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INSPECTION

3 March 1948

L48-101

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Publication Number L48-101

THE INDUSTRIAL COLLEGE OF THE ARMED FORCES

WASHINGTON, D. C.

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## INSPECTION

3 March 1948

COLONEL CRANE: Gentlemen, as you probably judge from some of our speakers from industry, there were rather serious problems in the field of inspection during the late war. Various improvisations were adopted during the war in an attempt to iron out these difficulties, but in general they were improvisations, and we ended up with an inspection force for each technical service in the Army, this resulted in duplication and lack of coordination.

Since the war, efforts have been made by joint committee action to establish a basis for coordinated inspection and centralized inspection. Those are just beginning, and as I understand it, they are already bogged down in the matter of paper work. It seems rather appropriate, then, to go back to the basic fundamentals of inspection to see just what we are trying to do, what is our objective, in order that we can get on the beam and get away from this question of whether we shall use this or that shipping document.

Our speaker this morning is not handicapped by any allegiance to any specific branch of the Armed Forces. As Assistant Professor of Business Management at the Massachusetts Institute of Technology, he is familiar with basic principles and fundamentals. He is a consultant in industry; he is author of a book "Handbook of War Production," which most of you have read. He has demonstrated the ability to apply these principles to practical problems. This morning his subject is "Inspection, from the Point of View of Management."

I take great pleasure in presenting to you Professor E. A. Boyan.

PROFESSOR BOYAN: Thank you, Colonel Crane. Gentlemen.

My primary objective is to define exactly what is meant by the term "inspection" and then to develop the related concept of "quality control," by showing how these technical-administrative activities influence and are influenced by the present problems of industrial operation.

Three vital reasons warrant serious consideration of this subject matter:

First, effective quality control practices can be made to serve as a common meeting ground for labor and management. Many problems in industrial relations during this postwar period have centered on questions

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"Quality Control is an administrative activity. It establishes characteristics desirable in a product, and maintains those characteristics economically and practically by controlling the causes of variation."

"Inspection, on the other hand, is the agency used to bring to the surface deviation from desired characteristics."

Strictly speaking, inspection cannot create quality, for it does not remove or add metal. Inspection merely brings deviations to light. Thus we must advance the use of the technical-management tool of quality control for the creation of conditions that produce uniformity. Consequently, quality control cannot become, under my earlier definitions, the eminent domain of an inspection group. Rather it becomes the responsibility of all parties concerned with a product, from conception, through manufacture, and out into the hands of the consumer.

## The Role of Inspection

Referring to Figure I, our starting point is to consider the basic industrial requirements that every company must meet, regardless of whether they are making jet engines or shoe polish:

Finance. The protection of the capital position of a company.

Market. The promotion of an adequate and satisfactory outlet for a company's product.

Manpower. A satisfactory working force embraced with requisite skill, ability, and pride of craftsmanship.

Materials. Correct materials at the right time and in the proper quantity.

Products. The establishment of products functionally and commercially desirable and capable of ready manufacture.

Processes and Methods. Effective utilization of equipment and manpower.

Facilities. Adequate tools for production and inspection with facilities for other associated activities, such as materials movement and storage.

Unclassified. Such as public relations, Federal restrictions, trade requirements, and other environmental conditions beyond the immediate control of an enterprise.

# role of inspection in over-all management

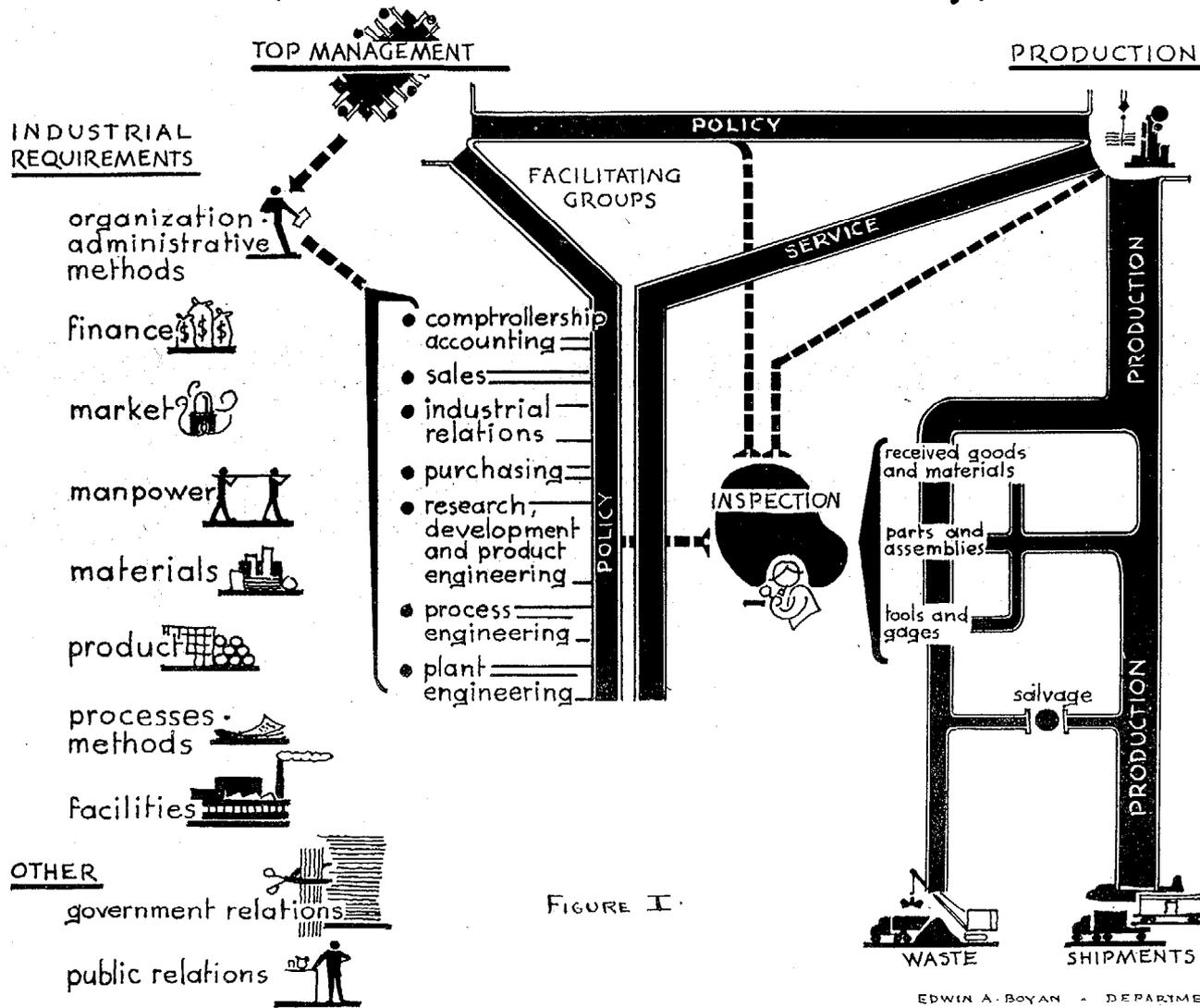


FIGURE I.

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Organization and Administrative Methods. The proper delegation of authority and responsibility for promoting and securing coordination of each of the foregoing requirements.

The difference in character between industrial organization, even making the same type of product, may be related to the manner in which the requirements are met. One company may be particularly proud of its facilities, another may glory in its labor relations. Still another may have a fine sales setup. But weakness in any one requirement can rapidly sap the company strength regardless of ability in other fields. Therefore, one management objective is balanced strength in all requirements.

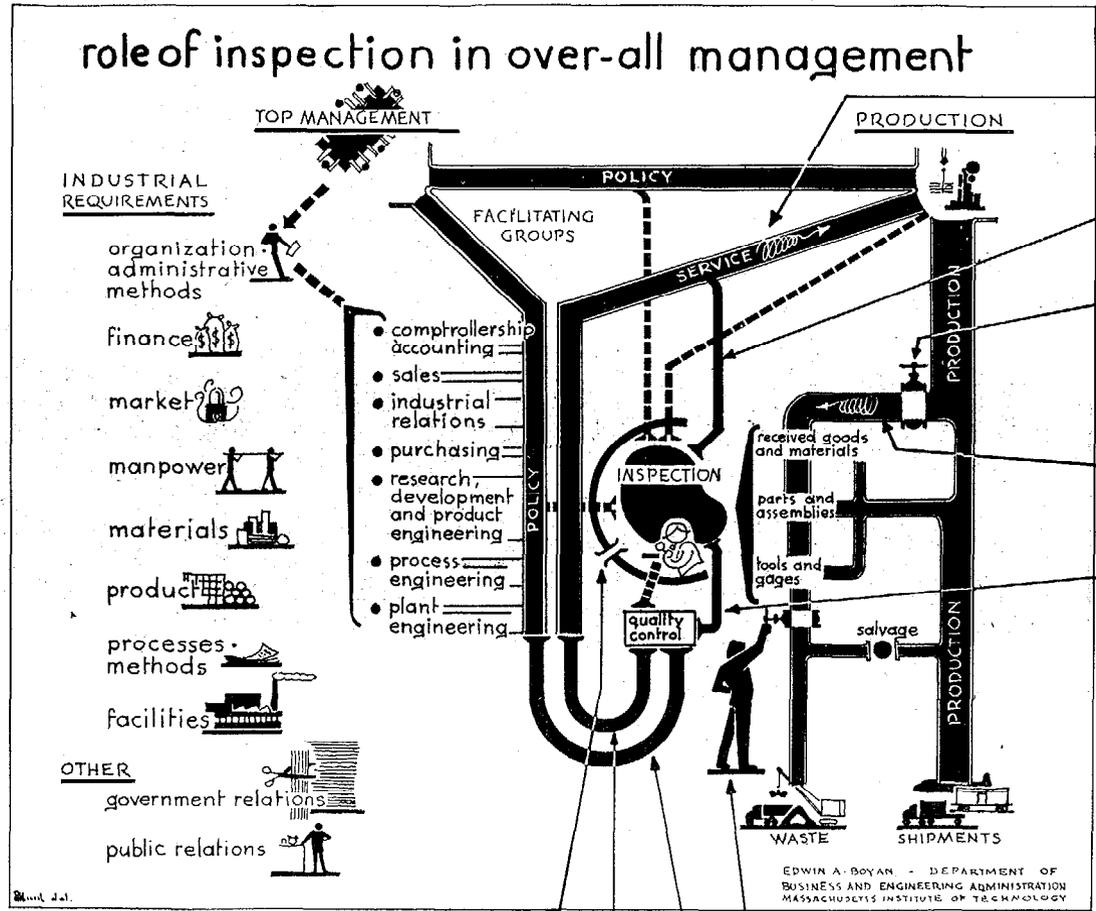
Promotion of each of the prime requirements is generally delegated to a facilitating group, for example comptrollers and accountants, to protect the expenditure and receipt of income, industrial relations to promote a better manpower situation, product engineering to develop improved products, purchasing to assure correct materials at the right time, special liaison groups to work with the Armed Services, and so on. Top management, through the proper selection and training of executives, proper delegation of authority and responsibility, and establishment of correct administrative methods, promotes the free flow of information for the determination of policy and its execution. This, in turn, creates a condition whereby service and resources are provided by the facilitating groups and are accepted by production. Production is primarily concerned with the development of form utility, resulting either in products shipped to the customer or rejected as waste if salvage cannot take place.

Naturally, though a manufacturing department is granted many resources in facilities--manpower, money, materials, and so on--it must make certain first, of what it is getting and secondly, of the results which it is achieving in converting the resources into satisfactory products. Inspection now enters into the picture in this way. By activities such as checking (1) received goods and materials, (2) parts and assemblies, and (3) tools, gages, and sometimes facilities, inspection serves the production group and the company as a screening agency on two scores--first, that the entering resources, for example raw materials and tools, are within desired characteristics; and secondly, that the utilization of resources is reflected in a satisfactory product. In cases where unsatisfactory deviation from desired characteristics are disclosed, inspection prevents further passage and thereby later and greater harm. At the same time the need for correction is highlighted.

## Major Classification of Inspection

Inspection in turn can be catalogued as preventive inspection and segregative inspection. Preventive inspection fundamentally calls for an observance of the time element and checking as close to a source of

# practices promoting quality effectiveness



4 increase of service (rate and amount) to facilitate quality.

5 service to inspection to promote operating effectiveness.

8 reduce amount of inspection and correction by promoting quality consciousness in manufacturing.

9 speed up rate and effectiveness of inspection.

6 provide inspection with philosophy, skill, technic and prestige.

7 no man can serve two masters. single channel of authority and responsibility.

3 providing of service to facilitate activities of other groups.

2 direct channel for forwarding ideas regarding unfavorable factors and for formulation of quality policies leading to better service.

1 brains and skill to locate and eliminate factors contributing to unsatisfactory quality levels.

FIGURE II

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see that anyone in the quality control position has sufficient authority and is provided with administrative procedure and channels to assist in the cooperation on quality problems. Naturally, any administrative procedure is supplemented by the ability of the liaison person to have a personality and an approach that fosters cooperation. One fundamental point is necessary at this time in that the quality control official should seek cures rather than culprits. Criticism dulls cooperation. The method of attack involved is not so much the determination of who is at fault, as it is the education of, and cooperation with, the person who can render assistance in overcoming the difficulty.

Practice 3--Service by Quality Control. It is often said that the best way to make a friend is by doing him a favor. The same idea applies to quality control if the group responsible can render services that will in turn foster future cooperation and assistance.

The services that can be provided are many: The accounting department may be materially assisted by careful salvage reports especially designed to assist in the analysis of variance between actual and standard costs. The purchasing department can receive material benefits from efforts of the quality control group to work with the suppliers in the determination of proper specifications and acceptance of material. As an illustration, during the past war, it has been found that capable liaison between the supplier and the user of material contributed to smoother deliveries and higher quality levels.

Practice 4--Increase of Service to Production. Too many times, poor quality is the result of a facilitating group defaulting in its obligation to production. As an example, one company engaged in the manufacture of firearms became concerned with the high cost of production, particularly with respect to assembly and fitting. The management of the organization took production to task even to the extent of displacing the existing supervision. Trouble continued, however. A special investigation was made of the specifications. Current drawings were removed from the file, and pieces were made and carefully measured to assure adherence to the blueprint. Then the mating parts were assembled and an X-ray was taken of the unit. An examination of the photograph disclosed that the relationship between the parts was entirely unsatisfactory and contributed to the malfunctioning of the unit. In other words, the engineering department had defaulted in its obligation of providing a service that indicated exactly what was required for functionality, thereby placing the production group on "quicksand" where it was anybody's guess as to what should be done. Furthermore, another disservice was rendered production by faulty tooling and jiggling.

This may appear to be an extreme case, but the same situation, to varying degrees, occurs frequently in many plants. In addition to proper

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then to follow-up on the solution of the difficulty. By doing more than catching the deviation, a man becomes more valuable to the company and feels that he is a member of the productive team.

Practice 7--No Man Can Serve Two Masters. The inspection personnel should be protected from a situation in which they have to take orders from a number of individuals. A decision must be made as to whom their services are the most valuable--whether it is engineering, production, or top management. This raises the problem of organization, plus the administrative procedure that they must follow.

Work is involved so far as routine inspection is concerned. Parts have to be handled and moved. In so doing, no fundamental value in the way of form utility is added to the product. Therefore, it is to the interest of the company that protection be achieved with a minimum of effort. This objective in turn can be carried out by the two following practices.

Practice 8--Quality Consciousness in Manufacturing. First, quality cannot be inspected into a product. Quality is properly achieved by the producing or manufacturing personnel as they are operating the process. Therefore, if they are stimulated to watch constantly for those factors that may contribute to poor quality and immediately to correct them to prevent waste, the inspection department has a strong ally. But too many times in the shop, the inspection department is considered to be a watch dog that will assume devouring of the poor from the good product. This is not their basic responsibility at all. The real watch dog of quality is the producer of the product.

Practice 9--Rate and Effectiveness of Inspection. Second, after the amount of necessary inspection is reduced by developing quality consciousness in the minds of the operators, the next step is to make certain that such inspection is performed efficiently. This requires active consideration of the application of work simplification methods, of the use of sampling and other statistical procedures, the proper placement of inspection stations, whether roving or centralized, and similar devices to disclose the deviation more effectively and with greater speed. This latter point is extremely important, as reduction of necessary inspection for segregation of poor product is automatically accomplished when deviations are spotted rapidly and necessary data are immediately forwarded to production or other groups for early remedial action.

## The Catalytic Effect of Quality Control

At this time it is possible to illustrate a very fundamental concept of quality control. Administrative power is created through a cycling

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Summary

First, inspection and quality control involve technical and administrative activities operating, so far as its basic requirements are concerned, as balance wheels to knit an industrial structure together. Anything done in this field must be evolutionary in character rather than revolutionary. "Bull in a China Shop" technique is disastrous. In promoting better quality levels any outsider must realize that any industrial establishment has developed by long practical experience a balance in its operations. If any change is necessary, the nature of improvement has to be carefully thought out and exercised over the entire organizational structure.

Second, there is a fundamental difference between inspection and quality control. Inspection is largely a policing agency, but if a policeman arrests a man for beating up his wife, he is not going to be the court and the judge. He will have to arrest the man, but the man goes on the docket for a hearing before a judge, because the latter realizes broader implications than the policeman himself. Inspection calls for sound and precise directives to the inspection group as to their authority and actions. Quality control, on the other hand, sometimes has to throw the rule book away and develop an attitude that is cooperative in nature in seeking facts and reconciling the difficulties.

QUESTION: I got the impression that production up in the right-hand corner of the chart and inspection elsewhere were sort of in opposition. What does the person in charge of production have as a tool for inspection to assist him in his responsibility of putting out a good product?

MR. BOYAN: That is very important, because it leads into the place of the inspection group with respect to production. A guiding concept is that quality is not created by the inspection department. Quality is created by the production department, and responsibility is fundamentally of that department. If the inspection department could be under production, by having them report to the production chief, the latter, organization-wise, is directly saddled with the responsibility for quality.

Because of the intimate knowledge of the production group of the day-to-day conditions of production, inspection can be directed along lines for maximum efficiency so that both groups tend to cooperate toward a common objective--the reconciliation of quality as against quantity. A production department head is often in a better position to insist on inspection service and can exert greater pressure for reform from his producing personnel and the staff groups servicing him. Inspectors, as an integral part of the production departments, do protect quality in some plants, especially when supervisors are capable, workers are conscientious, inspection is simple, and plant morale high. The main disadvantage to this arrangement lies in the fact that if the production

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its own arsenals and plants and industry in manufacturing similar articles. Now, there was, in response to a previous question, some discussion of the matter of inspection where the Government agent, sitting at a distant point, is buying this from a company. There is always the problem there of whether or not this company is thoroughly honest and whether or not they value the reputation of their firm. In other words, is it less expensive to handle rejects and maintain inspection on the floor, things of that kind, or should the Government give the authority to this inspector in the plant to make final acceptance for the Government or should he accept only a certain portion and leave a reservation to the final destination? Would you comment along those lines?

MR. BOYAN: The first thing that a contracting or purchasing agent must do is to be absolutely certain that the company is capable of fulfilling a quality characteristic that is desirable. If the contract involves a standard brand of goods or items, not divorced from company experience, the chances are the quality will be satisfactory, particularly when the item has already received recognition and acceptance.

If the contract is for something new, however, the procurement official in all cases should make a first-hand review of the facilities. This means a trip through the plant in many cases to determine how well the basic requirements of manpower, facilities, materials, administrative methods, engineering, and so on are met. This is a form of inspection.

If a decision is then made to award the contract for a new item a company should have the opportunity of reviewing the Armed Forces specifications, and making changes to conform with their shop and engineering practice. Then approval should be rapidly granted by the Armed Forces if functionability and interchangeability is achieved. By this practice many economies in production and time of delivery can be obtained, in addition to avoiding arguments and interpretation of specifications.

Following this, as stated in answer to the earlier question, the company should then be doing the inspection and be responsible for catching poor work. The government inspector then exercises an audit through final inspection to assure adherence to this responsibility. If the government inspector is competent and honest and the company's quality levels are satisfactory, no further protection may be necessary.

(2 September 1948--450)S.

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