

## **The Sociological Study of the Impact of Information Technology on the Working Life of the Workers of Industrial Organizations (The Experimental Study of the Workers of Pars Khodro Company)**

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**Abstract:** The current research investigates the impact of Information Technology (IT) on the working life of the staff of industrial organizations and relies on the study which was carried out on the staff of Pars Khodro Company. This study enjoys a qualitative approach to social studies and is conducted on the basis of biographical-narrative interviews with the staff of Pars Khodro Company, documentation and the researcher's observations. The results of the current study indicate that Information Technology holds different consequences, some of which have not primarily been of any concern to manufacturers and executives. The approach towards effective Information Technology is quite complicated. It is a combination of an evolution in financial instruments and constructs and involves an improvement in relationships, hierarchies and conceptual implications among those who are in action. The impacts of Information Technology are described through four models in the following areas: 1. Action Disembedding besides Trust and Risk, 2. Hierarchy and Symbolic Violence, 3. Competition and Expertise and finally 4. Acceptance of Information Technology. It is worth mentioning that the results of the current research show not only does Information Technology have an impact on working atmospheres, but also it encompasses people's personal lives.

**Key words:** Information Technology • Pars Khodro • The Grounded Theory • Working Life • Action Disembedding • Specialized Systems • Trust • Risk • Panopticon • Symbolic Violence

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### **INTRODUCTION**

Information Technology is one of the most significant achievements of the society in the current era. Large domains of people's lives and everyday experiences have been under the influence of the progress made in the area of Information Technology. Nowadays, it is unlikely to overlook a key element like Information Technology in any statement about the modern society. Information Technology is one of the most important, if not the most significant, factors distinguishing our technological era from the past. We can acknowledge that today life without Information Technology is very demanding, if not impossible.

Not only does Information Technology change financial instruments, technological areas, etc. but also it affects human life. For instance, the implementation of Information Technology in workplaces has influenced the

workers' lives dramatically; furthermore, due to the employment of Information Technology, modern workplaces are totally different from the old ones. However, the social work studies theoreticians have continually been dealing with fundamental questions regarding the impact of technology on working life.

**Statement of the Problem:** Information Technology is one of the most important technical innovations in the current era. It has been influencing our life in social-communicative areas. Theoreticians like Castlles [1], call the modern era, the Information Society, while Giddens [2] has established his theory of the Reflexive Society on the basis of "abundance and accumulation of information for an individual's decision-making in all areas," however, prior to Castlles and Giddens, Toffler [3] had explained the Third Wave Civilization on the basis of information-communication technologies. Considering the new

technology as an inseparable part of the modern society, modern organizations have been utilizing it greatly. Some estimates indicate that about half of the investments have been in the area of Information Technology since the early 1980s. Therefore, Information Technology is regarded as an influential factor in social-economic changes [4].

The state and nature of the relationship between technology and work are challenging and disputable (Grint, 2005, p. 379). For years, sociologists have been particularly interested in the relationship between technology and work. Researchers and theoreticians have continually been dealing with the question regarding the influences technology can have on our working experience. Due to industrial developments, the role of technology has been highlighted in workplaces [5]. Theoreticians and sociologists of work have had different, contradictory reactions to the use of modern technologies. For instance, Blauner [6] believed that those workers whose work has been under the influence of administrative automation are less likely to be alienated. On the other hand, Braverman [7] holds a completely different viewpoint. From his standpoint, automation involves deskilling the industrial workforce. In the discussion of Information Technology in workplaces, opposing viewpoints concerning the impacts and consequences of automation have recently been of certain significance. Workers' working life is certainly under the influence of this modern technology and some sociologists like Blauner argue that modern technologies have revolutionized working life through the advent of new, flexible approaches. These opportunities let us overcome the monotonous, boring and alienating aspects of industrial work and enter a freer, less conventional information era which gives us more control over the working process. In contrast, others believe that Information Technology is a tool for the management, through which managerial goals can be achieved; moreover, they assume that Information Technology leads to strengthening the bureaucratic hierarchies, elimination of face-to-face actions, losing trust and transformation of modern companies and organizations to isolated units which do not maintain any relationships with each other in the actual world [5].

**Problem Significance:** The importance of Information Technology on human beings is sometimes neglected. Technology is a multifarious entity which not only does involve focal functions, but also non-focal ones. This feature leads to technology being capable of making

changes in various levels. Even though there has been sufficient investment in the area of Information Technology, nearly two thirds of the budget is spent on communications infrastructure [8, 9] It can be inferred that although organizations are aware of the significant role of technology, specifically Information Technology, in the modern world, they are ignorant of the vulnerable relationship between human and technology.

The rate of technological development in the modern era has created an environment in which people are regularly facing new innovative technologies or encountering changes in the older ones. Furthermore, the rate of technological development is more evident in industry, production and workplaces since employers are more willing to increase their productivity; as a result, employees are faced with development in their workplaces. Effective work, changes in types of activities and relationship improvement among those who are in action are the outcomes of development in workplaces. A question is raised regarding development in workplaces: How can employees accommodate to these technological changes and cope with the new circumstances?

On the other hand, technology is imported to our society and it has not risen from internal ties and local realities; therefore, technology enters people's work and life abruptly. The process of getting adapted to the new circumstances and returning to the natural setting is a different topic which ought to be dealt with. How do workers manage to restore their original lifestyle or in other words how do they manage to adapt themselves to the changes? In fact, the main issue regarding the relationship between workforce and technological development is how they manage to cope with the changes, considering the impacts that technology leaves on their working life.

**Review of the Related Literature:** There are various theories concerning the relationship between technology, society and organization. They can be put into three categories as follows:

**Technological Determinism:** Technological Determinism introduces technology as a governing, external force which assigns economic organizations and relationships. Holding a Darwinistic standpoint, Technological Determinism argues that organizations' development is the result of a kind of conflict among them. The most suitable technologies remain; thus, the societies and organizations which utilize these technologies are the

ones which remain and expand, especially in the current era in which information technologies have a major role in predicting the future [10]. Technological Determinism believes in the one-way impact of technology on the society and social constructs. Blauner's prominent work [6] pertains to this viewpoint.

**Social Determinism:** Contrary to Technological Determinism, Social Determinism believes that technological changes are made by the society. Therefore, work relationships do not result from technological aspects, yet they are caused by social-cultural aspects [10] (p. 390).

From the viewpoint of Social Determinism, expressive individual behavior determines Social Reality to such an extent that there would be no direct relationship between objective constructs and individual behavior. Instead, social behavior would be determined through cognitive understanding as well as the relationships among people.

Therefore, cognitive characteristics are more important than a particular branch of technology [10] (p. 391). Galie's [11] adaptive study in British and French oil refineries along with Child's [12] Strategic Choice Theory are among the most noticeable works of this viewpoint.

**Political Technology and Schematic Technology:**

There are more moderate standpoints which are placed between Technological Determinism and Social Determinism. A wide spectrum of viewpoints argues that technological consequences intricately result from social interactions [10] (p. 396). Trist and Bamforth's [13] case study in the World Coal Association is among the instances of this standpoint. This study indicated that the social production system and the technical production system should be combined consistently and utilized simultaneously. Their most significant finding was that "technological needs impose some limitations on work organization; however, work organization enjoys some particular social-psychological features which are not related to technology." [10] (p. 398)

Winner's [14, 15] theory of Schematic Technology is one of the other considerable theories in this area. Winner believes that technical issues comprise a political aspect. Winner points to the American architect, Robert Moses, who designed New York bridges very low, so that buses cannot pass through the bridges and black people and lower-class white people cannot commute to the Jones Beach [10] (p. 401).

**Theoretical Perspective:** Watson [16] states that two aspects of work experience are influenced by technology:

- Work structure
- Work relationships (especially between supervisors and subordinates)

Work structure comprises the context of work. There are some classic issues which are related to work structure namely job satisfaction, self-actualization, deskilling and skill gain. These issues constitute the context of a job. The relationships between supervisors and subordinates are among the conducting aspects of work. The relationships between a superior position and an inferior position are the supervisory manners and mechanisms of these two positions. Providing that we put the interpersonal relationships in a workplace into two vertical and horizontal categories, the supervisory relationships between supervisors and subordinates would be among the vertical work relationships and the interpersonal, collaborative relationships amongst workers would be among the horizontal work relationships. One of the most significant features of vertical relationships is the supervisory aspect of them. The manner of supervision is also important.

**The Current Study Concentrates on Two Major Issues:**

- Technology, deskilling and alienation: Since the advent of technology and automation, the question that has continually been dealt with is whether or not the utilization of modern technologies results in the alienation of the workforce or instead through increasing the liberating aspects of work, technology has reduced alienation. As Braverman [7] states, division of work as well as deskilling have lead to the creation of deskilled workforce; moreover, workers have become more obedient, following routine, monotonous schedules. However, Blauner [6] acknowledges that deskilling and work division result in gaining skills, having more free time and reducing alienation. This process is largely related to how workers manage to cope with new work conditions and raises questions about how modern technologies are employed by workers. How do they manage to put up with the new circumstances? What variables affect their manner of dealing with the new situations? And what consequences does this process have on their working life, work skills and social ties? Research in this area has been carried out

through utilizing concepts such as Disembedding, Private Systems and Trust and Risk in Giddens' theory of Modernity.

- Technology, work relations and Surveillance: As a parameter of what Giddens calls the 'Reflexive Society', modern technologies and their numerous functions have a major role in controlling and supervising the work process. According to Giddens, basically what makes reflexivity possible in late modernity is the large amount of information that people have on hand in the society [17] (pp. 192-193). In fact, the large amount of information available to people in the society is one of the most important factors which pave the way for a Reflexive Society [2] (p. 198). Modern technologies and their supervisory capabilities are among the subjects of the impact of technology on work, especially work relationships including the supervisory relationships between supervisors and subordinates [16] (p. 181) This kind of Surveillance is similar to Foucault's Panopticon and permanent observation which does not need to be continually implemented. It is enough for the individual to know he is under supervision. In fact, Foucault explains the main impact of Panopticon as follows: "Creating a permanent condition for the prisoner while he is aware of being observed; this is a condition which guarantees automatic operation." [18] (p. 35) Research in this area has been conducted through two major concepts: Michel Foucault's 'Disciplinary Technology' and Pierre Bourdieu's 'Symbolic Violence.' The question which is raised here concerns the role of technology in the development of system Surveillance and control. Does this technology generate Surveillance instruments? Given that the answer to this question is positive, how does the Surveillance mechanism operate and how is it put into action? How do workers react to the Surveillance and in what way have power relationships in the workplace changed?

## **MATERIALS AND METHODS**

Theoretically speaking, the current study has been conducted qualitatively, based on the principles of Strauss and Corbin's [19] Grounded Theory. The basis of this study is the workers' narrative of the impact of technology on their working life. Previous findings or topics are not imposed on the data; moreover, the data are the basis for the formation and expansion of the topics. However, the current theories and notions which have

been of use in explaining and expanding the concepts and illustrating the relationships among them, have been used in the findings of the research in proportion to the topics and concepts' advancement.

**Qualitative Interviews:** Qualitative interviews have been utilized to collect the data in this study. Interviewing is one of the most important ways of collecting data in qualitative research and systematic studies [20] (p. 133). Interviews are largely functional in various aspects of qualitative research namely generational studies, gender studies and studies centering on different jobs and professions [21] (p. 203). In order to collect the data in the current research, interviews were conducted in two levels:

- Interviews with the advocates of Information Technology (local sources) in different sections, in order to get information about accessibility to Information Technology, in addition to how much and in what way Information Technology is used in those sections. They can be put into two groups: A) managers and central supervisors who have a mutual relationship with workers and managers in higher positions and are aware that to what extent and how these technologies are employed in different levels and B) those who work as the "representatives of Information Technology" in the different sections. An IT representative is one of the employees whose duty is to take care of the relationships between the section of the organization, for which he is working and the supervisors and IT technicians. In addition, an IT representative is responsible for the software/hardware requests of his unit. Justifying the need of the unit to the facilities is also among the responsibilities of an IT representative. He is in charge of all the programming of the unit he is working for.
- Interviews with those workers whose working life has been under the influence of Information Technology.

The interviews were conducted in a non-structured manner; the first question of which was concerning the general work process of an individual. Following a narrative, non-structured approach and the interviewer asked the interviewees to describe one of their typical working days. The interviews were conducted with the main focus on the research questions; later the observed issues in earlier interviews were added to the research questions and the research was carried out to investigate

an individual's experience of using Information Technology. In addition, considering the needs of the study, complementary instruments such as observation and examining documentation were also employed.

Subsequently, the interviews were transcribed and codified several times, so that the main focus of the study was specified and the final models were extracted.

**Participants and Sampling:** The participants of this study are a group of the employees at Pars Khodro Company whose work is in a way related to Information Technology. Since the workers of the company are different in their skills and accessibility to Information Technology; firstly, those whose work is not directly related to Information Technology have not been studied in the current research. Secondly, because of their different way of using Information Technology, senior managers (including the chief executive and vice president) have not been considered, either.

The participants of this study have theoretically been selected according to purposive sampling. In purposive sampling, the sample table is set based on the main variables [22] (p. 135) "Theoretical sampling is a kind of sampling which is based on concepts whose theoretical relationship with the emerging theory has been proved. This is a guide through the theoretical sampling of the questions and comparisons which rise throughout the process of analysis. This helps the researcher to discover appropriate, relevant categories, besides their characteristics and dimensions." [19] (pp. 175-177)

The interviews in this study were conducted in two levels with the informed and the users. Given that most of the productive use of Information Technology is in the Renault Production line (L90 and L86), interviews with productions workers were mainly done on the production halls of these two products. Moreover, some interviews were conducted with the workers of the Information Technology units (It and Planning department) and some staff of Human Resources and Quality Control. Sampling was done based on the two main principles of Maximum Variation and the Theoretical Sampling. In other words, analyzing and coding the interviews resulted in choosing some people, who could clarify the different aspects of the category and elaborate on the observed issues, for further interviews. Additionally, being a user of Information Technology was added to the criteria for choosing the subjects of the study and the interviews were conducted until reaching Theoretical Saturation. However, it appeared that Theoretical Saturation was

reached after the 30<sup>th</sup> interview. To validate the efficacy of the investigation, though, totally forty interviews were conducted for this study.

### **Theoretical Methods**

**Coding the Data:** Coding the data has been done based on the three-phase method of Strauss and Corbin (1998). The data are coded in three phases through which the raw data (the interviews) are changed to final paradigmatic models. The three phases of coding are as follows:

**Open Coding:** While, basically science does not exist without its concepts, the first step in conceptualizing the data is adding conceptual labels to them. "Conceptualization is the first step in analyzing the data." [19] (p. 63) At this stage, concepts are generally formed and the researcher is provided with a lot of conceptual labels without clarifying the relations between them. Moreover, different concepts are combined with each other and as a result of their combination categories are formed. In order to specify the different features of the categories and relate the conceptual codes of the categories to each other, the categories are dimensionalized; i.e. the characteristics of which are specified.

**Axial Coding:** "A series of approaches following Open Coding, through which data are linked by means of connecting the categories to each other." [19] (p. 97) According to Strauss and Corbin's method, at this stage the concepts and categories, which are formed at the phase of Open Coding, are merged or linked according to what is called "Paradigm Model." Paradigm Model can be summarized as follows:

- Causal Conditions: the events which lead to the creation or growth of a phenomenon.
- Phenomenon: a series of actions/reactions are directed to manage and control this major event.
- Context: a series of special features which imply the phenomenon. In other words where the related events stand in one dimension.
- The Intervening Conditions: general conditions, such as atmosphere, time, culture, etc. which leave an impact on the actions/reactions.
- Strategies of action/reaction: purposefulness is one of the characteristics of actions/reactions. Strategies are a series of activities and policies which are utilized to control the status of actions/reactions.

- Consequences: consequences are to control the circumstances. They are probably some events for individuals, places, or objects.
- Selective Coding: “The process of selecting the main category systematically and linking it to the rest of the categories, validating the relations and filling the gaps with categories that require correction and expansion.” [19] (p. 118) In fact, Selective Coding is the last stage through which the categories are merged, the main category is selected and the probable gaps are filled.

Through the 3-phase process of coding, the categories are extracted, conceptualized and linked to each other and finally theoretical models are extracted. However, some points need to be considered about the Coding process in the Grounded Theory [19](p. 59):

- Analysis is in fact explanation and interpretation. Therefore, what is important is discovering hidden meanings in the data through referring to the related literature, intensifying theoretical sensitivity and asking questions.
- While the steps of coding are explained thoroughly, the researcher does not mean to be strictly bound to them. In fact, the researcher can resort to his creativity throughout the process of coding.
- The description of the three stages of coding does not imply that these stages have been followed mechanically. The process of coding is a combination of three stages which are sometimes carried out consecutively; however, the stages are sometimes performed simultaneously and in some occasions in a cyclic manner. In other words, this is an analytic distinction which leads to the comprehension and implementation of the processes of coding to form the Grounded Theory. Researchers who use the Grounded Theory practically observe that even though coding is mechanical and phased in the first stage, as the researcher gains control over the study and process of coding, the three phases of the coding process merge and create an innovative process.

After being transcribed, the interviews were coded based on the aforementioned method. Conducting the interviews was followed by rereading the texts and specifying appropriate conceptual labels according to the coding process. As the conceptual labels were specified and more interviews were conducted, Axial and

Selective Coding were carried out through rereading the interviews, relating the categories to each other based on the model of the Grounded Theory, comparing with the related literature and using solutions from other theories. After the frameworks and general course of the data were specified, through revising the process of the interviews and selecting the cases, the concepts and categories were completed, the main category was selected and totally four paradigmatic models were extracted to explain the impact of Information Technology on working life. It is worth mentioning that the process of making the data “dependable” in order to develop and enrich the theoretical concepts is one of the requirements of a Grounded Theory-based study and was carried out on the basis of the conducted interviews. All the concepts and dimensions were preserved in the final analysis and later were presented as the findings of the research. The findings of the research were presented in the form paradigmatic models which contained a noticeable number of coded categories. In order to avoid prolixity and for the purpose of documentation, the researcher points to some prominent instances.

The role of theories and technical literature in coding the data: “Theoretical Sensitivity” is a subject in the Grounded Theory which does not infer following a specific theory or testing previous theories practically. “Theoretical Sensitivity depends on the individual characteristics of the researcher and indicates his awareness of the precision and meaning of the data. Theoretical Sensitivity can be related to the studies and experiences of the researcher prior to conducting the research. It can also develop throughout the process of the study. Theoretical Sensitivity attributes to these features: insightfulness, skillfulness in expressing the data, the ability to comprehend and analyze the relevant elements.” (Strauss and Corbin, 1998, p. 39) Therefore, it can be determined that although older works are examined in the Grounded Theory, none of which is employed and used as the basis for what is referred to as the “theoretical framework” of a quantitative research. As a result, these kinds of studies do not include statistical hypotheses; instead they contain research questions which are indicative of theoretical sensitivities. The theory is formed by means of the data of the research and most of the concepts and relations result from the data and are systematically presented throughout the process of the research.

However, to say that the Grounded Theory does not rely on older theories and is formed in a completely inductive manner is a radical conclusion. Although

Strauss and Glaser [23] were supporting a radical inductive point of view in their first draft, later Strauss and Corbin modified their viewpoint. Strauss and Corbin [19] emphasize the major role of technical literature and older theories in developing the Theoretical Sensitivity of the researcher. Furthermore, they point to some theoretical concepts while coding the data in this study:

- *“Some names originate from the storage of the concepts which you have gained in your previous studies. You can use the names mentioned in specialized texts. As long as these concepts are dealt with in a good way and since they carry analytic meanings, they are considered beneficial.”* [19] (p. 57)

Therefore, what has already been discussed does not imply not using concepts from other theories; it rather means: “Theoretical ideas which arise from current theories or the researcher’s perceptions are not tested throughout the research like in comparative studies; they have to be discussed through a trial and error process along with the data. Forming a theory is an evolutionary process.” [24] (p. 135)

As a result, theory and theoretical viewpoints are utilized in two ways in the Grounded Theory:

- Based on Philosophy of Science, observation without theory does not exist [25] (p. 109), the researcher definitely starts the research with specialized background information related to the specialized literature.
- Throughout the process of developing the categories and coding the data, according to the conceptual observations, the researcher can use concepts from other theories. Some sociological concepts have been utilized in this study in order to add to the theoretical intensity and develop the categories appropriately. These concepts have been explained following the categories and paradigms.

## RESULTS

**Information-Oriented Action:** The most important aspect of the impact of Information Technology is changing the conditions and characteristics of information-oriented action. The purpose of information-oriented action is exchanging information. The basis of the labeling is categorizing the actions according to their purposes. On the one hand, the role of Information Flow in

organizations and workplaces and on the other hand, the close, conceptual relationships between Information Flow and Information Technology have made information-oriented action the most important theoretical category associated with Information Technology. Information-oriented action is the most abstract and explanatory category that has been extracted from data coding of this research; it has been dimensionalized as the main category of this study.

The four main dimensions of information-oriented action are as follows: the kind of relationship, the quality of information, hierarchy and skill. These four dimensions as well as the four characteristics of the main category imply two kinds of action. Forming the relationship and hierarchy are related to the action setting. Action setting refers to where the action takes place and implies the material and structural properties of the action. The quality of information and skill imply the contents of the action. The contents of the action illustrate the presence of the individual in the action. In other words, the contents of the action are based on the personal and interpersonal properties of the action.

The most important theme of information-oriented action is how the relationship is formed and the characteristics of the relationship. The two dimensions of the relationship are type and rate. The type of the relationship which is based on individual relationships (direct) and technology indicates the instruments used to pave the way for the action. The other dimension is rate which can range from low to high.

Because of the conceptual relationship between time, place and speed, the rate of establishing the relationship varies according to the type of relationship which is not bound by time and place. According to this model, the rate of forming the relationship has been dimensionalized with the concepts of time and place. Mr. A. 31, with 10 years of experience is currently the supervisor of one of the production units. He says that: “Previously, access to information depended on our presence, but now I’m mostly sitting at my desk and checking what is going on. This is one of the biggest advantages leading to save more time and get the information faster than before.”

Therefore, “rate” as one of the dimensions or characteristics of information-oriented action is related to the two important concepts of time and place and the type of communication along with time and place. In other words, in information-oriented action, rate is influenced either by time connections among two time periods or by place connections of information-oriented action.

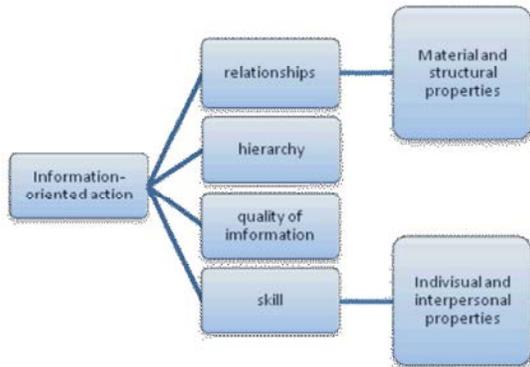


Fig. 1: Dimensions of Information- Oriented action

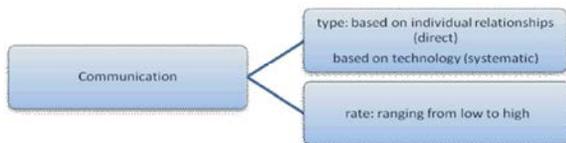


Fig. 2: Dimensions of Communication

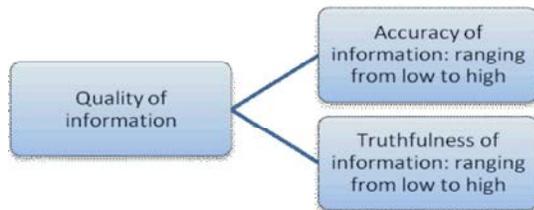


Fig. 3: Dimensions of Quality of information

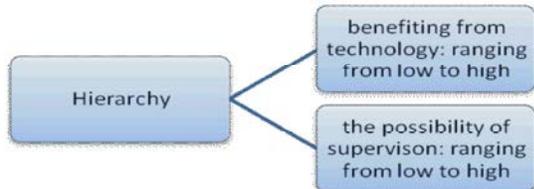


Fig. 4: Dimensions of Hierarchy

- Rate Resulting from the Omission of Distance in Terms of Time:

Time → synchronic, diachronic

- Rate resulting from the omission of distance in terms of place

Place → in the unit, in the organization, out of the organization

The quality of information implies two major characteristics of information: accuracy of information indicating that the information is devoid of error and

truthfulness of information implying that the information is in accordance with reality and is not false. In fact, the first characteristic implies wrong development and the second feature suggests the information is not initially based on truth. The concept of ‘quality’ has been dimensionalized with these two concepts.

Mr. M. who is a 34-year-old engineer with 9 years of experience, is currently the head of one of the quality control units. He says that: “Before there might be some problems because they might hand me a check sheet which could have a kind of problem with, for example, one of the numbers (Accuracy). Now mechanization sends it to the related section, so the information cannot be manipulated because everybody can see and share it. I don’t want to say that there’s no manipulation now, but it rarely happens. For example, PDF files cannot be manipulated (Truthfulness).”

Mr. J. 30, with 5 years of experience is a production line expert. He explains: “There are a lot of advantages in systematic work. Surely, there are fewer errors and higher accuracy when work is systematic. Work is not traditional and old-fashioned anymore. When the information is written down, there are more errors and accuracy is lower. This is one of the other advantages. (Accuracy)”

**Hierarchy:** Hierarchy in information-oriented action is specified through two concepts: “benefiting from facilities” and “the possibility of supervision” which are allocated based on the hierarchical position of the individual in the organization. Benefiting from facilities implies what Information Technology-related resources are accessible to the individuals. These resources, either hardware or software, are divided among the individuals based on organizational hierarchies and personal and situational (e.g. organizational position) preferences. The possibility to supervise implies the sources of power and the possibility that any individual in formal and informal organizational structures can be under supervision.

**Skill:** Skill implies those characteristics, merits and abilities that an individual employs in his action. Skill implies the setting and individual properties of the action. The required skill in information-oriented action is dimensionalized with two characteristics: “Type” and “Variation”. Focusing on type, skill can vary between traditional to knowledge-based. Traditional skills do not rely on knowledge and specialized systems; instead, they rely on experience, observational awareness and individual relationships. Knowledge-based skills result

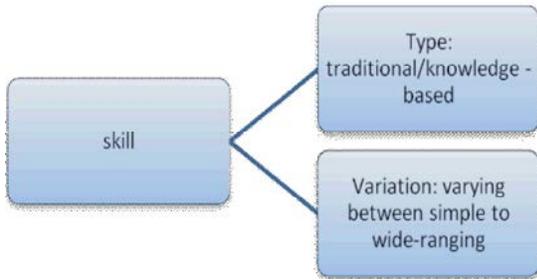


Fig. 5: Dimensions of Skill

from gaining knowledge systematically and putting the knowledge into practice. On the other hand, skill variation implies the complexity and multiplicity of the tasks that an individual is capable of performing. Variation can range from simple to wide-ranging and skills can vary between one-dimensional to multi-dimensional. The head of one of the production units with 10 years of experience in the area of job skills says: “Previously, our main concern was whether the automobiles will be accepted or not. There were some disagreements over the acceptability of a product among the inspectors, production operators, engineers and the rest of the departments (traditional). Most of our challenges were over stuff like this. But with the current change we can have the process systematically under control (knowledge-based).”

**Paradigmatic Models:** Information-oriented action and its dimensions, which is the main category, explain the areas influenced by Information Technology according to the four main paradigmatic models. These four general models connect the concepts and categories which result from coding the data and explain their relationships with each other.

**The Paradigmatic Model of Action Disembedding, Trust and Risk:** The environment, in which Information Technology acts as a technological mediator between relationships and action/reactions, provides different settings for the action. In this model, change is explained in two dimensions of information-oriented action and its impacts. The first dimension of information-oriented action is establishing relationships and connection. Establishing a relationship (communicating) in the setting of Information Technology has two features. The first feature is system-based relationship and the second one is the high rate of it because of omitting distances in terms of time and place by means of Information Technology.

**Action Disembedding:** Action Disembedding is an action/reaction strategy which is adopted in this area. Action Disembedding refers to when an action is void of local and personal settings. This strategy indicates the disembedding of an action from local and personal settings and its reoccupation in ultra-local and impersonal settings. This strategy is implemented in order to impersonalize actions considering distance in terms of time and place and make use of specialized systems constantly. Mr. S. who is a 31-year-old engineer with 9 years of experience, is one of the heads of the staff. He says: “When you turn on your computer, you focus on a special subject. It’s only you and the monitor. When you’re sitting here next to me, I cannot focus on this letter. I may be reading your letter, but all I think about is how you’re looking at me, what you’re thinking about and what you’re looking for. When do I have to hand in the report? What am I supposed to say in reply? There are thousands of thoughts which can be distracting. (Separation from local settings)”

Mr. P. 28, with 5 years of experience, is a production expert. He points to the role of specialized systems: “If it’s the operator’s fault and given that it’s a quality problem, there are some connections and regulations which have to be observed. First of all, the supervisor notifies the operator. Then, there are about eight forms that we have to fill in for the action plan program. We point to the problem in the first form and then write our plan for it. We state our plans and goals and say what we want to do. (Specialized systems)”

**Trust and Risk:** Impersonalization of the action leads to trusting new working systems. Impersonalized and disembedded systems assure the individual that everything is done appropriately without requiring the individual’s interference. The multidirectional transition from dangerous individual systems can be regarded as relying on abstract systems in order to build trust in an environment in which none of the pre-modern trust-building features exist. First of all, this system is free of unreliable personal face-to-face judgments. Secondly, this system is not individual; therefore, with the absence of one individual the system won’t be crippled. Mr. Sh. who is a 35-year-old engineer, is one of the heads of the staff. He says: “It’s been quite assured that the reports are prepared based on the skills of the workers. If someone is not skillful enough, we’ll need to check his work again. We’ve been working together for 5 or 6 years now. That’s why there’s a kind of trust towards those

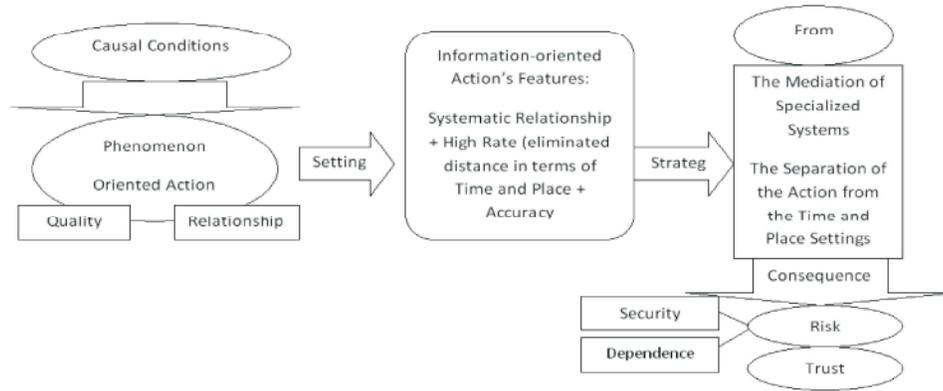


Fig. 6: The Paradigmatic model of Disembedding, Trust, and Risk

reports. We don't check the routine reports anymore. (Trust resulting from the strategy of action disembedding-specialized systems)"

The other consequence which is parallel with trust is risk. Risk does not deny trust. Trust and risk are interwoven with one another. The most important sources of risk can be perceived in two concepts: "dependence on instruments" and "information security". Specialized systems must work regularly and steadily. Chaos will emerge when the systems stop working. Besides, the disconnection of information settings from local environments by means of disembedding mechanisms will result in creating a feeling of risk-taking regarding the security of information. Separation of the action from its local setting results in the information being located in a non-physical, inaccessible area. When the individual is separated from the material setting of the action, a feeling of risk will be created in him towards the action which is not directly accessible to him anymore. Since the setting of the action is not directly accessible to the individual, a feeling resulting from the fear of losing the information is created. As Giddens [26] states the individual is linked to the specialized systems only in the access points and as a result the individual may not be sure about the system functioning well or may develop a feeling of danger towards it. Moreover, specialized systems rely on the regular, continuous functioning of some tasks for which specialists are responsible. Consequently, another dimension of the resultant risk is the danger of having a breakdown in the system which has all the tasks under control and in case of a fault the system would be disrupted. Mr. S. a 31-year-old engineer with 9 years of experience, is one of the heads of the staff. Regarding information security, he states: "Excel and Access are databanks. Well, they don't really help the system. They use them as a machine for recording information. They

keep the files, but they sometimes encounter some problems and you see all the files are lost. It's when you say paper was better for keeping information. Data on the hard disks may be lost any time. What if the data are lost?"

Mr. M. who is a 34-year-old engineer with 9 years of experience, is the head of a quality control unit. He says: "We've been crippled several times. The system was cut in several occasions. I didn't have a computer for a few days. I had to use my colleagues' computers. Sometimes I couldn't do anything."

**The Paradigmatic Model for Surveillance and Symbolic Violence:** The starting point of this paradigmatic model is the hierarchical quality of information-oriented action. The setting of this model has been conceptualized with two types of action which can be considered the two ends of the hierarchical spectrum. Each of the actions leads to the relevant strategies. In the first type, the information-oriented action enjoys a great deal of technology and the possibility to supervise is high. In the second type, though, the setting of the information-oriented action enjoys a low level of technology and the possibility to supervise is low. These are the two types of action settings and individuals are placed within these two types on the hierarchical spectrum.

**Strategies: from Surveillance to Acceptance and Internalization:** The setting spectrum for the action leads to a strategy setting spectrum for the action. Information-oriented action with a great deal of technology and a high possibility of Surveillance results in the Surveillance strategy. On the other hand, information-oriented action with a low level of technology and a low possibility of Surveillance lead to the strategy of acceptance and internalization. These two strategies

happen in a synthetic manner. In organizational and material structures of the action, individuals are scattered over a spectrum and according to the hierarchical positions in which, each of them has a lower position towards the higher ones and a superior position towards the lower ones. According to the hierarchical position of the individuals a combination of strategies are adopted. Every individual in a lower position adopts the acceptance and internalization strategies and each individual in a superior position implements the Surveillance strategy.

As the title implies, the Surveillance strategy uses the material properties of the action in order to control the subgroup regularly and systematically. The strategy of acceptance and internalization implies the acceptance of the Surveillance and adjustment of the individual's actions, so that automatic functioning of the Surveillance is adjusted. In other words, in such circumstances the individual accepts the legitimacy of the system and becomes a part of it. He adjusts his actions to the anticipated models without being directly supervised; as a result, his daily work is automatically in accordance with the anticipated model.

**Panopticon:** Surveillance in modern organizations is under the influence of a series of regulations which Michel Foucault [18] calls the disciplinary technology. One of the most significant techniques and principles of the disciplinary technology is having multidirectional Surveillance over the atmosphere, time and activities. Therefore, one of the consequences of the Surveillance strategies is that a Panopticon atmosphere in the organization will be created. Panopticon is a kind of Surveillance through which the subjects feel under constant control and regular examination by the heads of the organization. Mr. H. 31, with 5 years of experience is a production line expert. He says: "It's obvious that the ones who are sitting at the computer know what's going on in the production line. For example, when the line's stopped and the light is red, I have to let them know that my line's stopped because of lack of or running out of spare parts. They have to be informed."

Mr. K. an engineer, who is the head of one the production lines, says: "It depends on who you ask from. If you ask from the manager, he'll definitely tell you that he's satisfied. He's sitting in his office, checking the lines online. But if you ask from the workers, it's vice versa."

**Symbolic Violence:** According to the analysis of Bourdieu [27, 28], the main elements of Symbolic Violence are as follows:

- Symbolic Violence is exerted through different kinds of symbolic capitals. Symbolic capitals are manifested in preference and dominance.
- Symbolic Violence is officially recognized by the subordinates and its legitimacy is accepted by them. Therefore, subordinates help in exerting Symbolic Violence.

According to Bourdieu's conceptualization, Symbolic Violence refers to officially recognizing the discriminations in the material structure of the action and constantly reminding the subordinates of their lower position. Mr. P. a production line expert with 5 years of experience talks about his low access to a kind of production software: "We don't have access, but our boss does. Sometimes we don't need to have access. It's not necessary for us, but our boss and the supervisors have access. I've seen that in the production line some have access to control the process of production."

**Personal Life:** Internal Surveillance makes individuals behave in accordance with the expected models without worrying about supervisors and only with internalizing the rules. In other words, internalization of Surveillance changes the individuals' behavior permanently. A person who is active in this system does not change his behavior when the work time is over; instead, he leaves his workplace and enters the outside world with the same character and evolved behavior. In fact, any change in the work style of the individual has a reflection in his personal life. The assumption that work is separate from personal life even for those people whose work time and place are completely separate from their personal time and home is not in concordance with reality. Working in a system in which the individual has to follow some regulations, makes the individual lead a personal life based on self-control and internal discipline. Mr. T. 32, is a production line expert with 6 years of experience. He says: "Our working schedule influences out personal life. We didn't work at home before the 5S system was launched. We believed that women's duties were different from men's duties. Vacuuming the house didn't have anything to do with me. I used to drink tea and not wash my mug. Now, I personally have improved because some actions have been repeated at work. For example, at work I have to wash my mug, so when I go home I don't expect my wife to wash my mug. I myself do it. There are some actions which are transferred from home to work and some which are taken from work to home."

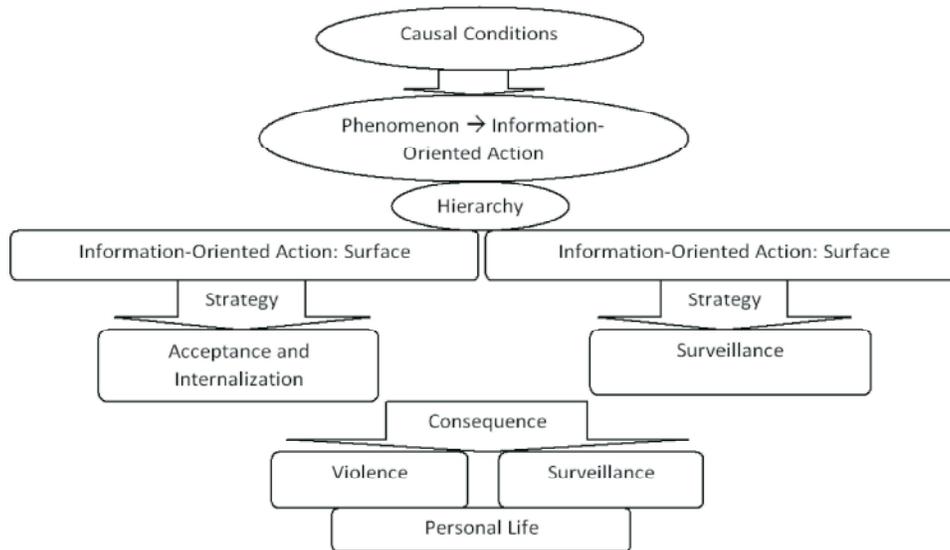


Fig. 7: The Paradigmatic Model of Surveillance and Symbolic Violence

**The Paradigmatic Model of Expertise and Competition:**

The skills which are necessary for information-oriented action range from traditional to knowledge-based and from simple to wide-ranging. The setting for the model of expertise and competition can be explained using an intervening concept called “function type”. Function type depends on how specialized the Information Technology instruments, employed by the individuals, are. General use refers to employ those instruments which are accessible to everyone and are not specified to a special group. For example, everybody including production experts, the staff, boss and employees are allowed to use Microsoft Office, directly or indirectly. On the other hand, specialized use refers to using software programs and facilities which have a specific use and are related to a specific type of work. Production software programs like MES and quality control software programs like Tag are among the ones which have specific use.

**Setting and Strategy:** Information Technology leads to growth and skill development among workers when used in a specialized manner. However, it has to be taken into consideration that the skills required for information-based action are different in different circumstances and regarding different jobs. The setting of the action is specified in two situations, each of which demands its own strategies. The first situation includes specialized use and the required skill in this situation is of the knowledge-based type. In the second situation; however, specialized use is accompanied by wide-ranging skills.

“Knowledge-based Learning” is the strategy which is associated with the first situation. The new work requirements make the individual willing to improve his skills in specialized areas since the traditional skills are not enough for information-based action. In order to manage working in new atmospheres, it is required to have a transition from traditional to knowledge-based skills. Mr. A. 31, with 10 years of experience is currently the supervisor of one of the production lines. He states: “It’s as if you enter a new world when you enter a new system. When the setting changes, it needs its particular information (knowledge-based skill) and it is the basis for learning new stuff (knowledge-based learning.) You’ll work on the weaknesses and catch up with the rest. As the supervisor, they expect you to save the information on the computer and send it to the chief (knowledge-based skill), so you need to learn the tactics for using these programs and use them (knowledge-based learning.)”

The required strategy in the second situation is called “Cooperation and Interaction”. Due to the different types of skills which are required in the new circumstances, cooperation and interaction among the individuals in different levels increases. The multiplicity of the required skills creates a bond among the individuals. For instance, the superior-subordinate relationship which used to be a formal, superior-to-lower relationship, has become closer and friendlier since the superior have become more reliant on the subordinates in some skills which the superior do not possess. In fact, skill variation has improved the relationships among individuals and made them

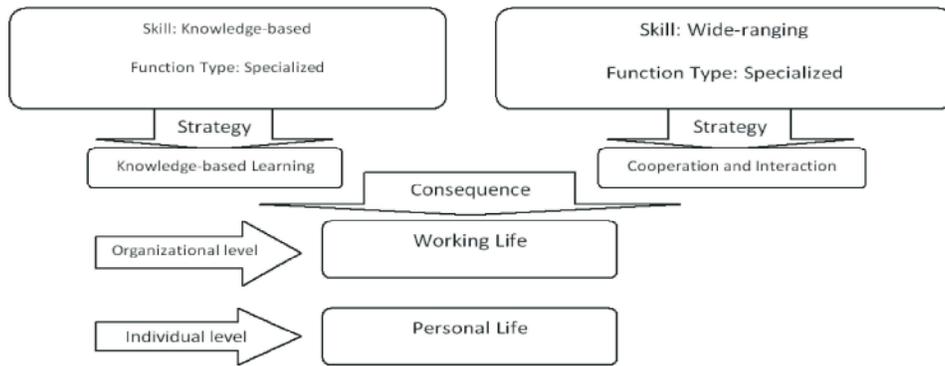


Fig. 8: The Paradigmatic model of Skill and Competition

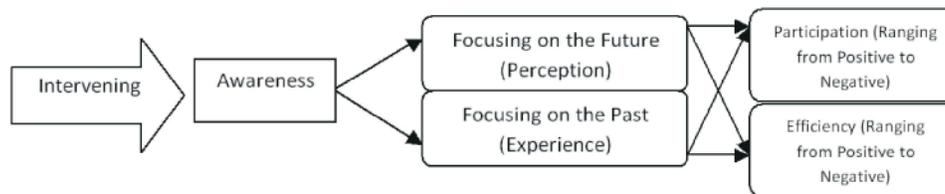


Fig. 9: The Paradigmatic Model of Acceptance

more reliant on each other; thus, they have to implement the strategy of “Cooperation and Interaction”. Mr. Z. a 31-year-old production line operator with 5 years of experience says: “Relationships have become friendlier and more consultative (cooperation.) But in the old system it wasn’t like this. The supervisor was the one in charge and he thought that he knew the best. Now, it’s different. You may know more than your supervisor because it’s not just work which is important in the system. In the old system the focus was on work, so because of being more experienced the supervisor knew more than the operators (simple skill.) But now there is a wide range of skills (wide-ranging skill), so workers consult more with each other and information is exchanged among them. They negotiate more with the supervisor (cooperation and interaction.)”

**Competition Based on Traditional and Knowledge-Based Skills:** The criteria for competition in organizations have changed from traditional abilities and merits to knowledge-based ones. As a result of skills development, developing knowledge-based learning strategies and establishing cooperation and interaction the criteria which determine promotion and growth in an organization has changed. Mr. A. a 31-year-old supervisor of one of the production lines, with 10 years of experience, says: “I started work at Pars Khodro Co. 10 years ago. At that time, my supervisor had only passed elementary education. The only thing he could write was his name. He left after retirement. Well, working with someone like

him who’s not aware of what’s going on around the world is a bit more traditional, so you’d have traditional expectations. Everything is traditional, for example, starting the production line, calling the workers and even checking who is present and who is absent. But now everything is different. Even the new operator that you’re working with has a new way of thinking. He’s more up-to-date, so surely anybody who wants to directly work with them has to be more informed specially in terms of IT and management psychology (knowledge-based competition.) Previously, it wasn’t like this. Those who seemed to be more strong-arm got the higher positions.”

The workers’ trainings not only do change their working life, but also they influence their personal life. Mr. Z. a 31-year-old quality control expert with 7 years of experience points out: “I myself before starting work here didn’t know how to work with simple programs like Microsoft Office. I could only type a letter on Word, but now I’ve learnt working with Access programs. I’ve learnt drawing tables and diagrams, working with Excel, etc. (knowledge-based and wide-ranging) I don’t have any problems with them in my personal life. I’m not a professional, but I think everybody needs to have Internet connections at home and be in contact with others (personal life.) Before, it wasn’t easy for me to work with the Internet because I hadn’t passed any computer courses and I think even if I has passed a course I would’ve forgotten how to work with it because of not practicing. We passed the course here 3 years ago.”

**The Paradigmatic Model of Acceptance:** Changing the material setting of the action implies changing the hierarchical position of the action. It results in a change in the level of enjoying technology and observational properties which are considered a phenomenon in this model. The intervening conditional in the strategy of acceptance is “awareness”.

**Awareness:** “Awareness” refers to the experiences and future perceptions of an individual. Awareness has two dimensions. The first dimension focuses on the past and encompasses the individual’s experiences. The second dimension focuses on the future and is called perception. Each of the two dimensions of awareness has two levels: efficiency and participation. Efficiency refers to the level to which technology accompanies an individual and participation refers to being involved in the advent, placement and utilization of technology and taking individuals’ views and experiences into consideration. Both of these levels exist in the two dimensions of awareness and range from positive to negative.

**Setting and Strategy:** According to the phenomenon and intervening factors the setting of the paradigm is specified as a spectrum on which the material properties of the action change. Furthermore, the individual’s awareness changes from positive to negative. When the awareness structure of an individual is positive the strategy of “Acceptance” is implemented and when it is negative the strategy of “Refusal” is put into use. In other words, the acceptance/refusal of technology is a combination of the individual’s experiences towards the efficiency of older technologies and his participation in the advent of them, his perceptions to the future and the efficiency of technology and his participation in new technologies. Mr. D. who is a 32-year-old production line supervisor with 8 years of experience points to the relationship between efficiency and acceptance: “It depends on the new system and how much we know about it. If it’s a better system than MES, we’ll accept it like when we accepted MES. (Efficiency - acceptance)”

Mr. A. who is a 31-year-old production line supervisor with 10 years of experience points out: “When people have an idea about something, they accept it. It’s when they have a positive supposition about something. For example, you want to buy something. People tell you that Sony is a good buy, so you’ll definitely choose a Sony product. When Sony presents a new product, because of your positive opinion of it, you’ll surely

accept it (acceptance) since the first one worked well (efficiency.) The new system will definitely work better and be more efficient (acceptance.)”

Mr. M. who is a 31-year-old engineer with 4 years of experience, is currently one of the heads of the staff. He emphasizes the element of participation: “The purpose of a system is defined based on the needs of it. If they meet the goal, it is fine (cooperation) But if they change the old system and install a new one, because they’ve got used to working with the old one, they may not be able to work with either system (cooperation – acceptance)”

#### **Results and Recommendations for Further Research:**

This research investigated the impact of Information Technology on the working life of an individual and the individuals’ relationships (horizontal and vertical relationships) with each other and some areas like skill, competition, Surveillance, acceptance, modernization and education were studied. However, due to the fluid and adaptable nature of the qualitative study, the findings of the research were not limited to these topics and in some occasions other areas which have been influenced by Information Technology were also investigated. The impact of Information Technology on the individual’s personal life and changing personal relationships, lifestyle, family ties, etc. is among the most important identified impacts. Information Technology is a “multifarious social entity”, i.e. firstly, it has some consequences which have initially not been considered by the operators. This was called as unintended consequences in Giddens [29] theory. Secondly, its effectiveness is to some extent complicated and includes a combination of changes in material properties and constructs and changes in relationships, hierarchies and mindsets among those who are in action.

The noteworthy impacts of Information Technology on the structure of the relationships among individuals and the settings of the action make us notice that functionally the advent of modern technologies ought to be taken into account from a point of view other than facilitation since developing relationships and everyday actions has a lot of noticeable results. In the meantime, some factors, such as, the size of the organization, organizational culture, age range, educational background and social class of the workforce vary in different organizations, therefore, not only is it necessary to study the impact of technology on the different groups separately, but also the impacts of technology has to be taken into account on these issues independently. Nevertheless, Information Technology creates an

impersonal atmosphere, so it has to be borne into mind that the establishment of Information Technology decreases face-to-face interactions of the individuals and may spoil impersonal, friendly relationships in the workplace. Although this issue increases work efficacy by means of eliminating informal relationships and making the workforce function on the basis of specific principles, as long as workplace is one of the most important settings for improving relationships among individuals and satisfying their need to build relationships and since forming informal relationships in organizations is of major significance, there should be some ways to replace these relationships. Group activities like doing team sports, throwing celebrations, etc. can maintain person-to-person relationships among workers.

Information Technology demands the establishment of specialized systems. It has to be taken into consideration that the establishment of specialized systems is accompanied by some risks (Information Security and Dependence on Instruments) which have to be controlled through increasing security and predicting some ways for replacement in emergency situations. On the other hand, due to the major role of Information technology on developing supervision on the workforce, it must be taken into account that even though improving the quality of supervision in the workplace is one of the ambitions of managers and supervisors, it has to be considered that individuals undertake supervision in specific circumstances: Firstly, supervision has to be limited to workplace and actions at work. Secondly, a special system for supervision, reward and punishment needs to be developed. Thirdly, the outcomes of this system are not blame and punishment, but increasing the output through teaching the required skills to the workforce. That is to say, supervisory systems ought not to change to one-directional systems which abuse workers, yet they have to officially recognize private boundaries and individual freedom and share the workers in the profits made by supervisory systems.

#### **Regarding the Noteworthy Impact of Information Technology on the Competitive Atmosphere of Organizations:**

- It is necessary for the organizations to provide a suitable mechanism for educating the workforce, so that in addition to encouraging the individual to

learn, their working skills are improved in a purposeful manner. Therefore, ineffective training is avoided. If the tendency to improve individual skills is not directed appropriately by the organization, the individual's time and money will be wasted and ineffective.

- It is essential for some competition-creating criteria, such as promotion, to enter the workplace officially, so that the required knowledge-based and wide-ranging skills will run in the system regularly.

Since, the impact of Information Technology is not limited to workplace, the organizations which implement these technologies need to consider the Para-organizational dimensions and make the required predictions. Attending to the impacts of the taught skills on personal life and utilizing modern technologies in the workplace can be effective and useful. Moreover, conducting further research in this area illuminates the different aspects of this effective process and clarifies its mechanisms.

The major role of the elements of efficiency and participation in individuals' acceptance of modern technologies indicates that, in this area, change is made regarding these two elements. These two elements are considered simultaneously. Examining the efficiency of modern technologies is not sufficient and even the most modern and developed technologies may not be effective enough in certain individual and environmental circumstances. Alongside examining and establishing efficient technologies, it is necessary for the workers and users to actively participate in the processes of needs analysis, system selection, etc. and in addition to expressing their opinions observe these processes, so the new systems and technologies are encountered with the lowest level of resistance.

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