ORGANIZATION DESIGN AND INNOVATION: A COMPARATIVE ANALYSIS OF TWO CORPORATIONS

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Abstract
Mechanistic organizational structure is optimal when the environmental conditions are stagnant and balanced; while organic organization structure is optimal when the conditions are constantly and rapidly changing (Burns Stalker). In this research, structuring of the research and development (R&D) departments in the corporations executing in Turkey is examined. The research contains a field research stating the R&D structuring of two corporations in Eskişehir. These corporations are on the top two ranks among the members of Eskişehir Camber of Industry in terms of allocating resources for R&D. Neither of these corporations have an independent R&D structure. A seperate R&D structure as shown in Seperate Early model stated at the classification of Westerman doesn't apply for them. Both of them organize their studies by structuring a central R&D. This situation can be explained in two reasons: Saving money and benefiting from incentives. R&D departments of these corporations conduct their business by conceptualizing projects. In other words, some business executions are only possible by framing them in a project. Conducting project type business has brought along an organizational structure with specific characteristics. This development is the result of the need for different persons, sources and groups in order to complete a work defined as "project". The organizational structure widely used in project management is matrix organization. All these results indicate that corporations design their R&D structures by considering the dynamics of Turkey.

Keywords: *Organization design, innovation, research and development department*

JEL Classification: M1 (Business Administration)

1. INTRODUCTION

The aim of this study is to explore the organizational design choices concerning research and development (R&D) departments in order to efficiently adapt today's highly turbulent business world. Innovation of a product or a service is not only a challenge for production process but also it is highly related to organization design. In addition, based on the findings in prior research proved that efficiency can be reached by finding the suitable organization designs. Organization design and the positioning of the R&D department in that configuration is a crucial factor affecting the overall efficiency level of the organization. The following part of this paper opens with a brief introduction of literature review. Next section includes the presentation of the cases constructed from the data generated by the comparative case studies conducted in two manufacturing firms located in Eskisehir, Turkey. Finally, the findings of the research is provided and discussed along with suggestions for further studies.

2. LITERATURE REVIEW

At the end of the 20th century, the perspective dominated the organizational paradigm which tries to understand the relationship between organization and the environment is known as contingency theory. Numerous studies conducted proved the validity of the contingency theory (Lawrence and Lorsch, 1986; Burns and Stalker, 1994; Donaldson, 1995). Burns and Stalker (Burns and Stalker,1994:13) proposed two different organization design choices according to the nature of the environment namely; the organic and mechanic organization designs. Organic designs are found to be more suitable to the environments in which the pace of change and the intensity of the competition is high. On the other hand the mechanic designs fit best when the environment is relatively stable and the competition is not that much strong. Competition in 21st century is intense ever than and only a few sectors left to be said stable. The key to stay alive and become a powerful part of this competition game requires firms to be innovative. This need of being innovative can only be realized by configuring firms around organic structures. However organic structures are suitable for being innovative, the type and the design of the unit conducting innovation work becomes another salient issue to be solved by managers. Westerman (Westerman et. al, 2006:231) offers three different choices for designing innovation units within the manufacturing firms. These are named as "Separate-early," "integrate-early," and "wait-then-transform." The choice of the structural design of innovating units is dependent on

and should be in line with the sectoral and organizational norms and environmental dynamics.

3. RESEARCH AND FINDINGS

The aim of the research is to define how corporations working in Turkey structure their R&D departments. At the end of the research, there is an analysis comparing the R&D structures of two corporations located in Eskişehir. These corporations take place at the top two ranks of Eskişehir Chamber of Industry in terms of allocating sources for R&D. By making interviews with R&D directors of these corporations, which are in Food and White Appliances industry; information about their source usage, communication among workers, their assessments, their innovative studies, etc. was gathered. Directors who joined interviews are executives who know the process of R&D department. During the interview, pre-prepared questions were used. However, the interviews were carried like "conversations"; so the directors had a chance to express their opinions freely. They were encouraged to give their messages in between the lines which was a good way to gain knowledge about the issues non-stated in the questions. This research is like a "preliminary survey" which can be used as a guide for another comprehensive research. The findings are relayed as follows: First the structures of R&D departments in these corporations were stated; then their similarities and differences were defined.

3.1. Food Corporation

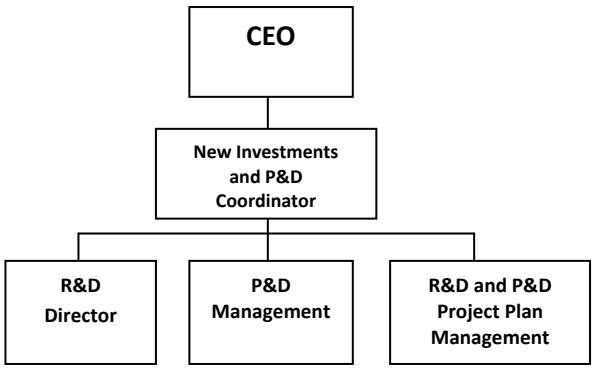
Food corporation produce biscuits, chocolate and cake. The corporation employs 4000 people and produces around 300 types of products with more than 50 brands. All of the premises of food corporation (6 factories) are in Eskişehir. Food corporation can be defined as innovative. Thus the contribution of the latest products to the endorsement has been around %20 for the last 3 years. When compared to white goods corporation, the biggest difference is the "central R&D" structure. Because all of the production lines are in the same city and five of them are located so close to each other. This makes central structuring easier and becomes affordable. Since 1986 the main food establishment has a central R&D department. Also two of the four factories have seperate quality assurance and R&D departments Central R&D department provide service forth a whole group (4 factories). With the reconstruction accomplished in 2010, two central departments were established. These are R&D and P&D (product development). The aims of these departments are defined as follows:

R&D: It means following researches on products, raw materials and processes; debating on the applicability of these researches; executing trustable food researches; keeping up with the technologic developments; exploring innovative products, materials and methods which will carry the corporation to the future, in accordance with the corporal aims and strategies by maintaining the innovative approach in the long-term.

P&D: It means providing continuous development in the short and medium term with new high-potential product designs and continuous improvement of current products by supporting the corporation in the competition environment in accordance with the corporal aims and strategies.

As stated above, the R&D department of food corporation is mostly concentrated on renovating technology, raw materials and workflow process rather than new product development. Both of the departmants are working under New Investments and Product Development Coordinator. The organization chart is shown in Figure–1.

Figure 1. Food Corporation Organization Chart



28 full-time employee work at R&D. These employees are R&D engineers and R&D technicians. Also in accordance with matrix organization structure, some employees working at other departments (marketing, production, etc.) support R&D (temporarily). All of them have bachelor's and postgraduate degrees. R&D department of food corporation is in cooperation with universities. For example; Hacettepe University has joint projects with Anatolian Agricultural Research Institute (Anadolu Tarımsal Araştırma Enstitüsü - ATAEM). In general, teamworks are applied. Conceptualizing projects brings along the matrix organization structure. The problems and their solutions related with matrix organization are stated in "analysis" part.The source usage of R&D department is

an important research subject. For instance; Westerman research analysed which organization models would acquire the sources of the corporation. According to the findings of Westerman, R&D departments organized autonomously have difficulties in using sources.

In food corporation, expenses of R&D department are defined in numbers according to the annual goals. In general, the budget of following year is planned in September. Reserve funds are allocated for extraordinary conditions. In 2010, around a 2 million American dolar worth source was used. Personnel expenses are not included in this budget. R&D department didin't have any difficulty in using sources; since the executives supported R&D. This explains why the department is central rather than being autonomous. In food corporation, R&D department work in the same building; so they use traditional communication methods. In addition to traditional communication, electronic intercommunication is widely used. All the information is recorded on an electronic portal. The employees use this portal as an information sharing medium within the framework of their authority and liabilities. While communicating with suppliers, universities or the employees of other departments; different methods such as videophone system can be used. Also at the R&D department of food corporation, "Prescription Management System" is used. Patents of numerous products are secured on a portal under the name of "prescription". The confidentiality of these prescriptions are quite important. Therefore these prescriptions are secured in a system in which written documents are not used. At the production phase of the factories using this system, the system includes the mixture into process by scaling. None of the employees see the whole prescription of each product (biscuits, chocolate, wafer, etc.).

Food corporation measure the performance of R&D department employees (like all the other departments) in a systematic way. According to corporal performance evaluation system, there are some pre-defined goals (on corporation, department and individual levels). For example; it is possible to be at a premium both as corporation, department and individual when R&D department bring in a new applicable innovation. This implies that the employees are highly motivated.

R&D department of food corporation constantly follow external world, their rivals and technologic improvements. For insantance; internet, media, national and international congresses and fairs are being followed. The credit of public opinon, especially the youth and the kids, is evaluated through researches. On the other hand, new products (biscuits, chocolate, wafer, cake, etc.) launched in the worldwide market have been under inspection. The support of the executives are

the most important aspect of all. Top management executives internalised the importance of R&D. Therefore; they support every move of R&D department. This approach indicates that R&D organization structure can be favourably updated if requested.

3.2.White Goods Corporation

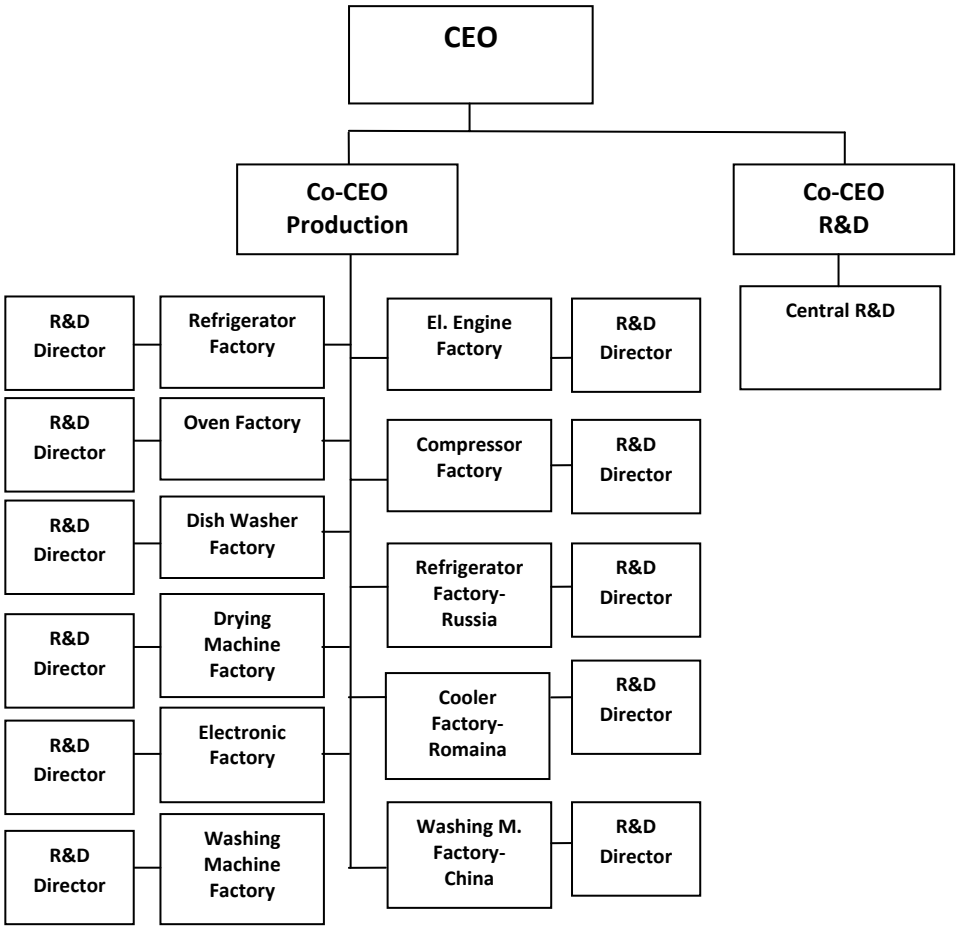
White goods/appliances corporation manufacture all kinds of white goods (refrigerator, washing machine, dishwasher, oven, kitchen appliances and electronics, etc.). The corporation employs 17.000 and has 8 factories in Turkey and 3 factories abroad. Their compressor and refrigerator factories are located in Eskişehir and around 2000 (two thousand) people work in these factories.

Two of the manufacture premises of white goods corporations (11 factories) are in Eskişehir (compressor and refrigerator factories). Different locations for factories are the main difference between white goods corporation and food corporation. Factories manufacturing at different cities and even different countries have their own R&D departments. In addition, there is a "Central R&D" in İstanbul. In the central R&D, there is a big laboratory and simulation devices. Using expensive hardwares at a center on common basis provides cost savings. In other words; there are test and simulation systems in central R&D. These hardwares provide service for R&D studies of all the other factories. For instance; rapid prototyping device which costs around 5 million USD is at the central R&D. The R&D departments of other companies use it when necessary. Also the same device test equipments like electric engines, compressor, etc. Testing devices in the laboratory can be used 2 or 3 times a day according to the density of business.

White goods corporation can be defined innovative like food corporation. In addition the white goods corporation is a leading company on the field of R&D in Turkey. White goods corporation holds 1/3 of patent applications of Turkey. They apply for around 130 new patents each year. As of 2008 they are the first and only Turkish corporation which took place in the first 500 list of WIPO (World Intellectual Property Organization). The corporation was awarded with the first prize by Turkish Patent Institute (Türk Patent Enstitüsü) for being the corporation with the highest application rate between the years of 1995 and 2010.

Refrigerator factory of white goods corporation has 20 patents. Blue Light Technology which keeps vegetables and fruits fresh for a long time is the most popular patent of the corporation.

Figure 2. White Goods Corporation Organization Chart



In the white goods corporations there are both central (in İstanbul) and factory-based R&D. The factories of the corporation are in İstanbul (2), Eskişehir (2), Tekirdağ (2), Bolu, Ankara, Russia, Romania and China. As seen in Figure–2; central R&D is under the co-ceo who is responsible for R&D and factory-based R&D is under the co-ceo who is responsible for manufacturing. The relationship between these two R&D departments can be explained as in follows: R&D projects which can be executed with the sources of the factory are handled in the factory-based R&D. The projects which require more source, knowledge, test device and laboratory facilities are handled in central R&D. Sometimes these two departments work in cooperation. For example; testings of a factory-based R&D project are carried out by central R&D.

Central R&D department was founded in 1980's as one of the first R&D centers of Turkey. It was renamed as R&D Center in 2008. The reason of the renovation made in 2008 was the effectiveness of 5476 numbered Code which supports R&D operations. This Code provide tax advantages until 2023 for the corporations which establish R&D Centers. This advantage was given as an incentive for improving R&D activities in Turkey. R&D in Eskişehir Factory was at first a department working under the name of "Technical Directorate". Then in 1995, it was renamed as "Product Development" and in 2000 as "R&D Department". 120 full time employee work in Eskişehir R&D. Matrix organization is being used both in central R&D and Eskişehir factory-based R&D of white goods corporation. Some employees working at other departments (marketing, production, etc.) can support R&D when they are required within the concept of a project. As stated above, the same matrix structure is also available in food corporation. In white goods corporation, "rotation" is used in addition to matrix organization. The reason behind rotation is to increase awareness on the issue of R&D by transfering a personnel from another department to R&D for a limited period of time. Similarly, they work as teams. All of the R&D employees have a specific expertise and they document this expertise (especielly at postgraduate education level).

The source usage of white goods corporation's R&D department is also similar to food corporation. Like in all other departments, they plan how much sources will be used and how these sources will be acquired in the following year in numbers. In this planning process, estimations are made by considering the sales and changes in production. Central R&D employees work in the same building (in İstanbul). There is an important cooperation between central R&D and factory-based R&D. Therefore there is a constant communication between the two departments. In this communication, electronic mediums (such as e-mail and video conference) are used. Also these two departments make four review meetings each year. In these meetings; current projects and the accomplishment rate of goals are analysed. All the other "monitoring" activities are conducted by electronic medium except for the review meetings.

There isn't a special model used for measuring the performance of employees. The current performance evaluation system of the corporation is applied for the R&D department as well. In addition to this process; an extra payment is given for the employees who take place in a patented project. In white goods corporation; external world and technologic improvements are followed by some other departments (production, quality assurance, marketing and patent) in addition to

R&D. Especially the technologies, new products and technologic improvements of rival corporations are being constantly monitored.

Another similarity with the food corporation is the supportive approach of executives. There is a top management in white goods corporation which integrates innovation into the name of their company. They are interested in the studies in R&D department and they inspect the results in detail. This situation enables fast solution process. As a result, the R&D structure which is a very valuable department for executives can be renovated as the needs for renovation arise.

4. ANALYSIS

The R&D structures of the corporations can be analysed by their "common" and "different" aspects. Thus; an explanative analysis can be made. So there are "common" and "different" work processes in the following explanations:

4.1. Common aspects: Neither of the corporations have independent R&D departments. Neither of them have an R&D structure similar to the Seperate Early modern of Westerman classification. This situation can be explained in two reasons: Saving money and benefiting from incentives. The reason for central R&D structure is to make savings by benefiting from scale economy.

In Turkey R&D activities are supported by law. The discounts, exceptions, support and incentive factors provided by law can be listed as follows: R&D discount, income tax witholding incentive, insurance Premium support, documentary taxes indemnity, techno-enterprise capital support. Corporations design organizations as "a different department in the same organization" in order to benefit from these opportunities. The aim of the Code put into effect on 28.02.2008 was to turn the national economy into an international competitor by developing R&D and innovation. Therefore; production of technologic knowledge, innovations in products and production processes, improvement of product quality and standards, increase in productivity, decrease in production cost, commercializing the technologic knowledge, development of cooperations before competition, acceleration in foreign capital investments and increase in employment would be encouraged.

The R&D departments of the corporations conceptualize projects. In other words, some works can only be accomplished by turning them into projects. Executing project type works brings along a uniqe organization structure. This is a result of being in the need for different persons, sources and groups at different times to finish the project. Project organization (matrix organization) is widely used at

project management. There are three important relationship in matrix structure. First one is the relation between the project manager and functional unit managers (production, marketing, etc.). They don't have any hierarchial connection; so they can discuss the matters and try to persuade each other. If they cannot find a solution and carry the matter to executives; they lose credit before the top management. The second one is the relation between the person who works in an expertise unit and has place in a project, and the managers of expertise units (functional managers). Such an employee is responsible towards the expertise unit manager in terms of his technical knowledge and expertise abilities as well as the results he gained at the project. Functional manager is also responsible towards top management in terms of the activities performed by his employees. The third one is the relation between project manager and above mentioned employees (who work in an expertise unit and have place in a project). These employees taking place in the project team are responsible towards project manager in terms of their works in a specific expertise carried out in a defined time and cost. However; project manager doesn't have any traditional command authority on these employees. He only has a "project authority" Decisions related with the project employees (such as promotion, payment, premium, etc.) are made in cooperation by project manager and functional manager. These three types of relationships make matrix structure difficult.

Both of the corporations with which interviews were made stated that their project management didn't have any difficulties and conflicts as explained above. When we look for the reasons behind such a positive outcome, we see that both of them are quite professional, corporal establishments. They are not "boss-oriented" but "system oriented". Open and effective communication lessen the problems before they arise. Executives with leadership qualities, performance evaluations and payment policy are other aspects of this success. Everybody in the organization should work in full cooperation as the project has to finish in a defined time, with a defined cost and quality. Any delay in project affects the project members in a negative way. Therefore; personnel of these corporations can freely discuss the problems instead of making effort on gaining authority/power. Both of the corporations make performance evaluations of employees who are project members by getting the opinions of both of their managers.

4.2. Different aspects: The biggest difference between the R&D departments of the corporations is that the food corporation has only central R&D; but white goods corporation has both central and factory-based R&D. The reason behind this structure is cost saving as explained above (common laboratory, equipment usage, etc.). Also in food corporation R&D takes place in "the same department";

but product design is carried out under "P&D" and the designing methods are decided under "R&D". As it is understood from the name that product development (P&D) is based on product while R&D is based on process. These units are under the control of same executive, they share same sources and they take place in the same building. In addition, there is a portal called "prescription management system" in food corporation. Here kept hundreds of product patents under the name of "prescription" in computer files. All of the employees have different levels of Access to these files in accordance with their authorities.

Another difference is the "rotation" activities in white goods corporation. The reason for rotation is giving a chance to employees to see and learn the processes of other departments. R&D has a different importance in this process. Because the corporation encourages their employees for being innovative. Table–1 shows the common and different aspects of these corporations:

Table 1. Common and Different Work Processes

	Food Corporation	**White Goods Corporation**
R&D Organization	Group R&D	Group R&D + Factory R&D
Internal Organization	R&D + P&D	R&D
Seperate Corporation Structure	None	None
Rotation	None	None
Personnel	30	120
Cooperation	University	Universtiy
Working method	Teamwork	Teamwork
Budget	Based on planning	Based on planning
Communication	Traditional + Electronic	Traditional + Electronic
Performance Assessment	Individual,departmant, corporal	Individual,departmant, corporal
Monitoring	Based on constant research	Based on constant research
Executives	Support	Support

5. CONCLUSION

Burns and Stalker researched how the organizational structures of corporations were affected by external environmental conditions and their findings made important contributions to contingency theory. Their classification of "mechanistic and organic organizational structure" was widely accepted. Mechanistic organizational structure is optimal when the environmental conditions are stagnant and balanced and rate of change is slow; while organic

organizational structure is optimal when the conditions are constantly and rapidly changing. As known, R&D departments are the most innovative units of organizations. R&D departments monitor the developments at external world, improvements in technolgy and the performance of their rivals as well as trying to adopt these factors. Therefore; R&D departments are supposed to give the fastest reaction to changing environmental conditions. The duty of the executives is to prepare the optimum conditions for faster reactions; in order words to design optimum organizational structures. As a matter of course, organic structures are the most suitable structures for R&D. Favourably a matrix organization, which easily accomodates changing conditions and gives flexibility, designed together with organic structure is the most optimum structure for R&D departments. Because there aren't detailed and limited job definitions at R&D departments. Instead of that, they are supposed to have a voice in their works. Instead of embracing the chain of command, they give importance to communicate with solution based persons. Communication among organization members is like a consultation (lateral communication) rather than a command relation. Organization is generally open to environmental factors. R&D organization is open to debates among individuals and groups. It even encourages these debates. There will always be disaggrements and conflicts between R&D director and functional units (such as production, marketing, etc.) on the issues like cost priorities, timing, usage of materials. These conflicts should be discussed with solution based approach and solved by using persuasion. Also in the fields like R&D, things may not be decided in details. Even so they may change over and over. Lots of things can be in need of being researched, discussed and tested. Thus people who plan on working at R&D departments should be able to bear obscurity and be patient. R&D departments are optimum organizations for constantly changing conditions rather than stable and routine conditions. The only deficiency which is not welcomed in this structure is communication faults. Every change and decision related with R&D should be relayed to the personnel. So versatile and effective communication has utmost importance. New technologies (such as e-mail, instant message, video conference, etc.) provides necessary conditions for multi-directional communication. The problem is the willingness of the users. But for both of the corporations, this situation does not become a valid problem.

Here in this research, R&D departments of two big corporations were analysed. Findings show that neither of them have independent R&D departments and both of them work project-based. This situation implies that corporations structure their R&D departments in accordance with the dynamics of Turkey. Both of them benefit from tax refund, incentives, etc. by structuring a central R&D. Another

reason for such a structuring is cost savings acquired by using common equipments. Westerman claims that there may be some obscurities in innovative units and there are three types of adaptation modes for overcoming these obscurities: Separate-early, Integrate-early, Wait then transform. It is seen that neither of these corporations use solutions similar to the adaptation modes of Westerman in their R&D departments. Obscurities are solved with the directions of executives. What explains a R&D structure is not the way of finding solutions for obscurities but "their reason for saving and benefiting from incentives". On the other hand, executives of the corporations embrace being innovative. These people spare most of their time and sources on finding ways of making an innovative corporation. This indicates that top management executives internalise the innovation. As a result; considering that R&D organization is not only an organization structure but also an organizational life style, we can conclude that both of these corporations largely embrace the innovative life style.

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