

A Study on the Development of the Quality Assurance System

Kim, Gwang Sub*
Hwang, Eui Cheol**

ABSTRACT

Quality Assurance is a system of activities whose purpose is to provide assurance that the over all quality control job is in fact being done effectively.

In this paper, we tried to develop the fundamental quality assurance procedures that can be applicable to the new-product design stage, to the production stage and to the after-sales stage of the production system.

I. INTRODUCTION

The product quality must be fully satisfied with the customers' needs by all means; needs ranging from the physical use of the product and the foreseeability of consumers' use and/or misuse to the degree of warning and information while being in use.

Quality Assurance is a system of activities whose purpose is to provide assurance that the over all quality control job is in fact being done effectively (the definition of ASQC). The system involves a continuing evaluation of the adequacy and effectiveness of the over all quality control program with a view to having corrective measures initiated where necessary (1982).

Accordingly, the QC procedures are how to acquire the customers' needs expeditiously and accurately and how to accommodate definitely and economically these needs into the products ahead of any domestic and international competitors. So, the product life cycle assurance procedures are necessary to be established under the concrete quality policy and program to satisfy customers' needs which vary from one product to another.

* Associate Professor, Dept. of Industrial Engineering, Ajou University.

** Professor, Dept. of Industrial Engineering, Hanyang University

The purpose of this study is to develop these optimal quality assurance procedures that can be applicable to the new-product design stage, to the production stage and to the after-sales stage of the production system. For this objective, the author surveyed some typical Korean enterprises' quality assurance system (1979-1983), and tried to modelling the fundamental procedures.

II. QUALITY ASSURANCE FOR THE DEVELOPMENT STAGE OF THE NEW PRODUCTS

The first step of the product quality assurance procedures are to grasp the exact consumers' needs by marketing personnel and then to put them into the hardware by the total quality control (TQC) procedures (1983), (1982), (1978).

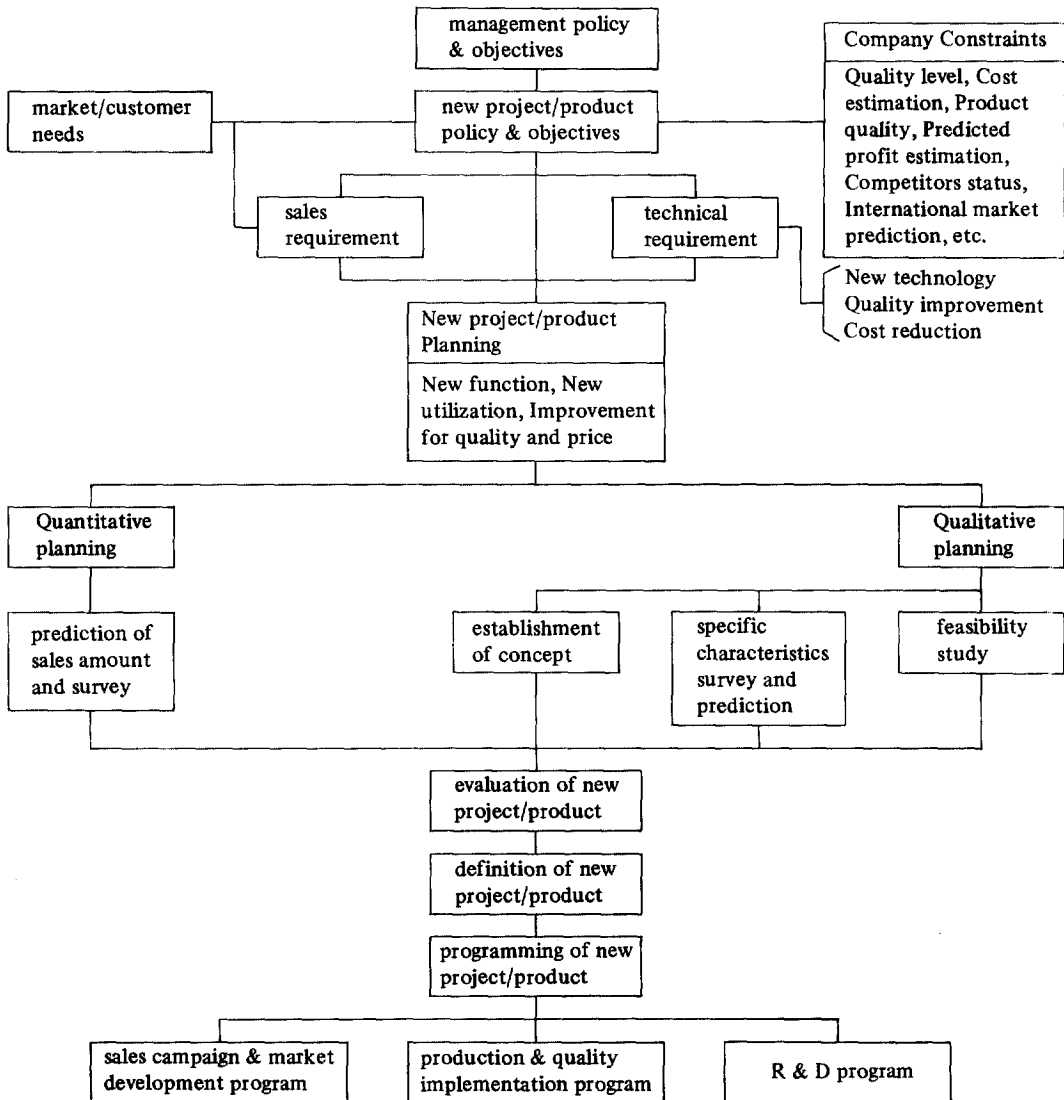


Fig. 1. New project/product planning and evaluation sequential flow

The customers' needs are classified into various aspects, depending on the products, such as fitness, luxury, shine, reliability, durability, low price, etc (1980), (1981). We can not name them at all, so that some systematic approaches to identify and to obtain visibility of these needs have to be established. A standard schematic can be summarized as shown in Fig. 1.

Further, to get more clear identification and visibility, the scientific market research and analysis are urgently needed (1980). The author propose the fundamental model for the analytical method as explained in Fig. 2.

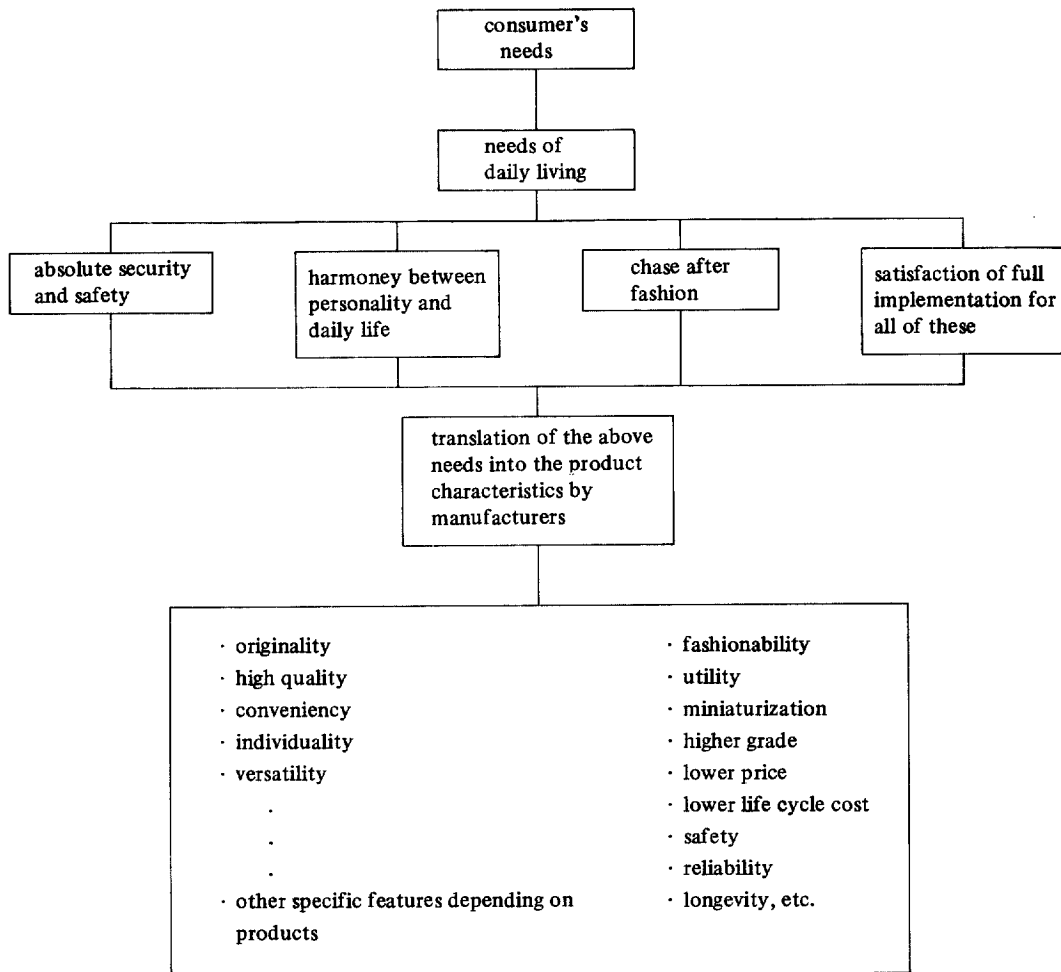


Fig. 2. Customer needs identification

In addition to the thorough analysis of customers' needs, some other essential factors for the successful new product development would seriously be considered from the managerial standpoints, and here is an explanation derived from the author's intensive experience in Korea (1980), (1979-1983), as per Fig. 3.

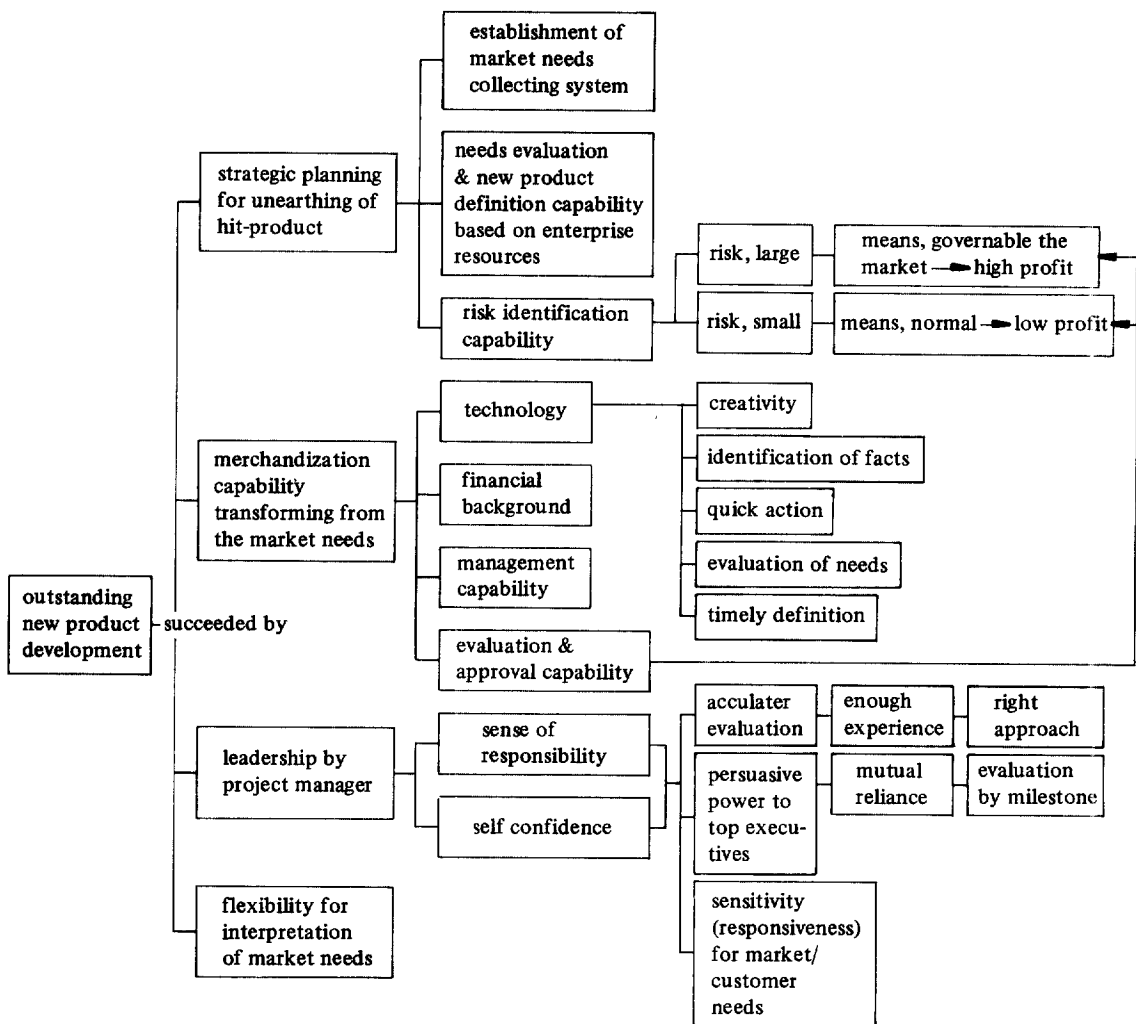


Fig. 3. Key for successful development

III. QUALITY ASSURANCE FOR THE PRODUCTION STAGE

If only we would identify the very best of customer/market needs, then the reliability is the most critical technological requirement to meet with the exact customers' needs in most industries: (1982) automobile, electronic, home appliance, etc. The reliability requirements are certainly implemented at the stage of the product design, and are met by the specific testings under the well-established organizations. The typical examples will be seen in Fig. 4. (1979-1983).

However, the reliability assurance tests are not conducted only to confirm design quality, but for the benefit of customers with definite purposes such as;

- 1) Improvement of quality design to meet with the customers' satisfaction for ensuring the present as well as future quality by way of consistent feedback of information obtained during testings.

- 2) Confirmation of test requirement for physical customer operation condition and environmental constraint, by identifying the failure modes and mechanism for each components.

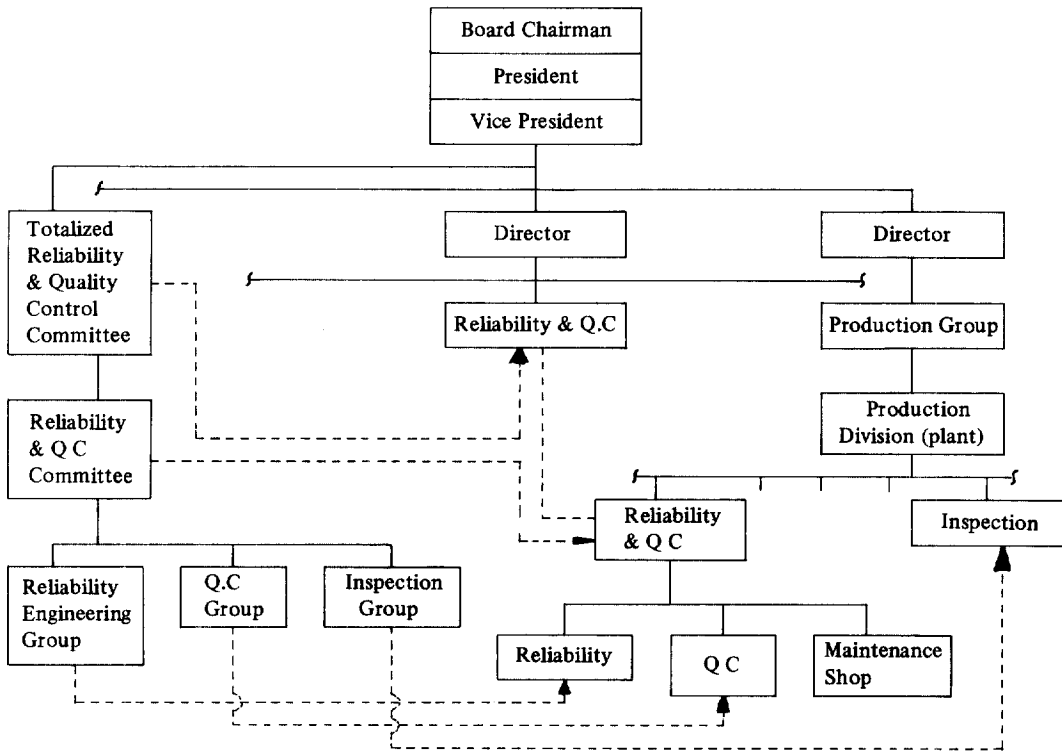


Fig. 4. Reliability engineering organization

- 3) Identifications of the status for the manufactured product quality and implementation of better quality manufacturing processes into the production line.

These reliability tests will contribute to the customers for assuring the reliability requirements, as follows;

- 1) Clarification of various environmental conditions under which each products are exposed in user's hand.
- 2) Prevention of recurrent type of quality problems through analysis with field information feedback system.
- 3) Identification of failure mechanisms and establishment of their corrective action for the innovated design.
- 4) Identification of malpractice and malfunction revealed and these corrective action to be taken during manufacturing processes.
- 5) Prediction of public life by the accelerated durability test under more stringent environmental conditions for the component related to the safety and customer needs.

The reliability test programs are established as shown in Fig. 5.

Many industries in Korea are not satisfied with the progress made up to now and are still continuing on to improve the "product reliability" (1980), (179-1983). Their direction and intention can be summarized in the following;

- 1) Improvement of reliability index prediction by replenishment of – FMEA, FTA, S-N Ratio, simulation of dynamic load, etc.

nomenclature	test standard	term. & humidity of test	fuel used	test condition						test duration
				revolutions	load	control temp.	oil temp.	ext. gas temp.	ignition timing	
continuous high-speed test	TS-0000	•	•	•	•	•	•	•	•	•
extreme cold test	TS-000X	•	•	•	•	•	•	•	•	•
extreme hot test	TS-00XX	•	•	•	•	•	•	•	•	•
humidity test	TS-0XXX	•	•	•	•	•	•	•	•	•
salt spray test	TS-XXXX	•	•	•	•	•	•	•	•	•

Fig. 5. Reliability test standard (for automobile)

- 2) Improvement of reliability test methods ———
 - (i) more thorough market research, (ii) more thorough investigation of operation procedures and dynamic environmental condition, (iii) close investigation of products in use and discrepant material.
- 3) Improvement of quality information equipment and test apparatus.

IV. QUALITY ASSURANCE FOR THE AFTER-SALES STAGE

This stage is the most common function, and everyone can understand the necessity of quality assurance. However, efforts are so devoted to the sales activity that sometimes the following quality function are neglected as for the assurance conception;

- 1) Surveillance and monitoring of the newly-marketed products to rectify the unstable quality characteristics at the initial stage.

- 2) Quick response to the claims, complaints and/or informations brought by the customers.
- 3) Summarization, compilation and transmittance of customer's claims, complaint and informations
(It can be summarized as shown in Fig. 6).

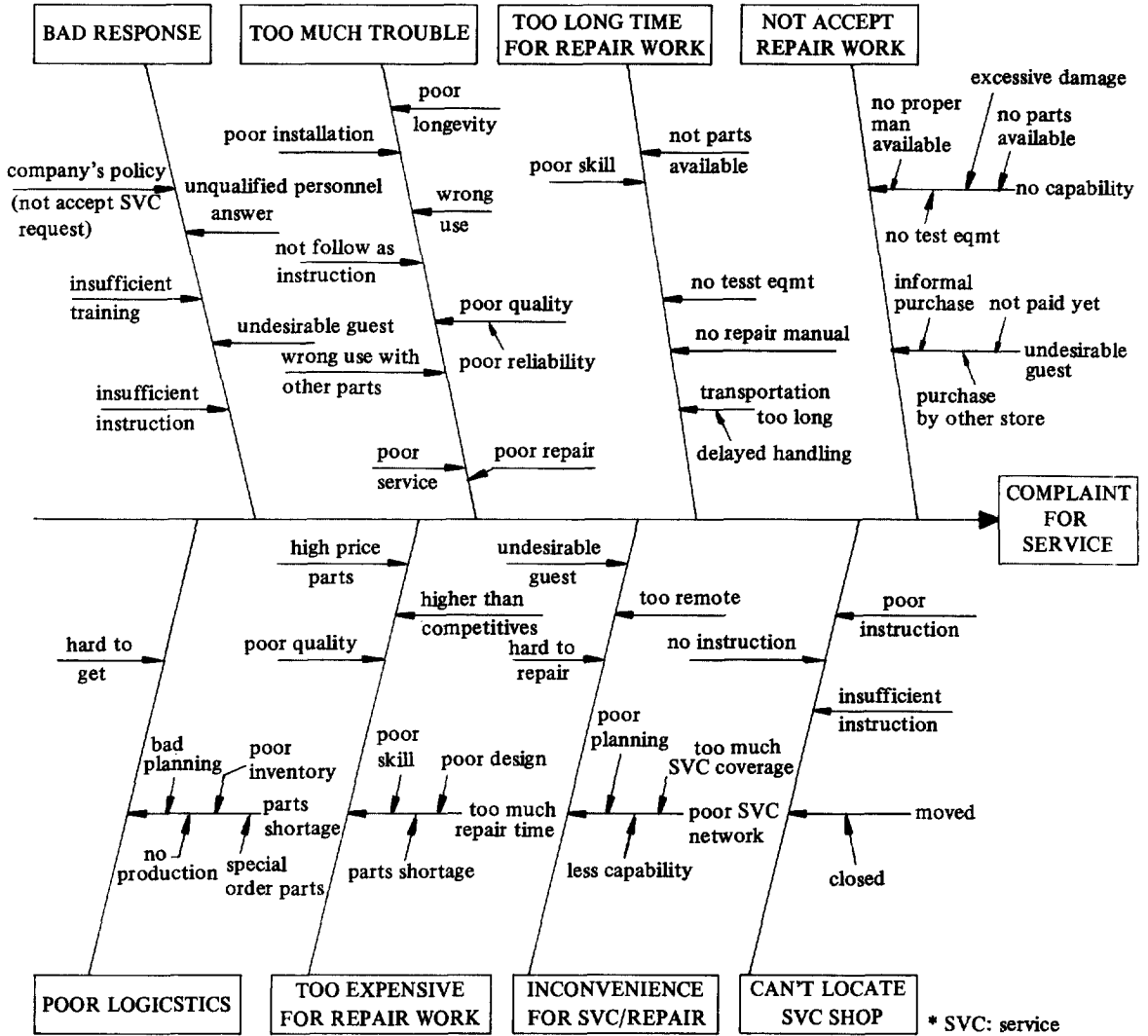


Fig. 6. Customer claim analysis

- 4) Prevention of customer's claim of recurrent type.
- 5) Summarization, complation and transmittance of product quality status and trend, especially for reliability, cost, longevity, maintenance action, etc.

- 6) Quick response of service/repair requested by customers, and improvement of service/repair technique through procedures of diagnosis, isolation, dismounting, accessibility, replacement, repair, inspection, check out, etc.
- 7) Periodic patrol-type services for customers.

V. CONCLUSION

If only we would identify the very best of customer/market needs, then the manufacturer implement and integrate these needs into the products by way of TQC to assure the customers' needs throughout the product life cycle as quality assurance.

In this paper, the presentation is to develop especially how the product quality is assured to satisfactorily operate and/or use in the customers' hand from the standpoints of reliability/durability/

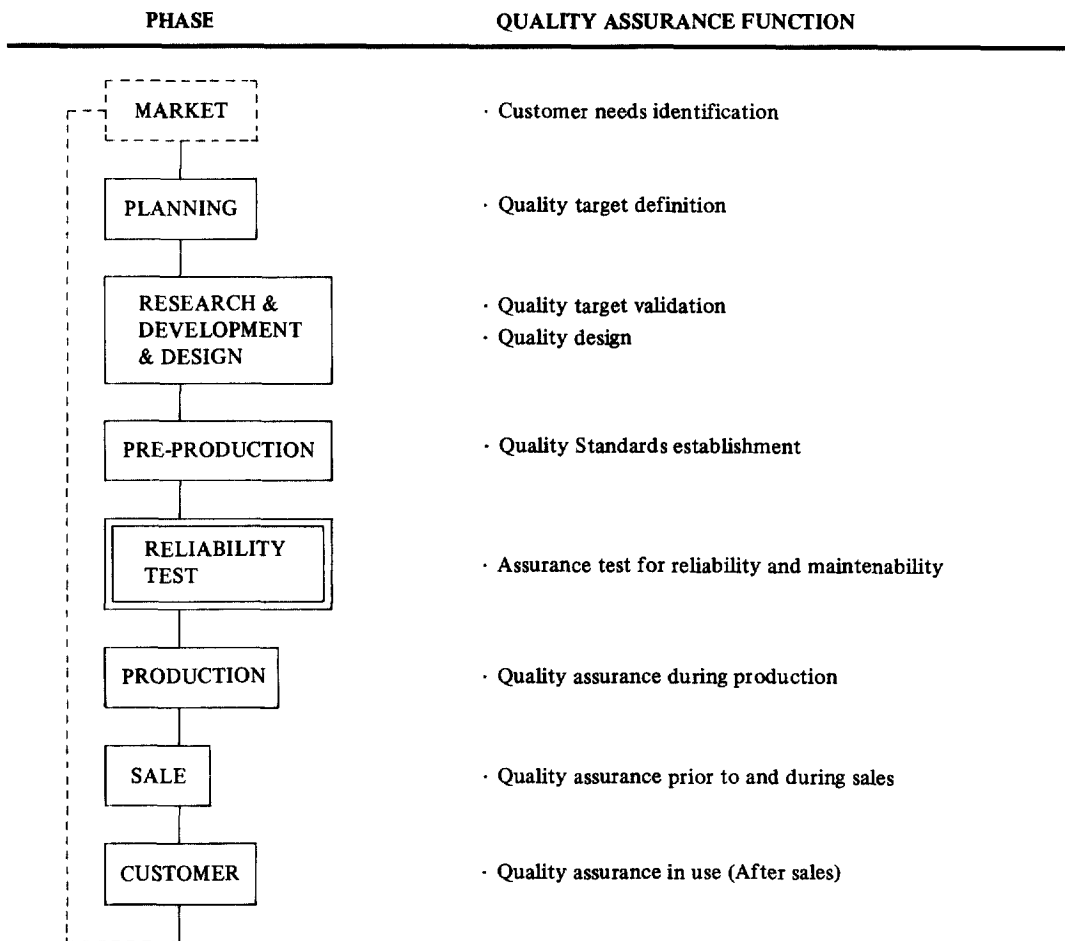


Fig. 7. Product quality assurance for life cycle

longevity which customers urgently and earnestly requested to the manufacturer so as to integrate these aspects into products at plant.

In conclusion, functions of product-wide quality assurance by phase are shown in Fig. 7, Fig. 8 and Fig. 9.

Characteristics of quality phase	SOCIALIZATION		MARKETABILITY		PRODUCTIVITY	
	conformance to regulation	assurance of social responsibility	assurance of reliability	assurance of marketability	achievement of productivity	assurance of production schedule
DESIGN, TRIAL PRODUCTION & EXPERIMENT	submission of production department demands to engineering					
	establishment of quality target					
	establishment of quality assurance program					
PRE-PRODUCTION	establishment of quality level					
	assurance test for safety standard conformance	assurance test for critical characteristics	reliability test for frame & construction	assurance test for marketability conformance	evaluation & determination of control procedures	process capability survey
					audit & instruction to vendor/sub-constructor	inspection & test
	evaluation of initial products quality					
PRODUCTION	evaluation of quality in use					
	evaluation & control of regulated characteristics	evaluation & control of critical characteristics	reliability assurance	marketability assurance	evaluation of productivity	
		lot control (traceability)			control of each operation	control of specific characteristics
					control of vendor/sub-contractor	training of inspector

Fig. 8. Quality assurance procedures (1)

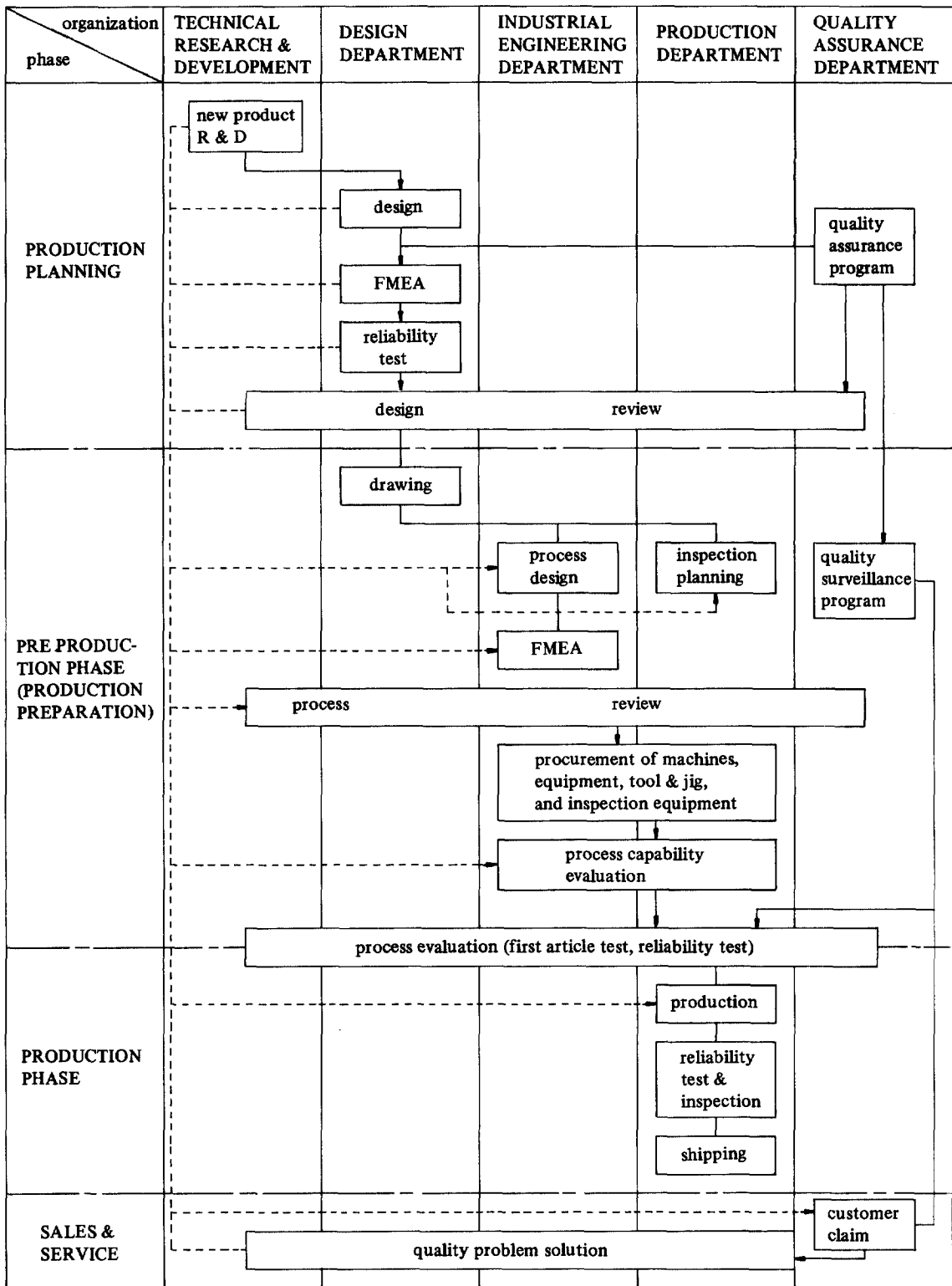


Fig. 9. Quality assurance procedures (2)

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