Factors Affecting Innovation Diffusion: The Case of Turkish Armed Forces

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Abstract - It is inevitable that organizations have to adopt speedily changing market conditions in order to sustain their existence. Improving an innovative management manner is also required for this adaptation. Pursuing new technologies, trends, and adopting improvements has become the major rule of the competitiveness. The concept of *Innovation Diffusion* which is the indicator of the rate of application of innovation to the process of organizations is getting importance. The models and analyses formed, play an important role in the strategic decision making and planning facilities.

The political authority, social, political, cultural, and organizational structure, commitment of top management and employees, and the function, performance, and the cost of the new and old technologies affect diffusion of technologies at several levels. In this study it will be introduced, at which level and how, organizational structure, including communication dimensions, information sharing, and commitment to innovations, influences the *Innovation Diffusion*.

Turkish Armed Forces (TAF) is also using an innovative management system in order to adopt to the new technologies. Examining *Innovation Diffusion* in TAF's structure will provide an advantage in strategic decision making and planning. In the present study we will first discuss how the innovation diffusion is performed and which models are being used. After inspecting the importance of the organizational structure among aforementioned factors, the effect of the critical aspects of structure of the TAF on innovations, newly adopted to the system, will be investigated. At the end of the study, it will be tried to reveal which type of organization structures is suitable for fast innovation diffusion. As a conclusion, it will be tried determine which properties must be gained to the structure of TAF to spread the innovations easily to all units of the system.

Key words: Innovation, diffusion, Turkish Armed Forces, technology.

I. INTRODUCTION

Innovation and diffusion of innovation have been the focus of many authors in the literature. Since innovation constitutes the focal point of the topic, before giving information about diffusion processes, it is important to deal with discussions about innovation and its characteristics.

Innovation has been defined by many authors in different manners. These definitions fundamentally depend on the concept of "invention". Mansfield [41] has favored that *"when we applied the invention for the first time it is called innovation*". Rogers and Shoemaker [54] examined the human side of the topic and defined innovation as an idea, practice, or object perceived as new by an individual.

Zaltman et. al [65] discussed three types of innovation definitions including adopted innovations. First definition is synonymous with the term invention. It refers to a creative process that combines two or more existing concepts in a new way. It may be a recombination of the old ideas, a scheme that challenges the present order, a formula, or a unique approach. The second definition says that when an existing innovation has become a part of an organization this is also an innovation, because the two apart side, individual or organization and innovation are brought together in a new way. Third definition includes a new idea, artifact, or practice, that is invented or accepted as new, independent of adoption or rejection.

Many scientists argued the economic side of the term "innovation". Drucker [16] stated that innovation does not have to be technical. It is an economic or social rather than a technical term. It can be characterized in supply terms as changing the yield of the resources. But in modern economy it can be defined in demand terms as changing the value and satisfaction obtained from resources by the consumer. Drucker [16] have proposed the term of "systematic innovation" that depends on purposeful and organized search for changes, and on the systematic analysis of the opportunities such changes might offer for economic or social innovation.

In this study the "innovation" term has been used as an idea, practice, technique, product, process that is newly introduced to the market. But the main point here was not the innovation processes in the organizations. Innovations introduced to market and adopted by organizations were the critical point of this study. For the R&D activities in the organizations see Kaya [35], and for the decisions whether to make or buy the innovations see Öncü [50].

II. LITERATURE REVIEW

Innovations are mostly classified according to the amount of knowledge that they contain. Innovations has been classified as:

1. Radical innovations (Revolutionary Innovations): Ideas that have impact on or cause significant changes in whole industry. It provides a brand-new functional capability, which is a discontinuity in then current technological capabilities [6][64]. For example; electron vacuum tubes, transistors, computers, lasers, and recombinant DNA techniques.
2. Incremental innovations (Continuous Innovations): Small ideas that have importance in terms of improving products, processes and services. They improve the existing functional capability of an existing technology

through improved performance, safety, quality, and lower costs [64]. For example additional grids in electron vacuum tubes, improved doping techniques in transistors, improved memory device in computers.

3. System innovations: ideas that require several resources and many labor-years to accomplish. It is a radical innovation that provides new functional capability based on reconfiguring existing technologies. Automobile, communications networks, and satellite operations are good examples for the system innovations.

4. Next-generation technology innovation: Incremental innovations within a system can create new technical generations. These innovation are still a kind of systems innovations but not radically new innovations. Such an innovation is system innovation that some have called "next-generation technology (NGT) innovation" [4]

A. Product and Process Innovations

Innovations are also classified as:

1. Product innovation
2. Process innovation

The aim of the product innovation is to offer customers radically new or incrementally improved products based on technological advances. The aim of the process innovation is to reduce the costs of manufacturing existing products [33].

Although Johne [33] has favored that both type of innovation is a variant of technological innovation, there are also product and process innovations in the service sector [11].

B. Technical vs. Administrative Innovations

Innovations are also classified from organization focus "technical", "administrative" "ancillary" innovations. The latter type have not been used frequently in the diffusion literature. The technical vs. administrative type classification is called as "dual core" typology:

1. Technical innovations (technological): These type of innovations occur in the operating component of the organization which consists of equipment and operations that change the raw materials or information into products or services. For example; adoption of a new idea pertaining to a new product or service, or the introduction of new elements in an organizations production process or service operations can be technical innovations. [11, 6]
2. Administrative innovations: They affect the managerial component that includes the social system and relationships among the organizational members. For example; introduction of Total Quality Management may be accepted as an administrative innovation. An administrative innovation does not provide a product or service but it influences the introduction of new products or processes [12].
3. Ancillary innovations are developed to assist the organization in its interrelations with other environmental constituents. For example; joint training programs, cooperative advertising campaigns [11].

Since factors examined in this study have mostly and significantly affect the technological innovations, they constitute the main focus [11]. Also the results of a poll conducted by Government Institute of Statistics (GIS) (see references) have shown that most of the firms are interested in technological process and product innovations.

C. Phases of Technological Innovation

According to Englert [18], there are six phases of the technological innovation (Figure 1.4.). In phase 1 many ideas are needed. Some techniques are used in order to promote creative ideas, for example brainstorming. In phase 2 the feasibility of the concept, technical, legal, and market constraints are studied, some experiments are made, competitive products are searched by the firm. In phase 3 the R&D department determines the optimum conditions and materials and studies the idea in a pilot plant. Engineering costs are assessed and are compared with the competitive products. Also customer interests are assessed in this phase.
In phase 4 the prototype is produced by engineering. Manufacturing methods are studied and manufacturing costs are developed by engineering staff. Field trials are conducted and final design is developed by engineers. In this phase sales methods are also selected. At the end of this phase engineering prepares a business plan. The manufacturing and marketing departments carry on the fifth and sixth phases of the process. Sales in the market are called diffusion phase. Manufacturing, sales, and the technical performance of the product influence the diffusion phase.

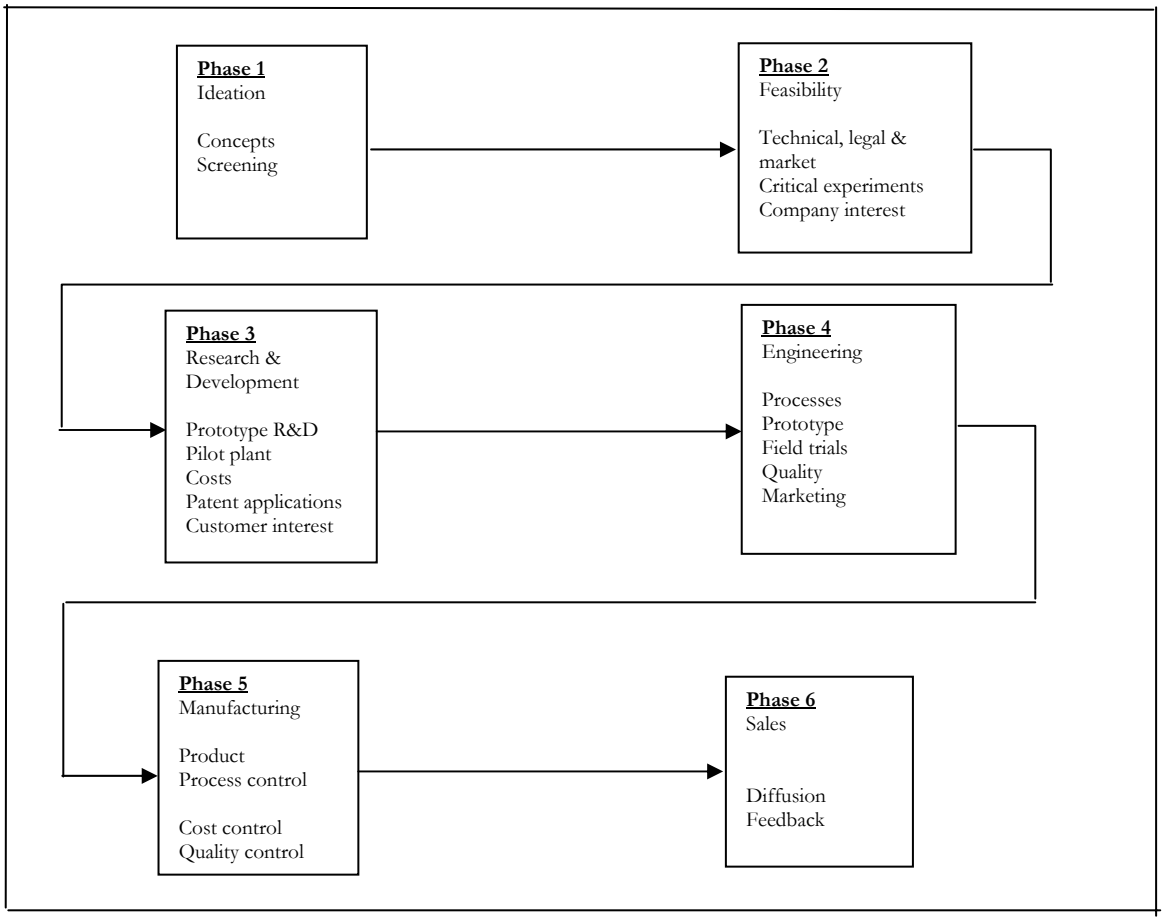
D. Diffusion of Innovations

Scholars from different disciplines (physics, engineering, economics, political science, sociology, management science, history, geography) have examined diffusion process from various viewpoints. Many interpretations have been proposed to explain and describe diffusion processes. Diffusion analysis have been applied to aid strategic business decisions and planning activities. The diffusion theories and applications have established a new frame of knowledge. This frame of knowledge is being used as an explanation for social and economic change [48].

E. Basic Concepts

The term "diffusion" term comes from the Latin word meaning "to spread out". Gases and vapors are the examples that fit the definition of the term. They slowly expand and spread through available space.

"Diffusion" is a concept that is linked with the idea of innovation. The terms "diffusion of innovations" and "spread of innovations" can be used interchangeably [65].



Source: Englert [18], p. 5

Figure 1.: Phases of technological innovation

The term "imitation" was used by some scientists instead of "diffusion" [51][41]. Many authors also have used "technology transfer", but this term refers to spread of technology from one industry to another, or among different economies. In some contexts diffusion may be analogous to the spread of information, but our concern here is the spread of physical items or techniques and practices.

Some authors used the term "innovativeness" as a characteristic of the organizations that shows the degree to which an organization want to invent or adopt an innovation [59].

"Innovation Adoption" and "Innovation Diffusion" have been used interchangeably in the literature [13] [28] [36]. It can be defined as a diffusion process from the industry viewpoint, But from the organizational viewpoint the term "innovation adoption" can be used. Diffusion process may also take place within the organizations.

F. Definition of Diffusion Process

Many authors have discussed the definition of the diffusion. The definitions were multi-dimensional. Because some of them were based on the individual decisions while the others were organizational-based.

Rogers and Shoemaker [54] have discussed the subject from individual viewpoint. Because they have examined the diffusion process as a part of social change. Social change is the process by which alteration occurs in the structure and function of a social system.. Social change occurs in three steps:

1. Invention
2. Diffusion
3. Consequences

Invention is the process by which new ideas are created or developed. Diffusion, on the other hand, is the process by which these new ideas are communicated to the members of a social system and it constitutes the second step. Consequences are changes in the social system as a result of the adoption or rejection of the innovation.

Parker [51] defined diffusion as a means whereby innovations become part of the production function or product range economic units which are not the originators. He also, as many authors, accept the diffusion as a phase of technical change. According to him diffusion is the stage where the benefits of an innovation are generalized. From the innovator, the innovation passes through other users until

it finally becomes a commonplace and accepted part of productive activity.

G. Innovation and Diffusion Research Perspectives

Innovation research has been studied by many authors and in many disciplines. These studies have been conducted under different perspectives. The discipline and goal differences have authors to examine the subject under different perspectives. These researches have been classified according to various criteria.

Subramanian and Nilakanta [59] have classified innovation researches into two groups according to domain which is to be examined:

1. Examining the causes of the innovative behavior of the consumers. The focal point of this research is individual customer. The marketing researchers are interested in this type of research. Because identifying the characteristics of the consumers help to enhance the effectiveness of the marketing efforts.
2. Examining innovative organizational characteristics of the organizations. The focal point of this research is organization. The researchers in the areas of "Organizational Theory" and "Strategic Management" are interested in this type of research. This research explains the organizational characteristics of the innovative organizations.

Innovation adoption research is also classified into two major categories:

1. Innovation Process Research: The diffusion of the innovations in the industry or market are examined. In the market, this research is interested in early or late adopters. In the Organizational Theory and Strategic Management it is interested in the organizational characteristics.
2. Innovation Variance Research: The factors affecting the innovativeness of the organizations are the main point in this type of study. These factors may be organizational, environmental. This type of research also associate innovativeness of organization, factors and organizational performance.

In a recent study Wilson, Ramamurthy and Nystrom [64] have discussed three types of research streams on innovation:

1. Diffusion of Innovation: Rate and pattern of spread of innovations.
2. Innovation Process: Identifiable stages of the innovation
3. Organizational-Innovation-Adoption: Determinants of innovation adoption in organizations.

The other research type is the spatial patterns of the diffusion process. Spatial patterns refer to the ways in which new products and processes spread geographically. This research is concern of economic geographers and anthropologists (eg. Hagerstand [31]).

In this research, the concern was to clarify the determinants of the "Innovation Adoption" among the organizations. That is, the factors that facilitate and impede the diffusion of the innovations among the organizations were the focus of this study.

H. Stimulus for Innovation

The stimulus for the innovation research may come from two sources. One is the conditions of the decision makers and the other is the performance gap in the organization's activities [30] [66].

When there occur a discrepancy between what the organization is doing and what it should do, it is called "performance gap" [66]. This performance gap increases the desire for the search for innovation. Performance gaps may stem from several reasons.

In addition to the performance gaps, the market demands, operating efficiency and cost, and response to technological opportunities have been found to the other factors stimulating the innovation [23].

I. Innovation Decision Process

Innovation adoption were accepted as a decision process in the literature by many authors [54][66][53]. Several stages were proposed to depict the process. In general, these stages were classified as individual-oriented and organization-oriented.

Rogers and Shoemaker [54] have proposed a four-stage decision making model for individuals:

1. Knowledge: The individual exposed to innovation existence and gains some understanding how it functions.
2. Persuasion: The individual forms a favorable or unfavorable attitude to innovation.
3. Decision: The individual engages in activities that lead to adoption or rejection of the innovation.
4. Confirmation: Individual seeks for reinforcement for the decision he has made. But he may reverse from his decision if he exposed to conflicting messages about the innovation.

Hage and Aiken [30] have suggested a four-stage model for organization decision making process. Although the end of one stage is not distinguishable from the beginning of the other, this analytical categories help in understanding the process. The stages are:

1. Evaluation: Study and assessment of the need for the innovation. Decision makers consider the alternative ways of correcting the problems of the organization.
2. Initiation: A set of activities starts after the innovation decision.
3. Implementation: The innovation becomes a reality in this stage. The other organization members have been introduced with the innovation. And so, innovation put into practice.
4. Routinization: Organization attempts to stabilize the effects of the innovation.

III. PROPOSED MODEL OF FACTORS AFFECTING INNOVATION DIFFUSION

Diffusion of innovations is affected by many factors. Authors have offered different characteristics and different models that determine adoption behavior of the organizations to the innovations. Although these models mostly are gathered around organization, innovation, environment, a few authors have made this type of distinction. In this chapter, at first the literature of the factors affecting innovation diffusion have been presented, then a new model that brings together the characteristics in a hierarchic manner has been proposed.

A. Organizational Factors

Most of the literature depends on the organizational side of the adoption research, because organization constitutes the focal point of the innovation and adoption topics. Not only the arguments contain structural characteristics, but also they include other attributes of the organizations, like resources, relationships among individuals and so forth.

Hage and Aiken [30] have concerned with the social change in organizations. They have used "program change" term instead of "innovation" and defined it as *"the addition of new services or products"*. They proposed seven characteristics of the organizations related to the program change. These are; complexity, centralization, formalization, stratification, production, efficiency, and job satisfaction.

Zaltman et. al. [66] have studied on five organizational attributes related to innovation. These are complexity, formalization, centralization, interpersonal relationships, ability to deal with conflicts. They have found that there is not a linear relationship between these variables and innovation. For example; at the initiation stage higher complexity, lower formalization and centralization facilitate adoption. But lower complexity, higher degree of formalization and centralization is needed at the implementation stage of the innovation.

Poor communication in the organization may lead to adopt innovations lately. Labour may resist to the change in an organization due to fear of displaced. Management may resist the change due to sheer inertia, reluctance to abandon learned methods, and reluctance to make investment. The long-lived equipment also causes to resist change. The elasticity of substitution of new capital for old, and capital for labor will facilitate the adoption to innovations [51].

B. Innovation Attributes

The most used innovation attributes related to adoption were proposed by Rogers and Shoemaker [54]. These characteristics were suggested to show how individuals' perceptions of innovations may be utilized in predicting the rate of adoption. They have concerned with five innovation characteristics; relative advantage, compatibility, complexity, trialability, and observability.

Tornatzky and Klein [60] have examined 10 innovation characteristics out of 30 attributes in their meta-analysis. They have defined each characteristic, and the quality of the references in terms of methodology, measure, nature of the adopting organization are given. Then the relationships between characteristics and the adoption behavior are reviewed. According to their methodology, compatibility, relative advantage, and complexity have found positively related to adoption. But other findings have been found insignificant for the adoption of innovations.

C. Environmental Characteristics

Few authors have studied on the environment characteristics of the organizations that affect the adoption behavior. There is no sufficient empirical or theoretical research on the environmental attributes of the organizations. But defining the domain that interacts with and affects the organization helps to identify what parts of it are relevant in decision-making.

Zaltman et al. [66] have considered the environment of the organization as a changeable domain. The environment of the decision-maker unit changes according to the characteristics of the decision. Also the information gathered from the environment plays an important role in the decision-making process. The empirical findings they studied on suggest that the most important information source for organization is market. So, they suggested market as the most important domain for the organization.

In this study environment of the organization has been considered as the external factors that influence the decisions of the organization. Internal environment of the organization has been discussed in the culture criteria group and in decision-maker category.

D. Individual Characteristics

The individual characteristics have been ignored in the literature of the innovation adoption. There is little conceptual and empirical study that supports the theory.

Rogers and Shoemaker [54] have classified the individuals into adopter categories according to the using the new idea. This adopter categories are containing individuals, with similar degree of innovativeness. The adoption to an innovation follows a S-shaped curve. This curve is normal due to the learning and diffusion effects. They have found that the adopter categories, based on this normal curve, are 2.5% as "innovators", 13.5% as "early adopters", 34% as "early majority", 34% as "late majority, and 16% as "laggards".

After these categorizations, they have listed the characteristics of the earlier adopters. Some of these are; earlier adopters are more educated, more literate, have higher social status, have greater upward social mobility, have more commercial economic orientation, have greater empathy, less dogmatic, have greater ability to deal with abstractions, have greater rationality, have greater intelligence, have more social participation, are more cosmopolitan, have more change

agent contact, have greater exposure to mass media communication channels, have higher degree of opinion leadership.

In this study, some of the individual characteristics used by Rogers and Shoemaker [54] have been utilized. Other attributes included in this study were the most correlated characteristics of decision-makers with the adoption of innovations.

E. A New Model For Innovation Adoption

A distinction, like organization, innovation, environment, and decision-maker, has been made by few authors in the literature. This type distinction helps us to understand the process thoroughly. Because each innovation can be taken up as a project for every organization. The success of this projects not only depends on the system it belongs. Also it depends on the development of the people and the organization [3]. All of these factors must be balanced. In the model proposed in this study, the factor groups cover "People, System and Organization" (P-S-O) approach at a balancing scale (Figure 1). The factors have been classified into four categories. These were "organization", "innovation", "environment", "decision-maker". The "innovation" and "environment" in this model refer to the system dimension. All variables studied were thought of importance in affecting the diffusion of or adoption to the innovations.

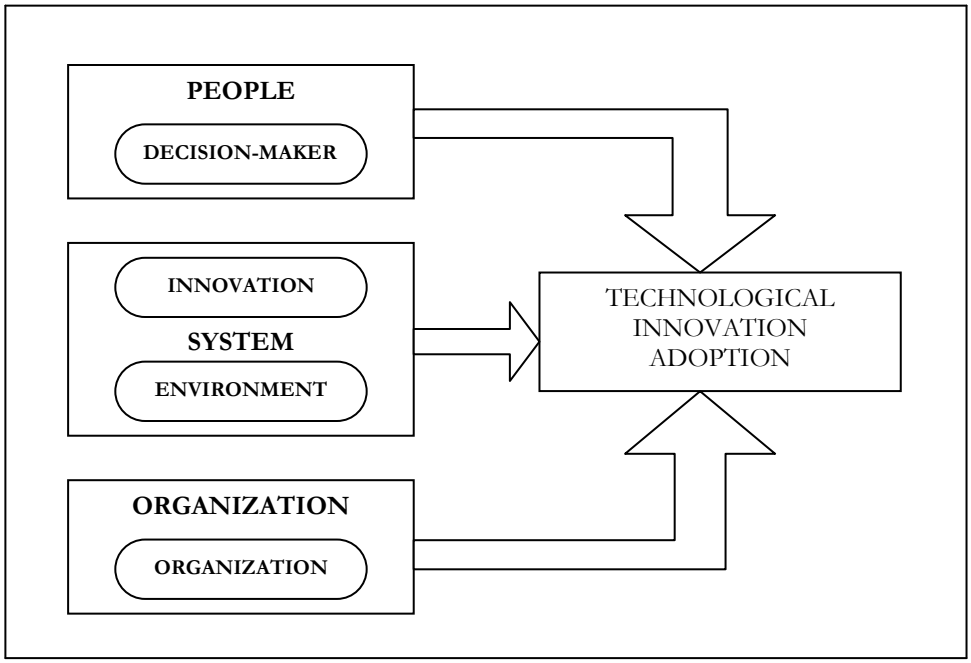


Figure 2: Innovation Adoption Model

IV. FIELD STUDY

We have tested the importance of factors affecting innovation adoption in three types of organizations in the light of the model offered in section 3 and above discussions about TAF. We have first revealed the purpose and then method of the survey have been presented. The statistical evaluations of the results were assessed and interpretations about the distinctions between the groups have been discussed. Then the conclusions and recommendations were made.

The purpose of the study was to determine the characteristics of organization, innovation, environment, and decision maker individual that affect the innovation adoption in organizations. The other purpose was to determine the importance degree of these attributes from the managerial viewpoint. So it has been intended to determine what characteristics of the organization, innovation, environment, and decision maker individuals potentially lead to innovativeness.

In this study at first factors affecting innovation diffusion have been reviewed using literature survey techniques and tools. After all the factors have been aggregated they have been grouped in order to constitute a model. Then the model has been investigated from the TAF's viewpoint. Then a field study has been conducted to test the importance of these factors for different organizations. Study has been conducted at the headquarters of General Staff (GS), Turkish Land Forces Command (TLFC), and Ministry of National Defense (MoND). In addition to these, two military factories and three civilian organizations have accepted to participate in the survey. The study was qualitative and descriptive.

A. Data Collection Methods

Two types of data collection methods were used in the study, interviews and a questionnaire. The other data collection methods could not be used due to the time constraints.

Interviews

The qualitative data needed have been gathered through the interviews conducted with the relevant personnel in TAF and managers from the civilian organizations. For our purposes five relevant personnel were selected from R&D Department of the Ministry of National Defense (MND) and Technical Project Management Department of Turkish Land Forces Command (TLFC). Although 5 managers from each three civilian organization have been planned, 8 interviews could have been conducted with 2 managers from each organization due to the time constraints. Because most of the questionnaires have been filled by respondents together with the pollster, additional interviews could have been made with the subjects.

Questionnaire

A questionnaire based on a form and an explanation part constitutes the main source of data. The factors affecting innovation adoption were listed in a form according to the order discussed in Chapter 3. The respondents were asked to enumerate the factors according to the importance in adopting innovations. The explanation part have helped them to learn the unfamiliar characteristics.

The data for TAF have been collected from the HQs of the General Staff and TLF. The complete data were available for a total of 86 responses for TAF. 75 subjects have represented the HQs of General Staff and TLF and the other 11 subjects have represented the military factories. While 35 respondents have been asked to fill the form for the "ideal" situation the other 40 have been requested to fill the form for the "present" situation.

We have totally received 30 responses from three for-profit organizations. (5 from Organization-A, 13 from Organization-B, 12 from Organization-C). 12 of the questionnaires were mailed, the others were delivered by face-to-face contact. They were not asked for the "ideal" situation.

B. Population and Sample

The population of the study included:

1. The population for TAF would be all the project officers, head of offices, and head of departments of the General Staff HQs and Service HQs that interested in the innovation and procurement facilities.
2. The population for the military factories would be all managers of these two factories located in Ankara.
3. The population for the for-profit organizations were managers of the selected three organizations.

The for-profit organizations were chosen by the help of associations and friends and were selected on the basis of one criterion. The organization known as neither extremely innovative nor totally lack of innovations. Three for-profit organizations were contacted.

"Snow-ball sampling" and "convenient sampling" methods have been used for the data gathering for TAF and military factories. For the for-profit organizations a different procedure has been carried out. In order to ensure that the most appropriate respondent answered our questionnaire, we have contacted a high ranking executive in each organization and have obtained their support for the research. This individual have examined the questionnaire and selected the respondents considered to be the most qualified to answer our questionnaire. The respondents were mainly the executives of the organizations at the level of general director, director, assistant director.

C. Data Analysis Method

In this study some statistical techniques were used to determine the importance degree of the factors. After questionnaire and interview responses have been obtained, the data were edited, coded, and categorized in terms of variables. After the raw data have been keyed into computer manually, the analysis have been done using Excel, one of commonly known computer program. We have not examined the relationship between the dependent (innovation adoption in organizations) and independent variables (factors affecting innovation adoption).

Importance of these factors, in the light of adoption behavior of the organizations, have been determined. Data were collected in ranking style. It has been used descriptive statistics to determine the ranking of the factors according to the importance for the organizations. Then factors have been ranked according to the mean and mode scores. The dispersion of the answers were examined by the help of standard deviations and means.

D. Validity and Reliability

A questionnaire has constituted the main instrument of the study. Before conducting the field study the prepared questionnaire has been implemented to the Military Research Group (MRG) members in order to test it whether understandable or not. But neither reliability nor validity tests could have been conducted due to the time constraints. However, some threats have tried to be overcome by simple techniques.

1. In order to avoid subject threat, the subjects of the "ideal" and "present" situations have been selected from different samples.
2. The rank distribution in the subjects selected from TAF were at a balancing scale in order to avoid also subject bias.
3. The subjects selected from each for-profit organizations were same-level managers in order to avoid also subject threat.

V. RESULTS AND DICUSSION

In this section we have discussed the results of the field study conducted with the determined units of TAF and civilian organizations. The frequency distributions of the subjects according to the organizations and ranks were presented in Table 1 and Table 2.

The frequency distribution of subjects according to their position in the organization were presented in Table 3. The position differences are due to the differences of the sectors that organizations are interested in.

TABLE 1: FREQUENCY DISTRIBUTION OF SUBJECTS BY ORGANIZATION

	TAF HQs	Military Factories	Civilian Organizations
Existing Situation	40	11	30
Ideal Situation	35	N.A	N.A
N	75	11	30

TABLE 2: FREQUENCY DISTRIBUTION OF SUBJECTS BY RANK IN TAF HQS

	TAF HQs (Present Situation)	TAF HQs (Ideal Situation)
First Lt.	8	8
Captain	8	10
Major	10	9
Lt. Colonel	8	6
Colonel	6	2
N	40	35

TABLE 3: FREQUENCY DISTRIBUTION OF SUBJECTS BY POSITION IN CIVILIAN ORGANIZATIONS

	Organization A	Organization B	Organization C
Director of Department	-	1	-
Director	2	5	2
Expert	-	5	3
Director of Region	1		1
Director of Accounting	1	1	3
Director of Sales	1	1	3
N	5	13	12

A. Organizational Structure

Centralization degree has been found the most important characteristic of this criteria group according to all of the organizations studied (means: 2, 2.5, 2 respectively). That is, the most important facilitator factor or impediment for the innovations have been thought as the place where decisions are made by all organizations. The higher perceived centralization degree of these three type of organizations by the people working in may be the reason of this result. For example; in TAF all decisions about an innovation are made by the commander of the relevant unit. The other typical characteristics of TAF, vertical differentiation and formalization have been found as the other important factors by TAF HQs personnel (means: 3.2, 3.5). These results are compatible with the interviews made by people in TAF HQs. Because these characteristics are thought as the most important impediments for the innovations.

In the civilian organizations and military factories formalization and specialization follows the centralization. The similar characteristics of these organizations may be the reason of these results. For example; there are engineers under the factory director of military factors. These engineers may affect the factory commander easily, because there are not much communication problems stem from vertical differentiation for them. The mean and the mode scores of the ranks according to the organizations have been presented in Table 4. Size has been found as the least important factor for TAF HQs and civilian organizations (means: 4.4, 4.5). But in military factories functional differentiation has been found as the least important factor (mean: 4.7).

TABLE 4: MEAN AND MODE SCORES OF RANKS ACCORDING TO THE TYPE OF ORGANIZATION

	TAF HQs (Present)		Military Factories		Civilian Organizations		TAF HQs (Ideal)	
A. Organizational Structure	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**
1. Functional Differentiation	3,9	3	4,7	6	3,9	4	3,2	3
2. Vertical Differentiation	3,2	2	4,2	5	4,0	5	3,9	4
3. Specialization Degree	4,2	5	3,3	5	3,2	2	2,2	1
4. Centralization Degree	2,0	1	2,5	1	2,5	1	3,6	6
5. Formalization Degree	3,5	2	2,6	2	3,0	1	3,7	4
6. Size	4,4	6	3,6	4	4,5	6	4,4	6

In the ideal situation, according to the TAF personnel the most important characteristics for adoption of innovations are specialization and functional differentiation (means: 2.2., 3.2). The reason for this result may be the desire to increase the number of experts in the TAF HQs . So, innovations are likely to be accepted easily through help of these change agents. Higher functional differentiation, as stated before, may cause an increase in the number of specialists. The importance given to functional differentiation may be the result of this desire.

B. Organizational Culture

Occupational cultures has been found the most important variable for the TAF's HQs in adopting an innovation in the present situation (mean: 2.4). The reason for this result may be that occupational cultures include the attitudes of the managers to the innovations as we discussed in the literature. The attitudes of the commanders may be thought of importance by the TAF HQs. But in the ideal situation job satisfaction has been found the most important factor (mean: 2.2). The difference may stem from the problems due to job satisfaction of the people working in TAF HQs. That is, they may have thought that job satisfaction is important for innovation adoption but present situation have not reflected this result. Job satisfaction has been found the most important factor for the managers of the civilian organizations and military factories in contrast to TAF HQs (mean: 2.3, 1.8). Similar structural characteristics of these organizations may be the reason for this result. The ranking results of the structural characteristics explain this interpretation positively. The mean and the mode scores of the characteristics have been presented in Table 5.

TABLE 5: MEAN AND MODE SCORES OF THE RANKS ACCORDING TO THE TYPE OF THE ORGANIZATION

	TAF HQs (Present)		Military Factories		Civilian Organizations		TAF HQs (Ideal)	
B. Organizational Culture	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**
1. Ability to Deal with Conflicts	3,0	3	3,0	5	3,1	4	3,0	3
2. Job Satisfaction	3,2	4	1,8	2	2,3	1	2,2	1
3. Occupational Cultures	2,4	1	2,6	2	2,8	3	2,9	4
4. Age of Organization	3,5	5	3,9	5	4,0	5	3,9	5
5. Risk-taking Climate	2,9	1	3,6	4	2,7	2	2,9	2

The age of the organization has been found as the least important variable for the adoption of innovations according to all of the three organizations (means: 3.5, 3.9, 4). The ideal situation have showed the same result (mean: 3.9). Instead of age, presence of satisfied personnel and risk-taking propensity of the organization affect the adoption of innovations.

C. Resources

The financial position of the organization have been found the most important factor for the adoption of innovations according to the TAF HQs personnel in the present situation as expected (mean: 2.8). Although TAF is a huge organization it has a limited budget. Financial resource has been being assigned to the innovations planned in the strategic goal plans and ten-year procurement plan. There is no surplus money for the innovations not planned. Some projects are not implemented due to the financial problems. The results have showed that for civilian organizations financial position is more important than TAF (mean: 2.2). The financial situation in the market or sectors which the relevant organizations belong may explain the result. They have more difficulties to find financial resource for the innovations. Especially reluctance of the innovators to give the new idea makes the patent expenditures of the civilian organizations higher. Only governmental organizations or may cope with this expenditures. Military factories also have also some financial problems in adopting innovations as well as TAF HQs (albeit second, mean: 2.7, mode:1). Military factories' situation may be attributed to the hierarchical link with TAF HQs. The mean and mode scores of ranks have been presented in Table 6.

Decreasing or increasing efficiency in the existing system of TAF HQs has not been found important for the innovation adoption (mean: 4.3). Insufficient efficiency tests or self-control of the efficiency in the TAF HQs may be attributed to this result. The least important factor for the civilian organizations have found as the slack resources. (mean: 5). The reason for this may that slack resources can be accepted as a function of financial position of the organizations.

TABLE 6: MEAN AND MODE SCORES OF THE RANKS ACCORDING TO THE TYPE OF THE ORGANIZATION

	TAF HQs (Present)		Military Factories		Civilian Organizations		TAF HQs (Ideal)	
C. Resources	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**
1. Slack Resources	3,7	2	4,6	6	5,0	6	4,5	4
2. Financial Position	2,8	1	2,7	1	2,2	1	2,9	2
3. Technological Capacity	3,4	2	2,1	1	2,6	2	2,3	1
4. Technological Specificity of the Existing System	2,9	3	3,5	3	2,9	3	2,8	2
5. Production Volume	3,9	5	3,9	5	4,3	5	4,3	5
6. Increase-Decrease in Efficiency	4,3	6	4,1	5	4,0	6	4,2	6

The technological capacity has been found more important for military factories in adopting an innovation than TAF HQs (mean: 2.1). Operations and adopted new techniques may entail specific types of competencies in a factory because their operations depend on largely technology. Also knowledge resource of a factory can affect the adopted innovation. Know-how knowledge of the engineers working in a military factory is more important than that of working in headquarters. The least important factor, different from the HQs, has been found as the slack resources of the factories (mean: 4.6).

In the ideal situation technological capacity and specificity of the system have been found as the most important factors in adopting an innovation according to the TAF HQs personnel. (mean: 2.3, 2.8). The procurement of the systems is made by the TAF HQs relevant units. Because of this the knowledge of these units about the system is an important issue. If the functions and capabilities of the innovation can not be understood and transferred to the user unit efficiency might be gained from the innovation may decrease. Procurement without considering the existing system may cause some problems.

D. Organizational Strategy

This criteria group has been evaluated only for civilian organizations. Because there is no growth and product diversification strategy of TAF units. But the rank of "strategy" has been compared with the civilian organizations in the organization category in sub-section 4.4.14.

Although the mode score was 2, the growth strategy of the organization have been found to be the most important factor for the civilian organizations (mean: 1.8). The reason for this result may be attribute to the "market pull" effect. Because companies adjust their technological policies according to the market situations. They try to coordinate the relations between marketing and R&D departments to increase the effectiveness of the technology policy. That is, they try to determine the requirements of the market and determine a technology attack according to these requirements. The least important factor has been found as the product diversification policy (mean: 2.2). The reason for this result may stem from the great number of the varieties in the products or services that the organizations have.

TABLE 7: MEAN AND MODE SCORES OF THE RANKS.

	Civilian Organizations	
Organizational Strategy	**Mean**	**Mode**
1. Market Dominated Growth Strategy	1,8	2
2. Technology Policy	1,9	1
3. Product Diversification Strategy	2,2	3

E. Profitability of Innovation

The efficiency and the cost of the innovation to be adopt have been found as the most important characteristics for the TAF HQs both in the present and ideal situations (means: 2.3, 2.5). There is not much consensus on the ranking on these variables, because the means are very close to each other and the standard deviations are high

TAF is a public organization and does not consider profit. Time–saving properties of the innovation are important for TAF as a service organization rather than gains from the innovation after implemented as money. TAF always wants to adopt innovations offer accomplishing the tasks on time and perfectly. The cost also important because some projects are waiting for financial resource or can not be implemented due to the expensiveness of the new system. So this factor is highly related with the financial position of TAF. They have thought that returns to investment is the least important factor for the adoption of innovations (mean: 2.7). The mean of the returns here may be understood only as in money. Because there is no profit approach in TAF this factor may be thought as the least important factor. But in fact the returns must be thought as the benefits gained from the investments for TAF.

In the ideal situation also efficiency of the innovation has been found to be the most important factor (mean: 2.7). The risk in the innovation has been found as the least important factor (mean:2.6). This results shows that TAF takes the risk

of the innovation to a certain degree. Also reliability of the suppliers and tests and evaluations been made on the system before the procurement phase may be thought as a guaranty factor for the innovations. The mean and mode scores has been presented at the Table 8.

TABLE 8: MEAN AND MODE SCORES OF THE RANKS ACCORDING TO THE TYPE OF THE ORGANIZATION

	TAF HQs (Present)		Military Factories		Civilian Organizations		TAF HQs (Ideal)	
A. Profitability	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**
1. Financial Cost	2,5	2	1,8	1	2,3	3	2,5	3
2. Returns to Investment	2,7	4	2,3	1	2,0	1	2,6	3
3. Efficiency	2,3	2	2,8	3	2,7	3	2,1	1
4. Risk and Uncertainty	2,6	4	3,1	4	3,1	4	2,8	4

The cost of the innovation has been found the most important factor for military factories (mean 1.8). This situation can be explained by the budget constraints of the factories. Because they take financial resource for the new systems according to the limits in the ten-year procurement plan. Risk in the innovation has also been found the least important attribute according to military factories (mean 3.1).

The managers of the civilian firms have found the returns to investment as the most important factor for the adoption of innovations contrary to the TAF personnel (mean 2.0). As we have stated before, civilian companies have to gain benefits in terms of money in order to survive. This result is compatible with this judgement. Cost follows the returns because it is also related with the economical problems of the organization. Civilian organizations also take the risk of the innovation to a certain degree (mean: 3.1)

F. Functionality of the Innovation

In this group the compatibility and the relative advantage of the innovation have been found the most important attribute for the adoption by the TAF HQs and civilian managers (means: 3.5, 3.8 respectively).

The reason for this result may be the traditional structure of the organizations. That is compatibility of the innovation with the values and norms of the organization innovation must gain the approval of social system in the organization. Compatibility of the innovation with the existing system also may have been taken into consideration. This factor most important for the civilian organizations because the production system may be affected by the innovation and may cause some alterations that not wanted. Besides, this factor can be perceived the compatibility of the innovation with the needs or tasks of the TAF unit from the viewpoint of TAF. This latter one can be accepted as the main reason for this result for TAF. The relative advantage of the innovations is perceived easily in the crisis situations. TAF has been adopting innovations mostly for example in the Internal Security Operations and Cyprus Peace Operation. Innovations that offer more benefit have been used in these types of crisis. The most important point here is the rank of the characteristic "scientific status".

Reversibility and the complexity of the innovation have been found as the least important factors for all of the organizations (means: 6.1, 6.2; 6.3; 6.3, 6.5 respectively) except complexity for military factories (mean: 4). The reason for this may be whatever the complexity degree of the innovation it can be learned through some training or by the effort of the user. Organizations want to try the system before full implementation. Innovations that do not conform to the adopter system can not be accepted an implemented. They guaranty this with the specifications. So reversibility is not an important factor for the organizations. The mean and mode scores of the ranks have been presented at the Table 9.

TABLE 9: MEANS AND MODES OF THE RANKS ACCORDING TO THE TYPE OF ORGANIZATION.

	TAF HQs (Present)		Military Factories		Civilian Organizations		TAF HQs (Ideal)	
B. Functionality	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**
1. Perceived Relative Advantage	4,0	1	4,9	9	3,8	5	4,9	1
2. Observability	4,5	2	4,8	8	5,3	6	5,0	7
3. Trialability	4,2	4	5,3	3	5,5	5	5,1	5
4. Complexity	6,2	8	4,0	6	6,5	7	6,3	8
5. Compatibility	3,5	1	2,5	1	3,5	2	3,8	2
6. Reversibility	6,1	9	6,3	5	6,3	9	7,2	7
7. Terminality	5,2	8	5,9	7	4,2	5	4,7	6
8. Flexibility	5,6	9	5,5	7	4,0	2	4,5	2
9. Scientific Status	5,7	9	5,7	7	5,8	8	3,5	1

The results of the factories are almost the same that of TAF HQs. But there are important differences. Compatibility, for example, has been found more important than for TAF HQs. The reason for this may be the presence of technical operations in the factories. The specificity of the operations must be considered while procuring a new system. Complexity of the innovation also has been found more

important for them. important factor for the managers of the military factories (mean: 2.5).

In the ideal situation the scientific status and the compatibility of the innovations have been found the most important factors for the TAF HQs personnel (means: 3.5, 3.8). The results have showed that reliability, validity, generalizability, and internal consistency of the innovation has not been found so important for the organizations in the present situation. (means: 5.7, 5.7, 5.8 respectively).

G. Impact of the Innovation on Organization, Individual and Other Inputs

In this group the number of approval levels has been found the most important factor for an innovation to be adopted by the TAF HQs and military factory personnel (mean: 3, 2.8).

The procurement phases of an innovation entail a chain of approval channels. Approval levels in TAF can be classified into two groups. Some these are external Ministry of National Defense (MND), Government Accounting Bureau (GAB). The command chain constitutes the internal approval levels. Different subjects are considered by these levels while approving the innovation. For example; GAP approves the economic side of the innovation. In the present situation the number of these levels may be considered as impediments for the innovations. But it has been found as the least important factor for the civilian organizations (mean: 4.9). The reason for this may be the small number of gatekeepers in these organizations. In some organizations especially belonging a family or a person the innovation decisions approved by these family and person. But in general the executive committee of the company approves the adoption. Gateway capacity has been found the least important factor of this group for the innovation adoption in TAF in the present situation (mean: 4.8). The reason for this may be considering only adopted innovation and its benefits. They do not consider the innovations that the adopted innovation may cause to be brought. The reason for this may be the cost which these innovations may bring. But in the ideal situation the gateway capacity of the adopted innovation has been found the most important characteristic for TAF (mean: 2.1). The number of the approval channels has been found as the least important factor in contrast to the present situation. Mean and mode scores of the ranks assigned by the organizations have been presented at the Table 10.

TABLE 10: MEAN AND MODE SCORES OF THE RANKS ACCORDING TO THE TYPE OF ORGANIZATION.

	TAF HQs (Present)		**Military Factories**		**Civilian Organizations**		**TAF HQs (Ideal)**	
B. Functionality	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**
1. Social Cost	4,4	7	4,9	7	3,9	6	4,5	4
2. Impact on Interpersonal Relations	3,9	6	3,5	6	4,6	4	4,6	5
3. Publicness	3,7	5	4,3	5	4,1	3	3,7	5
4. Number of Gatekeepers	3,0	1	2,8	2	4,9	7	4,8	6
5. Complementarities Among Innovations	4,2	4	3,9	3	2,7	1	3,3	2
6. Origin of Innovation	4,1	3	3,8	5	4,4	7	4,5	7
7. Gateway Capacity	4,8	4	4,7	7	3,5	2	2,6	1

The ranking of the factors has been found different for the civilian organizations. The most important factor has been found to be the complementarities among the innovations (mean: 2.7). They may have thought that only taking the innovation as a whole provide a full benefit to the organization. Otherwise innovation may not be implemented and used easily. Complex processes and product system of the organizations may entail to procure the innovation as a package. (e.g. software)

H. Organizational Environment

Contact with information sources have been found the most important factor affecting innovation adoption in TAF (means: 3.9). But the high mean score and standard deviation show that there is not much consensus on the ranking of the factors. Information about the developments in the other countries constitutes the main technology policy of TAF. The result is compatible with the expectations. Because after information gathering TAF determines what type of innovation constitutes a counterpart. Contact with information sources is intricate with the competition in the TAF issue. Because information stimulates the innovation facilities in order to deter the threat e.g. tank-antitank missile. Results also compatible with this interpretation. Competition has found as the second important factor for TAF HQs (mean: 4.5). High mean score may be attributed to the perception differences. Because while competition for civilian organizations reflects country basis, it reflects world basis for TAF.

The least important factors for this group have been found to be the industry concentration, demand uncertainty, and competitive price intensity (mean: 5.8, 6, 6.1). The results may be attributed to the absence of demand, price, and industry concentration. The meaning of these characteristics may not be considered as in the civilian organizations. This may cause this variables to be placed to the lower places in the ranking. Mean and mode scores of ranks for the organizations have been presented in Table 11.

TABLE 11: MEAN AND MODE SCORES OF THE RANKS ACCORDING TO THE TYPE OF THE ORGANIZATION.

	TAF HQs (Present)		Military Factories		Civilian Organizations		TAF HQs (Ideal)	
A. Organizational Environment	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**
1. Contact with Information Sources	3,9	1	4,6	2	4,7	3	4,2	2
2. Relative Price Movements	4,6	6	5,5	7	4,6	4	5,3	5
3. Competition/Number of Firms	4,5	8	4,2	2	2,8	1	3,9	2
4. Alternative Strategies	5,0	7	4,1	3	5,2	7	5,1	4
5. Fashion/Media Effects	5,4	5	6,1	9	6,4	9	6,3	9
6. Industry Concentration	5,8	6	5,3	4	4,8	4	5,1	6
7. Demand Uncertainty	6,1	9	5,2	8	6,2	9	5,8	9
8. Competitive Price Intensity	6,0	7	4,8	2	5,9	8	5,2	9

In the military factories the alternative strategies and competition have been found to the most important factors affection innovation adoption (mean: 4.1, 4.2). The reason for this result may attributed to the inertia that management of the factories represent to the innovation. The reluctance to change the production system may cause to think old technology. The higher score of the means show that the great dispersion of the opinions. Fashion and media have been found the least important factors for the managers of the military factories (mean: 6.1). Procurement of innovations are made by TAF HQs. So fashion and media have effects on the commanders in TAF HQs.

The competition has been found the most important factor for the civilian organizations (mean: 2.8). The competition in the sectors of the organizations studied on may be stringent. Other organizations may compete on the technology and may invest new production systems to have a good place in the market and increase profitability. So, this result show that organizations examined make investments on the innovations because of this competition. The fashion and media effect have been found the least important factors as in civilian organizations (mean: 6.4). They may have thought that fashion and media may direct the investments of the organizations in a wrong manner.

I. Supplier Environment

The most significant and different results have been found in this part of questionnaire. According to the TAF HQs vertical coordination has been found as the most important factor for the innovation adoption in the present situation as expected (mean: 2.1). Highly coordinated relationship between TAF and Defense Industry Firms may be the reason of this result. DIF are the main suppliers of TAF. Because technology policy of TAF encourages and strengthens this linkage. Main reason for this policy is the desire to increase the local competencies (see for details, Ozmen et al [68]). As we have stated before compatibility of the innovation with the task is an important issue for TAF. Vertical coordination with the suppliers may be thought of important mainly for the task compatibility of the innovation. The other important environmental factors are supporting products and services and incentives provided by the suppliers of the innovation (means: 2.9, 3). Reputation of the supplier has been found the least important factor in adopting an innovation for TAF HQs (means: 3.6).

The supporting products, distribution of the innovation and the reputation of the supplier have been found the most important factors ideally (means: 2.7, 2.8, 2.8 respectively). In contrast to the present situation vertical coordination has been found the least important factor (mean: 3.7). According to TAF HQs personnel, maintenance of the new system is an important issue after procurement phase. Because they may have thought that maintenance lengthens the life cycle of the system and benefit to be gained from the innovation becomes large and large. This is extremely important also for the users of the innovation like military factories (mean: 2.8). The importance of the well known supplier may depend on the quality and specification standards. TAF in the ideal situation do not want to be dependent on the suppliers. When the supplier decrease the quality standards or can not prevent increasing the cost of an innovation TAF may want to change the supplier. Means and modes of the ranks have been presented in Table 12.

TABLE 12: MEAN AND MODE SCORES OF THE RANKS ACCORDING TO THE TYPE OF THE ORGANIZATION.

	TAF HQs (Present)		Military Factories		Civilian Organizations		TAF HQs (Ideal)	
B. Supplier Environment	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**
1. Vertical Coordination	2,1	1	3,4	4	3,3	3	3,7	5
2. Supplier Incentives	3,0	3	3,3	5	3,4	4	2,9	3
3. Supporting Products/Services	2,9	2	2,8	3	2,9	2	2,7	1
4. Distribution System	3,4	4	2,9	4	2,8	2	2,8	3
5. Reputation/Image	3,6	5	2,6	1	2,6	1	2,8	1

The reputation of the supplier and the distribution system has been found important by the civilian organizations (means: 2.6, 2.8). Vertical coordination and incentives have been found the least important factors for them (means: 3.3, 3.4). The civilian organizations may not want to be dependent to the suppliers but reputation and image of the supplier is important due to the worries about the quality standards. Because, quality of the new system causes to keep own image of the adopter organization in a high degree. The higher quality systems, the higher quality products and services.

J. Laws and Regulations

The laws and the regulations of the government has been found as the most important variable by all of the organizations studied (means: 1.8, 2, 2). The main reason for this result is the hierarchical links of TAF with the government and governmental organizations. The first and foremost effect of government is budget constraints because it is limited. Expenditures of TAF are also under control of Government Accounting Bureau (GAB). GAB must be informed about the cost of the projects (MSY-380-1). Projects must get the approval of GAB. Also the politics of the government may affect the adoption of innovations. Because TAF is a public utility organization, laws have more effects on the this organization than civilian organizations. Laws may entail some standardization of the techniques and equipment of TAF. So there may be no choice for TAF except to adopt the innovation. Military factories are affected from the laws and governmental regulations through the linkage with TAF HQs.

From the civilian organizations' viewpoint, some laws may entail to adopt certain innovations. For example: some new techniques about the environmental protection are obligatory to be adopted by these organizations. Governmental regulations may not be so important for civilian organizations as for TAF because their budget is not under control of a governmental organization. But some education politics and

The labour unions have been found to the least important factors for all of the organizations (mean: 4.3, 4, 3.6). The main reason for TAF people working in TAF have labor guaranty except military factories. They may have some effects on the military factories especially for the labor-saving innovations. But also in the military organizations the labor unions have found as the least important factor for innovation adoption. The means and mode have been presented in the Table 13.

TABLE 13: MEAN AND MODE SCORES OF THE RANKS ACCORDING TO THE TYPE OF THE ORGANIZATION.

	TAF HQs (Present)		**Military Factories**		**Civilian Organizations**		**TAF HQs (Ideal)**	
C. Laws and Regulations	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**
1. The patent System	3,2	4	3,7	4	2,9	3	2,9	2
2. Laws and Governmental Regulations	1,8	1	2,0	1	2,0	1	1,9	1
3. Specification-writing Agencies and Insurance Companies	2,3	2	1,8	2	3,5	4	2,9	3
4. Labour Unions	4,3	5	4,0	3	3,6	5	4,1	5
5. External Interests in Diffusion	3,5	4	3,5	5	3,0	1	3,2	4

The results of the civilian organizations are also unexpected. It has been found that labor unions have almost no effects on the civilian organizations in adopting an innovation. The reason may be also the guaranty that the organization have offered them.

K. Social Characteristics of Decision Maker Individuals

According to the TAF HQs personnel, education and professional background of the decision maker individual have been found as the most important attributes in the both present and desired situations. (means: 2.1, 2.6; 1.6, 2.1 respectively). The dispersed results have showed that there is not much consensus on the ranking especially social status and tenure.

The reason for this result may be the goodness of the education systems of the schools where these decision makers are graduated. Also new education programs (e.g. post-graduate) and other courses that the decision maker have been being taken. These opportunities are offered to the decision makers by TAF. Also individuals may take informal education to improve his/her abilities.

Most of the decision makers in TAF have profession. Because they have graduated from the Staff Academy. They integrate their education with the implementations and form a career. This accumulated background affect their decisions for the innovations.

Although it has been found as the fourth important factor, tenure of the decision maker individuals in TAF in our opinion affects the innovation decisions factor as well as other attributes. Although the definition of "tenure" has been given explicitly in the explanation part of the questionnaire, respondents who did not read this part may have perceived the characteristic in a different manner. Tenure reflects the experience of the decision maker individual in TAF. But TAF's appointment system affects this variable. An individual may work in a garrison until the predetermined

time is over for that garrison. So the accumulated experience might go with the individual.

The least important characteristic has been found as the age of the manager for all organizations (mean: 4.5). This finding is compatible with the literature. The behavior of the age of an decision maker individual functions with the education, professional background and experience of him. That is, these factors affect the behavior of the age of the individual. The mean and the mode scores of each attribute have been given in the Table 14.

TABLE 14: MEAN AND MODE SCORES OF THE RANKS ACCORDING TO THE TYPE OF THE ORGANIZATION.

	TAF HQs (Present)		Military Factories		Civilian Organizations		TAF HQs (Ideal)	
A. Social Characteristics	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**
1. Educational Status	2,1	1	2,4	1	2,0	2	1,6	1
2. Social Status	3,1	4	3,2	4	3,5	4	3,5	3
3. Tenure	3,2	4	2,6	2	3,2	3	3,5	3
4. Professional Background	2,6	2	2,5	2	1,9	1	2,1	1
5. Age	4,1	5	4,3	5	4,4	5	4,3	5

L. Personality Characteristics of Decision Maker Individuals

The results are very dispersed in this criteria group. Difficulties in the ranking of nine characteristics may be the reason of this indecision. Higher aspirations and venturesomeness of the commanders have been found as the most important characteristics in the innovation decisions according to the TAF HQs (means: 4, 4..2,). Higher aspirations of the commanders about rank and career may be the reason of this result. We may assume higher aspirations as a source of motivation for the commander. They always want to made positive decisions about innovations in order to increase their career. This motivation also makes him made risky decisions. This may danger the benefit that TAF likely to gain. Every kind of loss can be inevitable for TAF in such situations.

Instead of "higher aspirations", "foresight" and "venturesomeness" have been found as the most important attributes of the commanders ideally (means: 3.5, 3.7). These two characteristics are complementary of each other. While decision maker afford several risky new ideas, his ability to see the future makes him think thoroughly and make reliable and reasonable decisions. Foresight is especially important for commanders

TABLE 15. MEAN AND MODE SCORES OF THE RANKS ACCORDING TO THE TYPE OF THE ORGANIZATION.

	TAF HQs (Present)		Military Factories		Civilian Organizations		TAF HQs (Ideal)	
B. Personality Characteristics	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**
1. Empathy	6,8	9	6,3	9	7,0	9	6,4	9
2. Achievement Motivation	5,0	2	4,9	5	5,1	5	5,1	7
3. Dogmatism	5,7	7	6,0	8	6,2	7	7,3	9
4. Intelligence	4,4	3	3,2	1	4,5	4	4,4	2
5. Venturesomeness	4,2	2	3,5	3	3,3	1	3,7	1
6. Foresight	4,3	4	5,7	7	3,6	2	3,5	2
7. Higher Aspirations	4,0	5	4,0	4	4,9	6	5,4	9
8. Imaginativeness	5,2	5	5,3	5	4,5	5	3,8	3
9.Emphasis on Efficiency	5,5	6	6,2	6	6,0	9	5,5	5

According to the managers of the military factories intelligence and venturesomeness (means: 3.2, 3.5), according to the civilian organizations venturesomeness and foresight have been found as the most important factors (means: 3, 3.6).

Venturesomeness is the common characteristic of the decision makers for all of the organizations. Ability to taking risk is an important characteristic for all of the decision makers. But only risk-taking behavior is not sufficient for the innovation decisions. Intelligence and foresight are the other critical characteristics of the managers.

Empathy has been found as the least important factor in adoption decisions of the individuals for all organizations.

M. Communication Characteristics of the Decision Maker Individuals

In this criteria group, seeking about the innovations have been found to be the most important factor for the innovation adoption according to the TAF HQs. The second important factor was the manager's exposure to interpersonal communication channels. These results were same of the results taken for the ideal situation (means: 2.7, 3.3; 2.3., 3.2).

Commanders that expose to the interpersonal communication channels play an important role on the innovation adoption decisions of TAF. Because they can be hear of requirements of the lowest level units via interpersonal communication channels. So they can seek for

innovations that suit for these requirements. Same characteristics also have been found as the most important factors for the civilian organizations (means: 2.2, 3.2)

The least important factors were the preference for the negative-positive information and information heterogeneity (means: 4.8, 4.7). Whatever the information's characteristic, negative or positive, or where it comes from is not important for TAF HQs.

There are some differences between factories and TAF HQs. The second important factor for military factories was social integration (mean: 3.4). Cosmopoliteness and exposure to mass media channels have been the least important factors for them. Mean and mode scores have been given in Table 16.

TABLE 16. MEAN AND MODE SCORES OF THE RANKS ACCORDING TO THE TYPE OF THE ORGANIZATION.

	TAF HQs (Present)		Military Factories		Civilian Organizations		TAF HQs (Ideal)	
C. Communication Characteristics	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**
1. Cosmopoliteness	4,1	3	4,8	2	4,6	4	4,9	6
2. Exposure to Mass Media Channels	4,2	3	4,6	6	3,7	2	4,3	6
3. Seeking for Innovations	2,7	1	3,8	1	2,2	1	2,3	1
4. Exposure to Interpersonal Communication Channels	3,3	2	2,6	1	3,1	1	3,2	4
5. Social Integration	4,3	5	3,4	3	4,3	3	4,4	5
6. Preference for Negative-Positive Information	4,8	5	4,3	5	4,9	6	4,3	4
7. Preference for Information Heterogeneity	4,7	6	4,5	5	5,2	7	4,6	7

In the next section we have presented the ranking of the criteria groups. As we have stated in the literature review these groups constitute the four main categories, organizational characteristics, innovation characteristics, environmental characteristics, and decision maker characteristics.

N. Organization

Although there is not much consensus on the ranking, structure of the organization has been found the most important factor in adopting innovations in the present situation according to TAF HQs (mean: 2.2). Structure of TAF possesses many critical factors. Centralization, for example, may be a reason for the higher importance of this factor due to the director position of it in the present situation. Structure makes feasible the operation of the other factors in the present situation Instead, it has been found ideally that TAF's strategy, that is technology policy, must be the most important factor (mean: 1.9). The reason for this may be the desire for a strong strategy that can affect the structure and facilitate the structural changes in case of an innovation adoption. Strong technology policy may cause to increase in the number of experts and this may make easy to reach new ideas. Mean and mode scores have been presented in the Table 17.

TABLE 17: MEAN AND MODE SCORES OF THE RANKS ACCORDING TO THE TYPE OF THE ORGANIZATION.

	TAF HQs (Present)		Military Factories		Civilian Organizations		TAF HQs (Ideal)	
Organizational Characteristics	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**
A. Organizational Structure	2,2	2	2,5	2	2,6	2	2,5	2
B. Organizational Culture	2,4	1	2,9	3	2,3	3	2,5	3
C. Resources	2,8	4	2,7	4	3,0	4	3,0	4
D. Organizational Strategy	2,7	4	1,9	1	2,1	1	1,9	1

It could not have been thought the strategy of the military factories and TAF HQs separately. Because TAF HQs' strategy comprises the strategy of the military factories at the same time.

The strategy of the organization has been found as the most important for the civilian managers in the present situation. "Strategy" of an organization at first creates stimulus for the innovations. Aggressive technology policy may make the human resource of an organization more effective. By the help of market simulated growth strategy, demands of the market can be determined easily and a innovation policy can be created according to these demands.

O. Innovation

Functionality of the innovation has been found as the most important factor to be adopted by the organization according to TAF HQs (mean: 1.8). TAF is a public and service organization. A well functioning innovation is more desirable for TAF than a profitable one. Because profit is not an important issue in the public organizations like TAF. Instead, innovations that are compatible, advantageous to existing system and has task priority are more desirable for TAF. But in the civilian organizations profit has been found the most important factor as expected (mean: 1.8). They always want get the economical benefits of the innovations in order to survive in the market. Profit returns to them as new techniques, new machinery, and human resource high in quality.

These results were compatible with the ideal situation. Mean and mode scores of the results have been given in the Table 18.

TABLE 18: MEAN AND MODE SCORES OF THE RANKS ACCORDING TO THE TYPE OF THE ORGANIZATION.

	TAF HQs (Present)		**Military Factories**		**Civilian Organizations**		**TAF HQs (Ideal)**	
Innovation Characteristics	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**
A. Profitability	2,2	3	2,0	1	1,8	1	2,0	2
B. Functionality	1,8	1	2,1	2	2,0	2	1,8	1
C. Impact on Organization, Individual, and Other Inputs	2,0	2	1,9	1	2,2	3	2,2	3

According to the managers of the military factories the impact of the innovation on organization, individual and other inputs has been as the most important factor (mean: 1.9). It may have been thought that the effects of the innovation on the social system of the factory may be perceived in a great sense. The small size of the factories may the reason of this perception. Small size makes the relationships among the people more intense. So, the sensitivity of these relationships to the innovation may thought to be higher than that of TAF HQs. The last priority of the "functionality" characteristic could not be explained. But the reason may attributed to the perception differences of the subjects.

P. Environment

The laws and regulations have been found as the most important factors for adoption of innovations both by TAF HQs and military factories (means and modes: 1.6, 1). The hierarchical links with the government and connective characteristics of the laws may be the reason of this result. Most of the innovation issues are stimulated by the R&D Department of MND which is a governmental organization. Expenditures for the technological innovations have been being made by GAB. In the ideal situation organizational environment has been found as the most important factor (mean: 1.6). There has been found a difference between TAF HQs and military factories. The second important factor for factories is supplier environment. The problems stem from the maintenance of new systems and machinery may be the main reason of this result. Mean and mode scores have been given in the Table 19.

TABLE 19: MEAN AND MODE SCORES OF THE RANKS ACCORDING TO THE TYPE OF THE ORGANIZATION.

	TAF HQs (Present)		**Military Factories**		**Civilian Organizations**		**TAF HQs (Ideal)**	
Environmental Characteristics	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**
A. Organizational Environment	2,1	2	2,3	2	1,4	1	1,6	1
B. Supplier Environment	2,4	3	2,1	3	2,4	3	2,5	3
C. Laws and Regulations	1,6	1	1,6	1	2,2	2	1,9	1

Organizational environment has been found as the most important factor for the adoption of innovations by the managers of the civilian organizations (mean: 1.4). Strong effect of the competition among the organizations belong to same sector may be the main reason of this result. The "market pull-technology push" effect also a complementary reason for this result. The weak effect of laws on the civilian organizations may be the other reason of ranking this factor as second priority.

Q. Decision Maker Individual

Personality characteristics of the decision maker have been found the most important factor for all type of the organizations and in the ideal situation (means: 1.4, 1.6, 1.5, 1.6 respectively).

Personality characteristics of a decision maker individual affect the communication and relationships of the him. These characteristics may be accepted as the determinants of other type attributes of the individual. That is, if a decision maker

is venturesome to afford new ideas and can easily see the future effects of this new technique, age factor has no visible effect on the decision of the individual and can be ignored. Decision maker may be hear of new ideas and new techniques, but if he does not take reasonable risks and has not imagination ability, he can not be successful in implementing the innovation on the processes of organization. Mean and mode scores have been presented in the Table 20.

TABLE 20. MEAN AND MODE SCORES OF THE RANKS ACCORDING TO THE TYPE OF THE ORGANIZATION.

	TAF HQs (Present)		Military Factories		Civilian Organizations		TAF HQs (Ideal)	
Decision Maker Characteristics	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**
A. Social Characteristics	2,4	3	1,9	1	2,4	3	2,5	3
B. Personality Characteristics	1,4	1	1,6	1	1,5	1	1,6	1
C. Communication Characteristics	2,3	3	2,5	3	2,1	2	1,9	2

R. Overall Ranking

In the overall ranking, the respondents have been wanted to arrange the categories of organization, innovation, environmental, and decision maker individual characteristics according to the importance degree. There has not been found much consensus in the ranking of the categories. The results have been found dispersed due to this indecision.

According to the TAF HQs organization is the most important factor the adoption of innovations (mean: 1.8). The main reason for this result may stem from the traditional characteristic of TAF. This traditional characteristic has a salient dominance on the decision maker individuals. That is, whatever the wants and desires or characteristics of the individuals is, organization's benefits appear to be important for the sake of survival. In the ideal situation also the same results have been taken.

According to the managers of the military factories the most important factor is the decision maker individual (mean: 2). The small size of the organization may be the reason of this result. The scope of the decisions made in a military factory and TAF HQs is important. Because the decision makers in TAF HQs made decisions relevant to whole TAF but a military factory manager made decisions relevant to the factory. There are hierarchical links between factories and TAF HQs. This may cause a paradox in these two results. Because most of the decisions of innovations are made by the commanders higher in rank than the factory managers. Mean and the mode scores of the ranks have been given in the Table 21.

TABLE 21. MEAN AND MODE SCORES OF THE RANKS ACCORDING TO THE TYPE OF THE ORGANIZATION.

	TAF HQs (Present)		Military Factories		Civilian Organizations		TAF HQs (Ideal)	
OVERALL RANKING	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**	**Mean**	**Mode**
1. ORGANIZATIONAL CHARTERISTICS	1,8	1	2,2	1	2,1	2	1,8	2
2. INNOVATION CHARACTERISTICS	3,0	3	3,0	3	2,7	3	2,7	3
3. ENVIRONMENTAL CHARATERISTICS	3,2	4	2,8	3	3,3	4	3,4	4
4. DECISION MAKER CHARACTERISTICS	2,0	1	2,0	2	1,9	1	2,0	1

Civilian managers have found that the decision maker individual is the most important factor for the adoption of innovations (mean: 1.9). If the organizations are family-type organizations decision maker characteristics must be considered as the most important factors. Because in this case the desires, attitudes, and attributes of the person, who has the power of deciding, become important in adopting an innovation. In civilian organizations decision maker may affect organization's attitude to the innovation more easily than in TAF. The environment has been found as the least important factor for the innovation adoption.

VI. CONCLUSION AND FUTURE RESEARCH

In this study, a new model, including seventy nine factors, for innovation adoption have been offered for public and for-profit organizations. These factors have been grouped into thirteen criteria groups under four categories. Then importance of these criteria have been assessed from the viewpoints of TAF HQs, military factories, and civilian organizations. The main conclusions derived from the study can be synthesized as below.

As in the former studies, specialization and functional differentiation keep their importance in adopting technological innovations in this study. There are not much opinion differences in the importance of structural criteria for

technological innovation adoption between the public and for-profit organizations. It has been found that TAF has not been giving sufficient importance to functional differentiation and specialization in the present situation. But functionally differentiated units and experts in them mean higher probability to confront with different types of ideas and higher probability to reach new techniques via these units and experts. Applications like *post-graduate programs* should be motivated and be kept the continuity.

It has been found in general that job satisfaction is especially important for organizations in order to adopt different new ideas. That is, people satisfied with their jobs have motivation to seek innovations. There are some differences in opinions between public and for–profit organizations. While occupational cultures are important for the former, job satisfaction is important for the latter. In the ideal situation also job satisfaction has been found as the most important criteria. This situation have made us suspicious about the job satisfaction subject in TAF. Some measurements should be made in order to determine job satisfaction of people and its effects on the innovations.

One of the most important factor was economical pressure that public organizations are confronted. Absence of funds makes hard to afford new systems. This situation is also cogent for for-profit organizations. This pressure may be lightened by making proper investments and avoiding unnecessary expenditures. Technical knowledge resources, that portray the potential of organizations about innovations, have been found as one of the most important factors. Preparations of the relevant units of TAF (R&D Department of MND, Department of Technical Project Management of Services) about an adoption process should entail research for the innovation in terms of critical knowledge, know-how, and experience. These units should be make some proper development work about the innovation.

The most important strategic factor for innovation adoption has been found as the market dominated growth strategy according to the civilian organizations. Knowing the requirements of market and to convert them technological requirements through growth strategy is an important issue for organizations. This may be provided by the strong coordination between marketing and R&D departments of the organizations.

Cost and efficiency of the innovation has been found as the most important factors for TAF. But for for-profit organizations the gain from the investment is the most important issue. The risk pertaining to an innovation is an important property that must not be forgotten in a decision to adopt it. Only cost oriented decisions may mislead organizations.

Compatibility and relative advantage of the innovations have been found as the most important characteristics in an adoption decision in general. Scientific status of the innovations has been being ignored by the organizations. Innovations to be adopted by TAF should be scientifically reliable, valid, internally consistent and compatible with the existing system, values and norms and the most important compatible with tasks that the innovation be used in. Besides, capability that bringing other new ideas together with the innovation should be thought of importance.

Competition has been found as the most important factor for innovation adoption in general. But external information sources also has an importance in seeking innovations. Absence of strong linkages to external information resources may cause the isolation of organization from environmental technological developments.

The supplier issue discussed in this study was also an untouched subject different from the other innovation adoption researches. Reputation of the suppliers in general has been found as the most important factor in innovation adoption. In addition to this, maintenance that the supplier provides was an important point that this has reached. The results have showed that while vertical coordination with the suppliers is the most important factor in the present situation reputation, supporting products and distribution system gets more importance in the ideal situation. The fear of dependence to the suppliers may have caused this result.

As a public organization, economical and hierarchical linkages between TAF and government have some important influences on the technology policy of TAF. Especially some constraints in the budget may have increased the importance of this issue in our opinion. Laws have specific effects on both public and for-profit organizations' technology policy.
The critical actors in innovation adoption are the decision makers. It has been found that education and the professional background are the main characteristics of decision makers that must be taken into consideration.

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