assure total quality is to have an individual assigned to that function with the resources, time and authority to make quality happen. Identify the individual with accountable responsibility for Total Quality assurance. Indicate his authority regarding organization, customer relations and resource control.

[5] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

C. Quality Management

3. Quality Improvement Program

a. Provisions

What program and organizational provisions have been made to assure that Quality will continuously be improved? [6]

To obtain competitive advantage through quality, customer expectations should be encouraged to grow. This places increased demands on the delivery of quality. Accordingly, the business organization should be designed to require continuous improvement. Indicate the programs and organizational structures that focus on improved quality. Include awareness programs as well as functional activities.

[6] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

3. Quality Improvement Program

b. Auditing

What does management audit in order to assess continuous Quality improvement?

For Quality to be continuously improved, it must be monitored. What elements will management monitor and how will they be reported?

Who audits continuous Quality improvement?

Identify who is responsible for preparing Quality improvement reports and who reviews them. Indicate for what they are used.

3. Quality Improvement Program

c. Reward and Recognition System

What personnel and reward system is in-place to encourage continuous improvement in Quality?

People must be encouraged to seek the improvement of Quality. Programs need to be in-place that support Quality behavior. This requires substantial, clear rewards for positive behavior.[7] Indicate the appropriate programs in-place and resources allocated toward them.

[7] This can also include negative reinforcement for inappropriate action.

3. Quality Improvement Program

d. Training

What Quality training program is in-place to provide the tools for continuous improvement of Quality?

Improvement of Quality requires the application of qualitative and quantitative tools. These "tools" must be taught to the people directly involved in the process. Indicate the training and educational program, including group workshops for Quality development. Indicate the resources that will be used to provide guidance. Describe the organization that will provide the training. Indicate the level of management that will be involved in the training activities.

C. Quality Management

4. Marketing Information

What activities are established to continuously reassess customer potential uses, benefits and expectations? [8]

Customer expectations and perceived benefits can be expected to change. It is critical that a program be established to monitor those changes and to assess the real customer benefits and conditions. Indicate the process that will be used to continually define customer expectations. Describe how that information will get to the appropriate people in the firm and to its Quality partners.

[8] Covered in the *Product Offering & Quality Workbook*; however, further details are likely to have materialized since the preparation of that workbook. Please reexamine present situation.

D. Production and Supply Quality

1. Potential Sources of Variability

What are the sources of variability in the total product manufacture and delivery system that impact Quality?

The total delivery system includes all elements from raw materials to the delivery of the customer benefits. Any element of the chain must be considered a potential source of reduced Quality.

For each major quality-affecting product attribute, sources of variability should be identified.

D. Production and Supply Quality

2. Process Monitoring and Control Systems

What process monitoring and control systems are employed for the major sources of variability?

For each source indicate how variability in the process will be measured and controlled. Attach the process flow diagram detailing the position of the monitoring and control systems.

Source	Monitoring and Control System

D. Production and Supply Quality

3. Quality Product Redesign

How can be product be redesigned to improve quality?

Are there aspects of the product which could be modified that would eliminate or reduce sources of variability? Are there total redesign options that could inherently give improved quality? Indicate these and estimate the cost impact of these approaches.

Product Modification	Cost Impact

How do we know that these changes are acceptable to the customer?

4. Controlling of Variability

a. Distribution of Variation

What is the nature of the distribution of variation?

Each source of variability can cause a different type of defect or nonconformity. The nature of the distribution of defects determines the type of control we need to employ. Distribution characteristics include the skewness of the distribution, the variability and the likelihood of time relations (autocorrelation). If feasible, indicate the model distribution that should be used (normal, log-normal, Weibul, Poisson, etc.)

Variable	Dispersion	Distribution	Time Relation

4. Controlling of Variability

b. Feed Stock Quality Assurance

What system is employed to monitor and control feed stock variability?

Indicate the sources of variability in feed stocks and the methods of monitoring and control. Include water, air and power requirements (i.e. incoming testing, supplier audits, etc.).

Feed Stock Variable	Monitoring Method

4. Controlling of Variability

c. Feed Stock Rejection Policy

What is the feed stock rejection policy?

Indicate the conditions when feed stocks from suppliers will be rejected and the resupply policy. Identify the sources of variability in feed stocks and the methods of monitoring and control.

Feed Stock	Supplier	Rejection Condition

How do we know the impact of feed stock variabtion on product quality?

4. Controlling of Variability

d. Supplier Quality Stewardship

How are we going to encourage our suppliers to assure feed stock quality?

It is far better to never need to reject feed stocks! Indicate how we can encourage the suppliers to maintain and improve their quality program to meet our needs. These can include: price incentives, quality partnerships, design reviews, and the use of quality surveys and audits. Indicate what resources are required to implement these programs.

Supplier	Method of Encourage	Resources Required

4. Controlling of Variability

e. Inventory Control

What system is employed to assure inventory Quality and material availability?

Things can change during storage. The procedures and system for verifying the quality and availability of feeds stocks, in-process inventory, and finished products inventories should be identified. Describe the system for controlling material flow. Indicate how this system will be implemented.

Feed Stock Inventory

In-Process Inventory

Finished Products Inventory
At-Plant

Distributed Warehouses

E. Quality Potential

1. Quality Potential Study

What is the highest quality (lowest variability) that the manufacturing process can deliver?

A yardstick is necessary to evaluate quality in the manufacturing process. Quality potential is an estimate of the highest achievable level presently conceived for the process.[9] It should be noted that as more experience is obtained, this "lowest" level may decrease further.

Describe how the process potential is to be obtained. Indicate the resources that are necessary and the time frame for the study.

[9] This is also referred to as a *Quality Process Feasibility Study*.

E. Quality Potential

2. Process Potential

What is the highest quality (lowest variability) that the manufacturing process can deliver?

The results of the process potential study are estimates of the lowest achievable variability of key product characteristics. No process component can be total free of variation. Indicate the lowest achievalbe levels for those key parameters. Identify the type of measure being used.

Parameter	Lowest Variability	Measure

E. Quality Potential

3. Quality Process Redesign

What process redesign program is underway to assure that the process has the highest reasonable Quality potential?

Often the process can be redesigned or modified to reduce variability or to shift variability to a less critical attribute. Review the process and identify elements that should be reviewed for redesign.

E. Quality Potential

4. Non-conforming Control Plan

a. Monitoring

How are non-conforming products and components monitored and prevented from being delivered to customers?
Testing, labeling, and disposal procedures should be indicated. A lot number convention should be indicated. The product rejec-tion policy should be defined.

E. Quality Potential

4. Non-conforming Control Plan

b. Control

What type of product and component sampling is employed?

What is the likelihood that non-standard material will reach the customer?

While 100% testing may be desirable, it is often impractical and unnecessary. Statistical sampling is traditionally used to test final product. If destructive testing is used, only statistical sampling can be done. Note the types and procedures for testing.

Note that sampling procedures may be required by the customer. This may involve stratifying by batch as well as random selection within batches. Indicate when the procedures are required by contract or agreement with the customer.

E. Quality Potential

5. Product Quality Program Cost

What are the total costs of the product quality control and assurance program?

The resources for the product quality control and assurance program should be indicated. All direct labor costs should be included. Allocated overhead and management costs should also be given and separated from the direct costs. Do not include control costs necessary for the operation of the process. Include only those costs directly associated with assuring quality.

E. Quality Potential

6. Cost Control Program

What cost control program is being employed to review and reduce production, marketing and administrative costs?

Customer expectations include reduced future real prices. Cost control and reduction is necessary to meet this expectation while also returning a reasonable profit. The cost control program is viewed as a part to the Total Quality Management program. Indicate the key elements and objectives for the program.[10]

[10] Learning curve analysis is typically used to set objectives for cost reduction. These are discussed in the *Venture Analysis Workbook*.

F. Service Quality

1. Complaint/Return Monitoring System

How are complaints and returns monitored?

Complaints and returns are key sources of information, though uncomfortable ones. The ultimate goal of quality is the elimination of complaints and returns. A system needs to be available that tracks and analyzes complaints and returns to determine the problem source and appropriate corrective action.

There are four elements in a typical complaint/return system: (1) data collection, (2) analysis, (3) communications, and (4) corrective action. The first three elements form the monitoring system and should be described here as well as the objective for its development.[1]

In order to determine the cause of defects or the non-conformity, the complaint systems has to be merged with production data. This is done either in the communication element or during analysis. Describe how this is to be done. Indicate how the information is to be distributed to all functions in the business: Marketing, Manufacturing, and Research.

Objective

Data Collection

Analysis & Definition

Communications

[1] *Wendy Hurwitz* suggested these elements for developing an effective complaint system.

a. Complaint Response

What system is established to respond to complaints?

Correction action to complaints is a joint responsibility of Marketing and Quality. Monitoring the complaint response provides further information on customer expectations and monitors service quality. A set of procedures should be available to establish proper responses. Describe the system.

How is ultimate customer satisfaction assured upon a complaint?

Indicate the nature of the follow-up program with the operational objectives and mechanism for establishing customer satisfaction.

How rapid is that response?

Indicate timing for immediate action by the sales force and technical staff as well as the timing for management decisions. If the sales force are not empowered to satisfy the customer, it is important to identify that authority and the timing obligation for action.

b. Defect Fault Mode Analysis

What procedures are used to examine returns and relate non-conformity to process history?

What analyses are performed to determine the cause of the defects?

What procedures are in place to assure that major concerns are identified and addressed.

Indicate the programs, systems and procedures that will assure proper handling of sources of defects. Identify who is responsible and the timing of action.

2. Technical Service

How is the quality of technical service measured?

Technical service and support is a key value-added component of the product offering. It is often a major differentiating aspect. Monitoring the quality of that service can be critical. Indicate how the quality of technical service is to be measured. Identify how the method of measurement was derived.

How is the quality of technical service to be measured?

Indicate the way the technical service performance and conpliance to standards will be determined. Identify how customer input will be obtained.

What program is in-place to continuously improve the quality of technical service?

Indicate the program elements to continuously improve the quality of technical service. Include both responsiveness as well as performance.

3. Sales Calls

How is the quality of sales calls monitored, compiled and distributed?

Sales calls and contact between the marketing staff and customers is critical and often the only contact. Impression of quality service is first and most often conveyed by the sales force. It is traditionally a key differentiating aspect of the business. Monitoring the quality of sales is critical. Indicate how the quality of sales calls service is to be measured in frequency, contact quality, and performance.

How is the quality of sales calls to be measured?

Indicate the way the sales calls performance. Identify how customer input will be obtained.

What training programs are in-place to assure continuous improvement of the Quality of marketing?

Indicate the program elements to continuously improve the quality of marketing.

V. PLANNING

This section documents the plan for both operations development and Quality. We believe that they are inseparable. All levels of management should be in general agreement with the plans. We recommend that you seek out advice from the your management. In addition it is crucial that the individuals who will execute the plan are full partners in its development. We, therefore, encourage you to make the preparation of this section a team activity.

In filling out this section, you might wish to refer to the other workbooks that have been completed. We have referred specific workbooks in the footnotes where the item is covered in more detail. However, things change and businesses evolve. If the conditions of the businesses are now different don't hesitate in making modifications.

A. Program Elements

What are the elements of the quality and product development program?

Indicate the planning items and milestones for quality and product program. Indicate the timing for all key milestones.

Milestones Time

B. Responsibility

Who is responsible?

For each program element, someone should be assigned responsibility. The person assigned must be held responsible for obtaining the desired information within the time frame and resource constraints. Where possible, link authority for the execution of the project element with the responsibility of reporting results.

Program Element	Responsibility

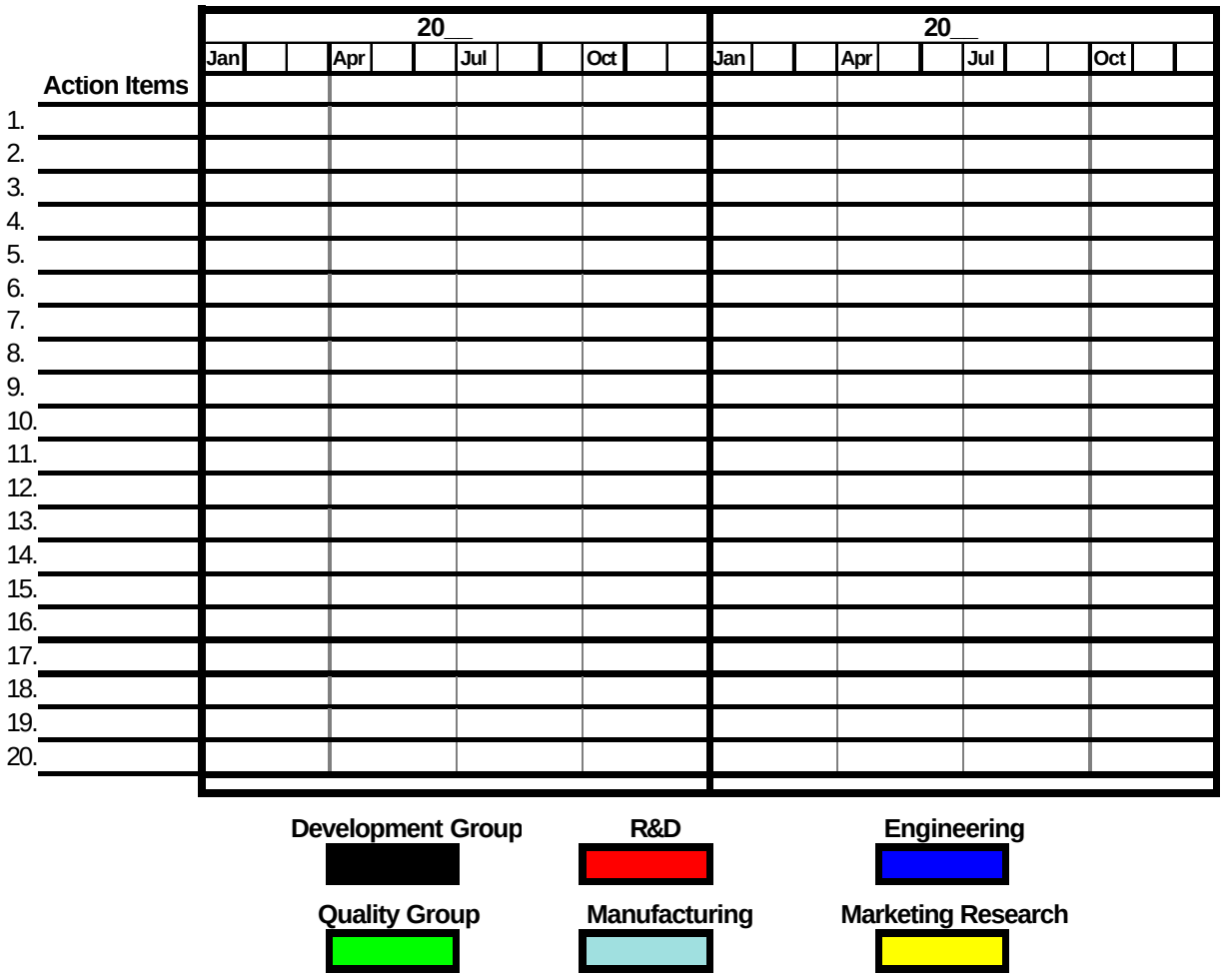
C. Action Table

How will the program come together?

Topic	Action	Timing	Responsibility
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

D. Gantt Chart

How to track the progress of the program?



Gantt Chart

	Action Items	20____ Jan	20____ Jul	20____ Jan	20____ Jul	20____ Jan	20____ Jul	20____ Jan	20____ Jul	20____ Jan	20____ Jul
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
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16.											
17.											
18.											
19.											
20.											

Development Group

R&D

Engineering

Quality Group

Manufacturing

Marketing Research

SUMMARY

I. BUSINESS DEFINITION

- A. PRODUCTS
- B. APPLICATIONS
  - *1. Primary Customer*
  - *2. Buyer Structure*
- C. COMPETITIVE PRODUCTS AND TECHNOLOGIES
- D. PRODUCT ATTRIBUTES
  - *1. Product Performance*
  - *2. Competitive Performance*

II. OPERATIONS

- A. MANUFACTURING PROCESS
  - *1. Operations Flow Diagram*
  - *2. Detail Process Description*
  - *3. Unproven/New Technology*
  - *4. Yield*
  - *5. Process Scaling*
  - *6. Power*
    - a. Requirements
    - b. Recovery
  - *7. Materials*
    - a. Flow Diagram
    - b. Handling
    - c. Tracing
  - *8. Supplies*
    - a. Selection of Suppliers
    - b. Identity of Suppliers
    - c. Assurance of Supplies
  - *9. Inventory*
    - a. Determination
    - b. Level
  - *10. Direct Labor*
    - a. Labor Needs
    - b. Labor Supply
  - *11. Maintenance*
  - *12. Waste Control*
    - a. Level
    - b. Special Handling
    - c. Disposal
  - *13. Safety Issues*
- B. PACKAGING
  - *1. For the End-User*
  - *2. For Distribution*
  - *3. Labeling Requirements*
  - *4. Costs of Packaging*

SUMMARY, Continued

C. EXISTING PRODUCTS
- *1. Planning Process*
- *2. Product Variations*
- *3. Variable Cost*
- *4. Fixed Costs*
- *5. Total Mill Costs*
- *6. Product Availability*

D. NEW PRODUCT DEVELOPMENT
- *1. Prototypes*
  - a. Procedure
  - b. Speed
  - c. Evaluation
- *2. Commercialization*
  - a. Criteria for Commercialization
  - b. Speed of Commercialization
- *3. Cost for New Variation*

III. CUSTOMER BENEFITS AND EXPECTATIONS

A. CUSTOMER BENEFITS
- *1. Primary Customer Benefits and Use Costs*
- *2. Intermediate Customer Benefits*

B. SOURCES OF CUSTOMER DISSATISFACTION
- *1. Consistency*
- *2. User Processibility*
- *3. Process Disruption*
- *4. End-User Quality Constraints*
- *5. Service*
- *6. Safety*
- *7. Unique Sources*
- *8. Interrelationship Among Expectations*
- *9. Priority of Expectations*

C. DEFECTS (NON-CONFORMITIES)
- *1. Types*
- *2. Levels*

IV. QUALITY PROGRAM

A. QUALITY PARTNERSHIPS
- *1. Quality Customer Partnership*
- *2. Quality Supplier Partnership*

B. PRODUCT QUALITY

SUMMARY, Continued

1. Determinants of Product Quality
- a. Correspondence with Customer Expectations
- b. Compliance
- c. Methods of Measuring Compliance
- d. Standards of Measure

2. Costs of Poor Quality
- a. Costs Non-Standard Products
- b. Market for Non-Standard Product
- c. Product Rejection
- d. Return Policy

C. QUALITY MANAGEMENT

1. Quality Objectives

2. Quality Organization
- a. Responsibility for Process Quality Assurance
- b. Responsibility for Total Quality Assurance

3. Quality Improvement Program
- a. Provisions
- b. Auditing
- c. Reward System
- d. Training

4. Marketing Information

D. PRODUCTION AND SUPPLY QUALITY

1. Potential Sources of Variability

2. Process Monitoring and Control Systems

3. Quality Product Redesign

4. Controlling of Variability
- a. Distribution of Variation
- b. Feed Stock Quality Assurance
- c. Feed Stock Rejection Policy
- d. Supplier Quality Stewardship
- e. Inventory Control

E. QUALITY POTENTIAL

1. Quality Potential Study

2. Process Potential

3. Quality Process Redesign

4. Non-conforming Control Plan
- a. Monitoring
- b. Control

5. Product Quality Program Cost

6. Cost Control Program

F. SERVICE QUALITY

1. Complaint/Return Monitoring System
- a. Complaint Response

b. Defect Fault Mode Analysis

2. Technical Service

3. Sales Calls

SUMMARY, Continued

V. PLANNING

A. PROGRAM ELEMENTS
B. RESPONSIBILITY
C. ACTION TABLE
D. GANTT CHART

GLOSSARY

Many of the terms used in this workbook have broader definitions than are intended here. The following definitions refer to this *Operations and Quality Workbook*.

Channel

Channel refers to the physical distribution channel for the product. It spans the range from the production of the product through distribution to the direct customer and downstream to the end-user. See *Distribution*.

Competitive Technology

Competitive Technology is any method or approach to accomplish the tasks or to give the same benefits that our product gives our customers. See *Functional Competition*.

Complaints

Complaints are any negative response from the customer regarding our products, services, or behavior.

Compliance

Compliance is the meeting or exceeding goals or product specifications.

Customer Expectation

Customer Expectations consist of all benefits that the customer believe should be obtained by dealing with this business. It consists of both the meeting of explicit agreements and implicit assurances.

Decision Maker

The Decision Makers are the individuals who have substantial input into the decision to buy our product. These may involve a number of people for any particular purchase. Both individuals involved in the specification as well as the actual purchase are included.

Defects

Defects consists of any unacceptable deviation from specification or goals. See *Non-Conformities*.

Defect Fault Mode Analysis

Defect Fault Mode Analysis is the effort to identify the factors that cause specific types of defects or non-conformities in the product. It is a standard requirement for continuous deduction of defects.

Direct Labor

Direct labor consists of all man-power directly required to manufacture a product. Management and support are usually excluded. Direct labor is usually consider a variable cost and is charged to the unit of production.

Distribution

Distribution is the method by which the product gets to the customer and ultimately to the end-user.

Economics of Quality

Economics of Quality (EOQ) is an analysis procedures of calculating the total benefits of improved quality by computing the total costs of poor quality and the incurred costs of Quality improvement programs.

End-user An industrial product is often used as an intermediate in forming the ultimate product. During that process the product may loss its identify. End-User is usually the last industrial user of a product, or the ultimate consumer, or the person whose use of the product removes any identification of it.

Flow Diagram The Process Flow Diagram is a display of the logical elements or steps in the process of making the product. Generally, the Flow Diagram consists of a chart of processing units connected by arrows indicating the direction of material or parts flows.

Functional Competitor Functional Competitors are products, technologies, or ways of accomplishing the same function as our product. Functional competitors are usually divided into in-type and competitive technologies. In-type competitors are those whose products will operate in the same form as ours. See *Competitive Technology*

In-Kind Competitor In-Kind Competitors consists of competitive products that can be "dropped in" as substitutes for ours. These usually include identical materials. Different materials for specific applications may behavior identically, and therefore, can be considered in-kind competitors for that application. In-kind competitors are generally restricted to identical compositions.

Intermediate Customer Intermediate customers consist of all individuals who buy the product on its way to the end-user. Intermediate customers are generally associated with resellers of the product rather than intermediate users or converters.

Inventory Inventory consists of all warehoused materials owned by the business. These consist of raw materials, partial process parts and goods, and finished products. Consigned shipments for sale by resellers are usually not considered part of the finished products inventory even though the business has retained ownership.

Labor Supply Labor Supply is the source of manufacturing man-power. Usually associated with unionization and the use of an outside vendor for contract labor.

Maintenance Maintenance consists of all activities required to keep the manufacturing facilities operating. It consists of both routine and preventive maintenance as well as repair work.

Manufacturing Process The Manufacturing Process consists of all activities required to convert raw materials to salable finished product.

Market Development A Market Development Facility is a commercial

Facility manufacturing facility large enough to produce products for sale to selected customers. It is usually built if the full scale commercial facilities is going to be extremely large. It is used as a stop gap for entering a business rapidly or to reduce the risk associated with a commitment to the final commercial facility.

Measures Measures are the means of determining compliance. They quantify quantifies the value of the attribute and its variation.

Milestones Milestones are identifiable events in a plan that can be used to measure progress along a plan of activities. It must be objectively noted and should be associated with specific business decisions.

Mill Costs Mill Costs represent the manufacturing costs of producing a product. It includes all raw materials, labor, power, and fixed costs associated with the production process. Manufacturing management costs are usually included.

New Technology New Process Technology is any process step that is new to the firm or for which this organization has little or not means of getting first hand experience on its characteristics. New Process Technology should be viewed as a potential source of unexpected product variation. See *Unproven Innovations*.

Non-Conformities Non-Conformities consist of any deviation from specification or goal of a product. Non-conformities are include product defects. Non-conformities also include any deviation from expected performance including non-product issues such as service and complaint response.

Non-Standard Non-standard products have characteristics that deviate from goal specifications.

Out of Specification Out of Specification, or Out-of-Spec refers products whose non-conformities are large enough to deviate significantly from product specification. See non-standard.

Partnerships Partnerships are any formal or informal agreement between the business and customer and/or suppliers to work together to improve the offering. Partnership is often associated with Quality programs.

Pilot Plant A Pilot Plant is a facility designed to have all the operating characteristics of a full scale plant, but at a fraction of its size. It is usually a dedicated facility designed to prove out the manufacturing process.

Primary Customer The Primary Customer is usually the first person to take ownership and use the product. He is viewed as the key purchaser of the product. If subsequent customers specify the product, they may take control of the purchase process and therefore become the primary customer.

Product Attributes Product Attributes consist of all characteristics of the offering that are relevant to the customer and users.

Product Performance Product Performance consists of the relative benefits obtained by using the product compared to competition. It is often associated with the relative value of key product attributes.

Product Characteristics Product characteristics are all measurable parameters of the product. Product characteristics are used to set specifications, goals, and for monitoring the manufacturing process.

Product Variability Product Variability is usually associated with the variation in the measures of product attributes. It can be associated with variation in the performance of the product as viewed by the customer.

Prototype Product The Prototype Product consists of an operating functional model of the product that will be produced. Generally, prototype products are not produced in the same manner as the final commercial product. It should have most of the operating characteristics in order to be tested by the potential customers.

Quality Quality is defined as meeting or exceeding customers' expectations. However, it is used in the workbook to refer to both Product Quality and Total Quality. See *Total Quality*.

Quality Assurance Quality Assurance is the program of making sure that customers' expectations are met. It usually is associated with product quality and quality control.

Quality Potential Quality Potential is the process study done to ascertain the product quality that the proposed process can deliver.

Raw Materials All materials and parts obtained from outside the business and used for the manufacture of product or the delivery of services.

Resource Assistance Resource assistance refers to the professional assistance in Quality. These are individuals trained in Quality development techniques and statistics which can provide special expertise.

Reward System The Reward System is the set of policies and programs to assure that personnel are appropriate rewarded for desired behavior. For this workbook, we focus on a reward system to assure continuing quality improvement.

Root Cause The Root Cause is the underlying source of a deflect, nonconformity, complaint or potential customer concern. several root cause may exist for a problem. Furthermore, the problem may arise from the interaction of several issues. These collectively are referred to as the root cause.

Semi-works A Semi-works is a manufacturing facility large enough to fully demonstrate the characteristics of the manufacturing process. Usually, a semi-works (or technical works) is a flexible intermediate size facility between laboratory scale and a pilot plant.

Specifications Specifications or specs are the formal requirements on the product. These usually consist of either general product characteristics or those written for particular customers.

Stewardship Stewardship as used in this workbook refers to the responsibility conveyed to suppliers or vendors for the maintenance and improvement of quality.

Suppliers Suppliers or vendors are any company providing this business with materials, energy, personnel, and services.

Total Quality Total Quality consists of meeting or exceeding customers' expectations regarding the total operation of our business. It includes product Quality and the quality of our associated operations.

Trans-shipment Trans-shipments are any shipment or transfer of the product in the distribution channel.

Unproven Innovations Unproven innovations are any process or product innovation that is new to the world, as far as we know. Such innovations should be viewed as potential sources of unexpected product variability. See *New Technology*

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User Processibility Industrial products usually involve they use in a subsequent processes. The ability of the product to function for the user in a consistent and reliable manner is referred to as User Processibility.

Variations Product Variations consists of the grades or variety of products that are being produced. Some of this products

are made to meet specific customer demands. Unfortunately, some are made due to product change over in the process or to poor product consistency.

Waste

Waste consist of any materials that need disposal. By-products whose mill costs are small should be considered waste until their earnings allow for reasonable assignment of mill costs.

Yield

Yield is the measure of acceptable product to that which could be produced based on consumed raw materials.