PERSONAL CONSEQUENCES OF WORK UNDER 'NEW ECONOMY': THE CASE OF METU-TECHNOPOLIS

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ABSTRACT

PERSONAL CONSEQUENCES OF WORK UNDER 'NEW ECONOMY':
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This thesis is an attempt to present the sociological dimensions of high-technological work from the perspective of highly-qualified white-collar professionals under the conditions of 'new economy'. This study tries to shed some light on the rapidly growing professional high-tech work and its interrelation with personal consequences. The pace of change and the acceleration of global informational economy have created a new kind of workforce, introduced new cultures of work, and witnessed diverse social transformations for more than twenty years. At the core of this research, it aims at providing a broad sociological perspective on the changes which are brought by the entry of a large number of well-educated young people into the workforce. New forms of work organization, employment, and the new cultures of work and identity that emerged in this industry is taken into consideration.

Technopoles as a newly emerging concept for Turkey, are clusters where this so-called technological change could be clearly observed. METU-Technopolis is chosen as the field of research due to the widespread use of flexible production employment methods and highly-qualified labor force.

Keywords: New economy, technopole, METU-Technopolis, work culture.

ÖZ

‘YENİ EKONOMİ’ KOŞULLARINDA ÇALIŞMANIN KİŞİSEL SONUÇLARI: ODTÜ-TEKNOKENT ÖRNEĞİ

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Bu tez çalışması, ‘yeni ekonomi’ koşulları altında çalışmanın sonuçlarını, nitelikli beyaz yakalı çalışanlar açısından sosyolojik boyutlarıyla sunmayı amaçlamaktadır. Bu çalışma, hızla büyüyen yüksek teknolojik iş ve kişisel sonuçları üzerine ışık tutma çabasındadır. Yaklaşık yirmi yıldan bu yana, küresel enformasyon ekonomisinin hızlı değişimi yeni bir tür işgücü, çalışma kültürü ve farklı toplumsal dönüşümleri de beraberinde getirdi. Çalışmanın merkezinde çok sayıda nitelikli çalışanın işgücüne katılması ve böylelikle çalışma kültürü ile ilgili ortaya çıkan değişimler yer almaktadır. Bu değişimin neticesinde ortaya çıkan yeni iş örgütlenmeleri, istihdam biçimleri ve çalışma kültürü incelemeye değer bir konu olmaktadır.

Türkiye için henüz yeni bir kavram olan teknokentler ise, bahsedilen teknolojik dönüşümün açık şekilde görülebildiği yerler olmaktadır. İleri teknolojik üretim yapan firmaların yer aldığı ODTÜ-Teknokent, esnek üretim ve istihdam yöntemlerinin yaygın olarak kullanılması ve yüksek nitelikli bir işgücüne sahip olması nedeniyle projenin araştırma sahası olarak seçilmiştir.

Anahtar Kelimeler: Yeni ekonomi, teknokent, ODTÜ-Teknokent, çalışma kültürü.

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Every morning in Africa, a gazelle awakens. He has only one thought on his mind: To be able to run faster than the fastest lion. If he cannot, then he will be eaten.

Every morning in Africa a lion awakens. He has only one thought on his mind: To be able to run faster than the slowest gazelle. If he cannot, he will die of hunger.

Whether you choose to be a gazelle or a lion is of no consequence. It is enough to know that with the rising of the sun, you must run. And you must run faster than you did yesterday or you will die.
This is the race of life.

An African Proverb

CHAPTER 1
A BRIEF INTRODUCTION TO THE CONCEPT OF WORK

1.1 Defining Work

Work is vital for human beings. The act of work, which can be defined as the physical and mental effort spent for achieving a certain goal, played a central role in the relations of individuals with society and nature.

Many thinkers acknowledge work as the defining feature of human species. As to this, work was an effort totally peculiar to humans in order to survive and to meet their constantly increasing needs. As Thomas denotes, "Birds might build nests and bees gather honey, but they did so by following instinct rather than by acting in accordance with a conscious plan. Only mankind worked (Thomas, 1999: XV)." Hence, the purposive labor constructs mankind's essential features and leads to the fundamental distinction between human beings and animals.

Work involves sociability, personal relationship and human contact. The organizations working collectively for a common purpose had a deep impact on the social and mental structure of human species. Work has been the cause for the development of social relations since the times when people started to hunt collectively. The tools of cooperation and division of labor utilized by primitive communities for common purposes, constituted the earliest sources of contemporary, global society. The Turkish word for work-ing, *çal-ış-ma* can be counted as an example, which has the adjunct reference that the verb corresponds to an act that is done collectively.

The thesis that language evolved through the need of coordination for collaboration or the idea that the human intellect developed through complex relations that emerged after people started to work and live in groups, is admitted widely. If work and the activities emerged through it resulted as the development of human intellect,

language and societies, then work should be accepted as one of the most important factors of the particularity of human species.

In summary, all the discussions and explanations stated in this study consider work as a basic element for the evolution of mankind through history. The main thesis of the entire study can be epitomized in Jacques Bidet's words: "work is a general anthropological category such as the language. Without work, neither the process of humanization, nor the specifity of mankind can be comprehended" (Méda, 2004:22).

1.2 Changing Nature of Work throughout History: A Bird's Eye View

Work is a fluctuating and an unruly concept that it can be construed with innumerable meanings. Let's start with the most prominent issue: the relation between work and freedom. Does work lead to emancipation or to the contrary, enchains man? Both arguments might be accepted proper to some extent. According to Marx, work was the unique activity of man *for itself*. It is the continuous struggle of man against nature and alienation. As he characteristically states in *German Ideology*, work is the creative act of mankind:

> For as soon as labor is distributed, each person has a particular, exclusive area of activity which is imposed on him and from which he cannot escape. He is a hunter, fisherman, a herdsman or a critical critic, and he must remain so if he does not want to lose his means of livelihood. In communist society, however, where nobody has an exclusive area of activity and each can train himself in any branch he wishes, society regulates the general production, making it possible for me to do one thing today and another tomorrow, to hunt in the morning, fish in the afternoon, breed cattle in the evening, criticize after dinner, just as I like, without ever becoming a hunter, a fisherman, a herdsman or a critic.

On the other hand, work has been seen as an enchainment and a curse. Work is the source of pain and fatigue for an important part of people through civilization process. The root of *travail*, French word for working, confirms this opinion. Derived from *trepālium,* an instrument of torture; and the travails of childbirth recall the curse that is associated with all forms of labor with pain (Thomas, 1999: XVIII).

An apparent proof of the work conceived as intolerable, is the ordeal of African people and their slavery for centuries. In addition, who can argue that *work liberated* the people in concentration camps? Moreover, work is still used as a punishment to for the people who commit light crimes. It is for sure that, the government officers do not aim to bring freedom to criminals by work.

Ancient Greeks regarded work as a curse, as well. It was correlated with the terms such as pain and suffering. Work was not an activity that the gods or nobles dealt with. According to Hesiod,

> The race of men that the immortals who dwell on Olympus made first of all was of gold. They were in times of Kronos, when he was King in heaven; and lived like gods, with carefree heart, remote from toil and misery. Wretched old age did not affect them either but with hands and feet ever unchanged they enjoyed themselves in feasting, beyond all ills, and they died as if overcome by sleep. All good things were theirs, and the grain-giving soil bore its fruits of its own accord in unstinted plenty, while there are at their leisure harvested their fields in contentment amid abundance (Thomas, 1999).

Moreover, the cultural norms allowed free men to pursue pure exercises of mind such as large-scale commerce, politics, philosophy and arts in the ancient Greek world. The leisure time that one possesses reveals the status, virtue and morality of people. Aristotle (1995) was stating that "[t]he citizens must not live the life of mechanics or shopkeepers, which is ignoble and inimical to goodness. Nor can those who are to be citizens engage in farming: leisure is a necessity, both for growth in goodness and for the pursuit of political activities.

On the one hand, work was admired as a divine activity and practiced by the God. It is ennobled for people as a sacred duty and the source of all human comforts. For Nicole Bozon, a 14th century friar,

> [W]ork is the life of man and keeper of health. Work drives away occasion for sin, and makes man rest himself, is the relief of languor, a stay to illness, safety of the people, sharpener of the senses, stepmother to idleness, duty to young people, and merit to old. Hence

> he, who would give up the joy of everlasting life takes care that he does not work at all in this life.

In the medieval world, it was difficult to set the limits to where work and leisure is separated. Work was a religious duty and, in the meantime, a measure of protection against the sins of idleness. Religious salvation was seen as dependent on the dedication of work to god. According to the Christian belief, man's labor was the continuation of god's creation and a social duty that every one should perform the most that they can. Thus, work as a worldly act finds its roots in a divine act. In other words, the medieval god was expecting diligent work from its subjects.

The other question related with the nature of work is whether it leads to satisfaction or fosters dissatisfaction and boredom. For some, work was a cure for boredom and melancholy; offers the pleasures of sociability, release from daily anxieties and provide pleasure, thanks to achievement of something. According to Henry Ford, work was the creator of civilization and a remedy against discontent.

> The natural thing to do is work-to recognize that prosperity and happiness can be obtained only through honest effort. Human ills flow largely from attempting to escape from the natural course. I have no suggestion which goes beyond accepting in its fullest this principle of nature. I take it for granted that we must work. All that we have done comes as the result of a certain insistence that since we must work it is better to work diligently and forehandedly; that the better we do our work the better off we shall be. All of which I conceive to be merely elemental common sense.

On the other hand, work was the main factor that led to dissatisfaction and boredom. The physical hardships and privations, especially during the factory work, are counted as the causes of alienation. The following statement shows apparently how the work results in dissatisfaction in the human soul.

> According to my personal opinion, working in a factory means the decomposition of my own respect in two or three weeks because of the brutal and daily limitations. In the end, I do not suppose that there will be a feeling of rebel. No, in contrary to that, an unexpected situation happened to be: submission. The submission of a pack animal consented to its faith…You should kill your spirit, ideas and feelings for eight hours a day in front of the machine. This situation puckers thinking as if the flesh puckers by lancet (Méda ,2004).

The work also calls to mind punctuality, deferment of gratification and its primacy against all other acts. It is placed in the core of every surviving act and becomes a reference point for social status, recognition and the way to gain individual autonomy by earning money.

To sum up, however it is perceived, work has always evoked contradictory reactions. Nevertheless, throughout the history, it always remained a defining category for human beings as an unavoidable part of the human condition. After this brief look at the various perceptions of the basic term, now it would be more proper to get into the specific content of ‘work’ for this study.

CHAPTER 2
TRANSFORMATION OF CAPITALISM

Flexibility is described by referring to solidity. The definition of capitalism as a solid structure gains importance in order to comprehend how a flexible economy takes its meaning. In this part of the study, therefore, Weber's highly relevant terminology of capitalism will be evaluated, and the scientific principles of Taylor and the Fordist methods of production will be focused on to catch a glimpse of the inward relations on the transformation of capitalism.

2.1 Max Weber's Contribution

The significance of Max Weber lies in the fact that his deepened analysis of the modern society aftermath the industrial revolution and its inevitable consequence as the control of nature. In the sphere of nature, the control is manifested as the mechanized production of goods and services; in the social sphere, on the other hand, it is the control of the development of nation state and its instruments such as welfare state and state bureaucracy. (Hoogenboom et.al, 2005:165)

2.1.1 Protestant Ethic and the Spirit of Capitalism

The most celebrated book of Max Weber, *Protestant Ethic and the Spirit of Capitalism,* reveals critical insights as to the transformation of the work culture and the perpetuation of this change. The core argument of the book, simply put, was belief in the contribution of puritan ethic and ideas in order to make economical gain leading the development of capitalism within rational principles.

The protestant ethic stipulates work for 'individual salvation'. The idea of hard work as a duty that carries its own intrinsic reward which Weber inherited from

his uncle Karl David Weber (Bendix, 1966:51) was conceptualized as a practical action by himself for both the individual and the society. The religious values maintain themselves as diligent work in a secular world. Work in that sense is re-conceptualized as a duty for the benefit of the individual and society as a whole. The religious values are transformed into values of a secular world in terms of an obligation to work 'industriously'. Therefore, unlike the ascetic and isolated understanding, Protestantism appeared also as a new kind of perception of a religion whose worldly attributions was strong and ruled by a mass movement.

The protestant ethic turned upside down the belief in work as 'accursed' and a weight on the shoulders of society. Together with this, even though there was an increase in the load and time of work, it had positive contribution as it rose as an ethical value in newly emerging modern society.

However it is evaluated, in last instance, Max Weber's *Protestant Ethic and the Spirit of Capitalism* was an alternative to and criticism of the Marxist understanding, which placed privacy on the relations of production in the economic sphere. The protestant ethic thesis, on the other hand, placed privacy on religious values rather than on the determination of economy and its superiority in the functioning of society as a whole.

2.1.2 The Militarization of Society

The model of a military system for the societal institutions is one of the critical points in Weber's sociology. Total obedience to a rational order are indispensable for a man who had lived in and witnessed the rise of the dominance of military system in almost every particular institution of modern society. For Weber, the institutionalization and hence, the rationalization of the civil society was its sources in this militarist peculiarities. In Weber's rational state, shaped with militarist and social capitalist characteristics, the militarization of civil society reveals itself in every aspect of social life where time and place is defined according to the rational order.

The protestant ethic means for Weber the delaying of gratification The militarist bureaucratic system is well into the above explanation in the sense that it delays the present desires and orders what should be done for now and achieve its reward in the long-term. Indeed, what Weber was pointing out with the 'spirit of capitalism' was the 'spirit of rationalization' in a broader perspective. Weber's thesis of 'disenchantment of the world' should be analyzed from this standpoint and conceptualized with its affinity with rationalization and control of life and society. The disenchanted world became the determining feature of western societies premised on rationalization and the magic of previous world lost its fascination.

According to Richard Sennett (2006: 23), the conception of time lies at the center of Weber's thought. The army model is based on a view of control of time which prescribes a predictable future and planned for long-term purposes. Rationalization of society can only be possible with such a fixation. In this way, rationalized time "enabled people to think about their lives as narratives-narratives not so much of what necessarily will happen as of how things should happen" (2006:23). The thing that Sennett emphasized in his prior works appears in this context. Conceptualization of a specific time enables long-term plans and makes it possible to predict about future and have the control over one's life. On the other hand, one of the principles of protestant ethic as mentioned before, is to delay the gratification of present due to organization of time.

2.2 Taylor and Scientific Management

Science and technology are closely related with the development and evolution of work. The two factors leading change happens to be at the center of Taylor's principles. Frederick Winslow Taylor published his book, *Principles of Scientific Management* in 1911. Yet, from 1900 to 1930, Taylor's scientific principles can be evaluated as the dominant form in the understanding of management. These years were just after the transformation from industrial revolution to mass production. Taylorism, in fact, is the incarnation of positivistic and techno-scientific rationality of 19th century thinking. As Kumar (2005: 58) denotes "Taylorism became the hub of a new technocratic ideology that did not stop at the factory or office but moved out to

the world at large." The organization of the production units and its influence on work, therefore carry high importance for the aim of this study.

Taylor's method is indeed based on simple motives. According to Taylor, the increase in productivity is possible with the application of scientific and technological principles. Taylor's scientific management was an attempt to apply "the methods of science to the increasingly complex problems of the control of labor in rapidly growing capitalist enterprises (Braverman, 1974:86). The methods that Braverman mentioned are mainly a, strict division of labor in the production processes, standardization of tasks, separation of mental and physical labor, and the hierarchical structure with the centralization of production.

The basic emphasis of this hierarchical structure is the organization of time. This model of organization acknowledges the fastest worker as the norm, and shapes all the organization with reference to this worker. Indispensably, this situation leads to pragmatist results in the organization of work. Performance of the worker determines the position and this competitive environment ends up with a 'scientific' selection. Meanwhile, the distinction between worker and managerial class culminates in the separation of production and controlling moments which, in the end, increases efficiency. Moreover, the logic that lies behind this organization model is the dominance of abstract relations and impersonal social relations.

Taylor believed that the existing relations were not useful due to the laziness of workers. Soldiering, as he uses, was a factor which decreases the speed and the efficiency of work. For this reason, Taylor divided the work to tiny particles. In other words, the production processes became rational and the decision making mechanisms are given to managers by excluding workers.

2.2.1 Principles of Scientific Management

Taylor's principles of scientific management were among the first, which aim to develop management processes scientifically. Hence, the lately developed concepts such as 'quality control cycles' or 'reengineering' can be counted as the first

inheritors of scientific management. Taylor's principles of scientific management aimed to find the 'one best way of doing something'. Taylor's scientific methods consist of four principles:

1. Replacing rule-of-thumb work methods with methods based on a scientific study of the tasks.
2. Scientifically selecting and training each employee rather than passively leaving them to train themselves.
3. Cooperating with the workers to ensure that the scientifically developed methods are being followed.
4. Dividing work nearly equally between managers and workers, so that the managers apply scientific management principles to planning the work and the workers actually perform the tasks

2.2.2 Functional Management

According to the principles of scientific management, design and application of work is strictly separated. Taylorism was comprised of functional management which standardization and simplification are the reflections of managerial and labor force. All the qualities and the potentials of judging are concentrated in the department of planning. The 'science' part of the scientific management belongs to a nucleus group dealing with planning. The disqualification of mid-level managers, losing their ability to control and consider their job as a whole is in the center of Taylorism.

Functional management embodies with the 'one best way of doing something'. The only way of doing best can be ensured with the division of work to small units. When the individual differences are abolished, then working time and its control belongs to employee. By this way, both the employee and the employer have the knowledge of the probable completion time of work.

In these circumstances, a general evaluation in the transformation of work organization can be argued as follows: Taylor's principle of scientific management is

based on an extensive planning and organization of work summarized as “radically refined division of labor, rigid separation of conception and execution, and standardization and splitting of tasks into the simplest possible forms” (Kumar, 2005:45). In that sense, standard methods for the performing of each job and the selection of workers with the appropriate abilities are arranged in order to increase efficiency in the work.

Yet, it can be argued that Taylor’s scientific principles of management are an example of economic reduction. According to him, workers are motivated merely with economic needs, disregarding the individual differences among workers. Efficiency, in Taylor’s conception, can be defined as the rise in production materials. However, efficient work might not be provided with only economic promotions. Moreover, it can probably result with dissatisfaction of workers from the work environment.

As a result, Taylor’s principles should be evaluated as the application of scientific management methods to the work organizations for the first time in the history of work. Furthermore, it was a specified plan of the study of jobs and separation of tasks which enabled importance of selection.

2.3 Fordist Production

Almost all world economies welcome 1930s with the load of an economic depression. The reflections of depression did not diffuse solely to the production and consumption categories of capitalist economy, yet disseminated to any areas of sociability. In those years, there appeared a new generic attitude and a new regime of accumulation to which the scientific method was unable to respond.

Even though Fordism was identified with the production line, the important thing that the system produced was the new socio-economic system. Henry Ford showed interest to the worker’s lives besides their working hours and take the worker’s life, worldview as a whole. Together with the advantage of the availability of that

period's labor-capital-state relations, Keynesian welfare state led the development and workers became an important actor in the history.

The Second World War years became the peak point of mass production and consumption. Big production establishments became the centers of scale economies and stock volumes reached to gigantic amounts. From this perspective, division of work, specialization in production, standardization, techno-scientific rationality of modernity, covering with Taylorism happened to reach its peak.

2.3.1 The Characteristics of Fordism

Basically, the characteristics of Fordism can be analyzed under six titles. First, *the standardization of production* appeared to be the inevitable result of production lines and scale economy. Second, *the automation techniques* made the factories as grand areas of application of rationalization. Third, *centralization and Taylorist principles of management* strengthened its position. As it can be seen here, the process through Taylorism to Fordism is, at the same time, a process of deepening phase.

Fourth critical point is *the role of social state*. Becoming a regulatory and controlling agent, the state intervened to the economic structures not only with implementing the price and contract policies, but also it had the right to use the organs of economic politics by determining wages and levels of consumption. Fifth, the semi-skilled and mostly migrant workers concentrated in the factories, so that the *distinction of blue and white collar workers* made by Taylorist principles deepened and a new type of worker appeared who is oscillating between nine and six from factory to house. Last, the *employment relations are constant and planned for long-term.* Both the white and blue collar workers were employed for entry level jobs and making career in the factory relying on the job security of their job.

Those characteristics of Fordism were not valid only for capitalist economies, yet they can be applied to socialist economies as well. The mass production and mass consumption are not distinctive characteristics of a capitalist economy. However, it

must be discussed that different forms of production lead to different results. What we mean here is the man that Fordism creates.

2.3.2 General Overview

A simple definition can be made for the definition of Fordism as production for masses and being devoid of flexibility. Even, that conceptualization is consistent in itself and corresponds to rational theses, Fordism should be assessed with a sum of relations. Fordism was not only the applications of a new technology in the area of production. More than that, it was the organization of time and systematic control of life narratives related with its regular operation.

As Kumar indicated (2005:88) "the industrialization of production was ultimately followed by the industrialization of the mind." The industrial revolution did not solely produce changes in the level of economy, yet it was a systematic application of social and scientific techniques to the regulation of relations and influenced every sphere of society.

On the other hand, Fordism was very useful and workable method for the cheap and mass production of similar products. However, the differentiation of consumer demand interrupted Fordism's efficiency. The technological innovations and the new life styles were among the factors that triggers differentiation. In these conditions, Fordism became old fashion.

2.4 The Way through Post-Fordism

According to French Regulationists (esp. Lipietz, 1987); the crisis of Fordism was in fact sourced from reaching its limits. The accumulation regime in the Fordist structure maintained itself due to a partly preservation from foreign markets and the stable increase in the incomes of consumers.

Anyhow, it may be a faulty expression to analyze the production and consumption relations in uni-linear relations of determination. The crisis of Fordism should be

evaluated more broadly than just reducing the crisis to an incompatibility in demand and supply. The crisis of Fordism in 1970's, is also the result of the conflict of the mass man and atomized isolated individual of liberal system, as well as the economic structure. The importance of this above argument is to show that how Fordism is born inside Taylorism, post-Fordism should also be evaluated as the maintenance of Fordism.

In that sense, post-Fordism points to the fact of a differentiation in the demands due to new requirements. In other words, unlike Fordism which concentrates on the production of similar products with high amounts, post-Fordism designates to a new structure which incorporates the production of variety of products in smaller amounts. In this kind of production, the design of product precedes the function. The division of work and technologies are reorganized in order to respond the volatile demand. The economic activity in Post-Fordism passes through production to presentation of services. Furthermore, a more reactive and reflexive production systems are preferred instead of Taylorist and Fordist principles. According to this new paradigm led by service sectors, the source of efficiency and development lies in the production of information. People who will produce information are the ones who will have managerial and technical qualities.

Essentially, the discussions made about post- Fordism are pivoted on defining it as non-Fordist. The production line left its place to target-oriented working groups. The result is the reorganization of a whole economic system based on standardization, mass production and non-qualified workers to a system which targets variation of production according to the changing demands, necessitates highly qualified workers and just in-time production.

The transformation from Fordism to Post-Fordism as maintenance or a radical rupture is a confusing problem. Does post-Fordism correspond to a paradigmatic break? The answer of this question lies behind how Taylorism and Fordism is taken into consideration.

Hence, the flexible production phenomenon is not only one of the basic elements of post-Fordism; it might possibly be the most important haunt of transformation. Such dualities as capitalism and late capitalism, mass society and information society, industrial society and post-industrial society, modernism and post-modernism, Fordism and Post-Fordism should therefore be discussed in order to fully understand the phenomenon, such dualities point out the fact that the situation of flexible production is as critical as Taylorism in the beginning of 20th century.

CHAPTER 3
WORK UNDER THE CONDITIONS OF 'NEW ECONOMY'

3.1 The Term 'New Economy'

The term 'new economy' has no single definition. It is used in the widest sense to describe the changing structures of organizations with the advent of rapid developments in the communication and information technology industries. Various concepts such as 'knowledge economy', 'information based economy', 'network economy', 'digital economy', 'flexible economy' or 'new capitalism' are used interchangeably to emphasize different aspects of more or less the same phenomenon.

Referring to Webster (2003:2), new economy can probably be best understood as a series of organizational, as well as technical innovations which are being widely advocated and introduced in response to major changes in world markets. Yet, how do these major changes have personal consequences and how does the transformation of work and economy influence the work culture? Even though it will be discussed later on the basis of the data gathered in the field research as well, it would be explanatory to mention critical titles for our study.

First, the new work organization in the new economy depends on individual autonomy and responsibility. Work in the new economy is moved from narrowly defined and routine tasks to multi-tasking. Together with multi-tasking, work necessitates multi-skilled professionals. Flexible teams and project work are examples of the increasing autonomy and responsibility at work. However, volatility and ambiguity go hand in hand with such autonomy and responsibility. Second, the unpredictable future of work carries the risks of flexibility and other problems related with the impossibility of making plans for future. Skill updating, on the other hand, appears as a challenging matter, which imposes on the worker the task of learning continuously.

Third title concerns loyalty and informal trust relations that flourish at workplace. The continually changing organizational environments are harmful to developing such a relationship. The rapid pace of organizational restructurings and the accelerated mobility of new workers increase uncertainties, and reduce work and work environment merely to economical sphere which people work only for gaining income.

Fourth title is related with changing forms of employment and contracts. The precarious environment of work does not propose a secure future or even a secure present. Security is left aside with volatile contracts and non-standard forms of employment.

3.2 New Economy and Information Society

As already mentioned above, the term 'new economy' corresponds frequently to 'informational economy', 'information society' or 'flexible economy'. For the rest of this chapter, the term 'information society' and 'flexibility' will be explained in details with respect to changes brought about with 'new economy' both at social and economical levels. In this chapter, the term 'information society' will be evaluated considering the relevant literature, and flexibility at work will be conferred in details to understand the transformation of work and its reflections on personal level.

The Latin *'informatio'* is associated with *'informis'* and *'informo'* which means 'formless' and 'reporting' respectively. The word *'informatio'* also means 'transmission' and 'forming from inside'. Martin Heidegger (1991: 29) states in his lectures *The Principle of Reason* (*Der Satz vom Grund*) that:

> [t]he word information which is (not a word of German) provenance-speaks more clearly here insofar as it means on the one hand, the instant news and reporting that, on the other hand and at the same time have taken over the ceaseless molding (forming) of the reader and the listener.

Information should not be taken as a mere concept, but it also deserves to be considered as one of the main determinants of our age. The labor and capital, which were the keystones of the industrial society, are replaced with information. With the advent of information, communication became important and, consequently, the global circulation of information made its allocation and communication compulsory.

Information society theoreticians (Touraine, Bell, Toffler, Masuda) prefer to use a three phased periodization of history (Uğur, 2002). According to this periodization, the agriculture based societies are referred as 'pre-industrial societies'; later the second period is called 'industrial societies', and last, it is called 'information societies' with respect to the rapid innovations in technology.

While the people of the first industrial revolution encountered remarkable cultural and social change, the people of the late twentieth century experienced incredible cultural and social shifts with the advent of the information age. In Richard Rorty's words "what industrialization was to America at the end of the nineteenth century, globalization is at the end of the twentieth" (Bradley, 2000: 9)

This mode of system, based on application of new technologies and information, started to be the dominant characteristics of the world economy. Yet, what was its magical affect that covered more or less the whole world in a short time and with fast acceleration? According to Castells (2005:357), the new economy was 'informational' because economic well-being is increasingly dependent upon the ability 'to generate, process and apply knowledge-based information efficiently'. It is also 'global' that "under the new historical conditions, productivity is generated through and competition is played out in a global network of interaction (Bradley, 2000: 16-17).

3.3 Relevant Theories of Information Society

3.3.1 Daniel Bell: 'The Coming of Post-industrial Society'

In his book, *The Coming of Post-industrial Society*, Daniel Bell (1973) argues that the post-industrial society is an information society. He concludes this on the basis of the analysis of pre-industrial and industrial societies. As he indicates, "the concept of a post-industrial society gains meaning by comparing its attributes with those of an industrial society and pre-industrial society" (1973: 126). He mainly makes these divisions according to the forces of control and types of instruments used against nature.

In pre-industrial societies, the rhythm of life was shaped by the contingent natural forces. The sense of time is *dureé*, of long and short moments, and the pace of work varies with the seasons and storms where it can also be called as a game against nature. They can be called 'agrarian' and are structured in traditional ways of routine and authority (1973: 126-127).

Industrial societies, on the other hand, struggle against fabricated nature. While Daniel Bell was trying to define the world of industrial societies, he applies to the words 'coordination', 'scheduling', 'programming', 'organization', which all refer to comprehensive and holistic meanings. World is more systematized and the processes are rationalized. It is gradually secularizing and science is growing to be the leading phenomena to explain worldly things. The above given adjectives can also be used to explain time and space perception of industrial society such as, time/space is coordinated, scheduled, programmed and organized, etc.

Thus, the conditions of work are transformed coherently with the above generalizations. Aim of productivity which is the art of making more with less, comes first and the machines supersede man. World started to be explained mechanistically. The product is reduced to the rhythmic motions of cogs and wheels. Skills became extinct and the production is left to the scientific engineer and semi-skilled worker, which Bell (1973: 128) defines as the 'human cog between machines

until the technical ingenuity of the engineer creates a new machine which replaces him as well'. Life is seen from an economic perspective and the relations are evaluated within the efficiency and utility scales.

Table 1 Tripartite periodization according to Daniel Bell

	Based on	**Life**	**Critical element**	**Key figure**
Post-ind. societies	Services (trade, finance, health..)	Between persons	Information	Professionals, technical workers
Ind. societies	Goods-producing	Against fabricated nature	Energy	Engineers, laborers
Pre-ind. societies	Extractive industries(mining, fishing, agriculture)	Against nature	Raw muscle power	Land-owners, religious people

Bell explains the transformation in three components: Economically, it is clear that there is a shift from an economy based on manufacturing goods to a service based economy. Secondly, the post-industrial society is science-based and applies to high-technology by giving huge significance to research units such as universities. Last, technical competence and expertise are the main elements that give rise to new elites.

So, what is different with post-industrial society, as mentioned before, is the use of information as the force of control. Labor and capital, are replaced by information which is the central variable. "The labor theory of value, as classically formulated by a succession of thinkers from Locke and Smith to Ricardo and Marx, must give way to a 'knowledge theory of value'. Now 'knowledge, not labor, is the source of value" (Bell, 1980:506). The semi-skilled worker is superseded with the well-equipped and highly-educated professionals. In short, blue collar worker is replaced with the white collar personnel. In other words, the coming of post industrial society can be conceptualized with the importance of scientific information and technology which are the primary determinants of a new social structure.

3.3.2 Krishan Kumar: 'From Post Industrial to Post-Modern Society'

According to Kumar, the source of post-industrial society is the 1973 oil crisis which displaced the optimist atmosphere of 1960s. Unlike Bell, Kumar gives a lot importance to the difference between the conceptualizations of information society and 'informational capitalism'. For him, the new paradigm is the old wine in a new bottle, which, in other words, is the polished form of old capitalism. New technologies and advanced use of science supports the maintenance of the same old, well-known capitalism.

As Kumar evaluates information society in relations of continuity, instead of envisioning it as a radically discrete stage, he explains the transformation from 'solid' to 'flexible' production in the same manner. For him, Fordist way of production should also be understood as flexible, and the new production techniques are not the opposite but the reformulation of Fordist production. In other words, what is called post-industrialism by Bell, is the matured and throughgoing rationalized face of industrialism.

According to Kumar, the key of the post-industrial society is to abandon central planning and state intervention. Indeed, instead of central planning, replacement of short-term plans which can respond to sudden changes in the economic and political conditions has its reflections in every aspect of social life. In other words, it is not only true for the shortening of employment period replacing a life-time work, but also it is true for the churn rates of companies, the length of personal relations or the pace of fashion etc.

3.3.3 Lash and Urry: 'The End of Organized Capitalism'

"The world of a 'disorganized capitalism' is one in which the 'fixed, fast-frozen relations' of organized capitalist relations have been swept away. Societies are being transformed from above, from below, and from within. All that is solid about organized capitalism, class, industry, cities, collectivity, nation-state, even the world, melts into air" (1987: 312-313). These are the last sentences of Lash and Urry's

book. That kind of an explanation is of course highly influenced by Marx and Engels and what they wrote in the *Manifesto of the Communist Party*. Even though, the political and economic situations are transformed, what led Lash and Urry to aforesaid explanation? When Marx and Engels wrote those memorable sentences, capitalism was on the way to be 'organized'. Yet, Lash and Urry use that expression to describe the disorganized form of capitalism.

They use the terms 'organized' and 'disorganized' capitalism differently from the distinction made by Bell to describe industrial and post-industrial age. According to Lash and Urry (1987:7), "a certain level of capital accumulation is a necessary condition of capitalism's disorganized era in which the capitalist class continues to be dominant." Therefore, it can be argued that capitalist social relations still continue to exist. In that sense, Lash and Urry had a similar point of view with Kumar concerning the changing structural relations of capitalism in 20th century.

They define the period from the second half of the 19th century to the 1960s as organized period of capitalism. Organized capitalism simply means Fordist production using Taylorist scientific principles in large-scale and planned economies, whereas, what is meant by the disorganized capitalism is, more or less the reverse form of those characteristics. In other words, disorganized capitalism is portrayed with the globalized market, intensification of flexible labor and employment practices, and replacement of white collar with blue collar workers.

3.3.4 General Overview

What the thinkers briefly discussed above have in common is the transformation and its consequences as in economic, political and cultural spheres. Disorganized capitalism reveals the instability and uneasiness of capitalism which shelters in itself, more clearly than before, and by this way it points to the qualitative changes in cultural, political and economical areas in general.

Economically, global markets and global corporations further rose, with the internationalization of the world economy while, national enterprises and nation-

states lost their economic significance. Mass production is replaced with methods of flexible specialization and production is decentralized. Moreover, organizations started to prefer communication instead of command, thus seemingly flattening hierarchies. Politically, class-based politics has lost its importance and race, identity and gender based politics gained popularity giving way to new social movements. Culturally, related with the above given thesis, the class-struggle type conflict in the society left its place to service class and of its fragmentary structure. Individualism happened to be the dominant mode of thinking and eclecticism found its reflections in almost every aspect of life.

3.4 Transformation of Work in the Information Age

Isn't it possible to have a more just distribution of income and wealth together with innovation and rapid development? Is insecurity a necessary consequence of an economy built around innovation and rapid change, or can we have both flexibility and security at the same time? These are the questions that the new economy proposes. New economy influenced the cultural life as well as the developments in global market. Nevertheless, new economy is discussed with such titles as forms of employment, using new technologies, production of services. Yet, it deserves to be discussed with its socio-cultural consequences. Traditional production relations are gradually replaced by new forms of working and the conditions of work become sharper with the increase in indeterminacy. In short, work demands more from the workers and give less.

At first glance, the development and replacement of non-standard forms of employment seems to be a revival of a working type prior to modern industrial revolution. Jobs, as we understand, are relatively modern invention. Until the mid eighteenth century, home was the place of production. Work in the 21st century has become non-standardized and the worker has in a sense some initiative on the work itself, with a similar attribution to pre-modern societies. Nevertheless, both in developed and developing world, informal work and non-standard employment became widespread through non-qualified simple workers to well-educated professionals. Thus, it can be argued that there is a trend with a decline in the

standard employment relationship and the rise of various forms of non-standard employment.

Regalia's explanations provide us with a better horizon in order to understand the reasons and the development of non-standard forms of employment in the western world which can be traced back to 1970s. According to Regalia, there are three essential reasons for the development of flexible employment arrangements: first, there is a change in the requirements of firms operating in a broader, more uncertain and more unstable economic context with constantly intensifying pressures to increase competitiveness and to cut costs; second the behavior of labor supply is changed with a marked increase in labor-market participation especially by women; and last, there occurred changes in the labor policies by governments and the European Union as to unemployment. (2006:9-10)

First, in this rapid pace of change, employment relations took its share and transformed through a greater openness and interdependence of markets. Regalia (2006: 10) expresses this situation with the uncertainties in demand, development of a service economy, and the advent of the potentials of the technology revolution. Consequently, firms leaned to using all-embracing and systematical methods different from the prior, traditional models. According to Regalia (2006: 10), the tendency to use non-standard forms of employment, indeed, enabled firms to

> [a]djust their work forces more efficiently and more rapidly to variations in demand or in customer needs, avoiding redundancies and waste, and consequently reducing costs; it allows them to acquire human resources with specific or rare skills for the time that they are necessary- and therefore without internalizing them on a stable basis; it allows them as well, to use long trial periods to screen workers before hiring them permanently, or only to meet temporary, additional or substitutive labor needs.

Second expression of the transformation is related with the profound social and demographic variations in the labor supply such as the increased female labor-market participation, transformations in family patterns and increased life expectancy (Regalia, 2006:11). In these circumstances, it can be deduced that, the new flexible

non-standard working opportunities create working areas especially for women and young people due to the possibility of part-time, seasonal or home-based work. Thus, non-standard forms of work gave way to enlargement of work areas and offer new opportunities to whom otherwise will not be able to work.

Third reason for the transformation in the forms of employment is due to the political incentives of European Union and governments. The growing unemployment and the inadequacy to produce new standard job opportunities lead to a propensity of encouraging new work arrangements even though they are unstable, insecure, indeterminate and temporary. As Regalia (2006:11) argues, the logic behind this was to increase opportunities for employment.

3.5 The Rise of Flexible Production

Flexibility is a tenuous concept which its various expressions coexist due to some theoretical complexities. First, as Harvey (1997) states, transformation processes from Fordism to Post-Fordism, so to flexibility, has not ended yet. Thus it does not correspond to a static phenomenon, and can not be put in a frame which has certain borders. Nevertheless, flexibility can simply be defined as adaptation to individual customer requirements, rapidly shifting market conditions and considerable fluctuations in demand over time.

"We estimate that close to 70 percent of Intel's profits in 1997 will come from that were not on the market as of January 1st of this year." These words belong to Gordon E. Moore who is the chairman of the board of Intel. This expression well explains the matter of volatile market conditions. Flexibility has become a cement of insecurity and the indispensable actor of adaptation to the changing technologies and labor market conditions.

Information revolution and technological developments lay at the center of all flexibility discussions. Within the technological advancements, flexible work and employment methods are preferred to be used extensively. Work started to be defined with the level of technology used. In that sense, flexible work and

employment forms appeared to be most suitable and essential component to the rapidly changing, volatile and unpredictable conditions (Massey et. al, 1992:106). While high levels of volatility make workers more vulnerable to the changing conditions, adaptation to work became as a significant aspect for the employees to continue their jobs.

Table 2 Types of flexibility

	Numerical	**Functional**
Internal Flexibility	Part-time work, Flexi-time arrangements, Annualized working hours, Working time accounts	Multitasking, Job enrichment, Multi-skilling, Team working, Project organization
External Flexibility	Fixed-term contracts, Freelance work, Temporary agency work, temporary layoffs/seasonal work, Irregular work	Subcontracting, Outsourcing, Freelance work

(Source: Atkinson & Meager, 1986)

3.5.1. Numerical Flexibility

Numerical flexibility is the adjustments that are made for managing the conditions of economy. Here the size of labor input, or the number of workers and working hours are taken into consideration. These include employee turnovers, use of non-standard forms of employment methods and temporary contractual agreements. (Benner:2002, 21; Flecker et. al, 2005: 54; Massey, et. al, 1992: 106)

3.5.1.a Short-term Work

In the 'new brave world' of work, the focus of individuals and workers are on temporary tasks and the results to be achieved, instead of permanent positions. The highly flexible and portable nature of work reproduces the meaning of work, the organizational structure and the employer. From the organizational side, new workplace policies such as "flex-time, telecommuting, and instant collaboration over great distances" (Benner, 2002: 64) are regulated. The employer should be self reliant and independent without any commitment to the work. The short-term characteristic of work can be seen in the replacement of jobs with projects and high levels of job shifts.

3.5.1.b Changes in Forms of Employment and Contract

The new economy conditions made profound changes in the concept of work. What Gorz once mentioned, as the 'metamorphosis of work', influences its contents and contractual forms. This so-called metamorphosis finds its reflections, in the changing employment relationships and newly emerging contractual arrangements. These new regulations in the nature of work are becoming popular and widespread especially in high-tech work. Employment relations are based on more open-ended, indefinite contracts instead of traditional, standard and typical models.

Those new forms existed before, yet the rise of information society gave way to its prevalence. A clearer way of conceptualizing non-standard forms of employment might be to define the standard and its main characteristics. Non-standard forms of employment define itself with what is not characterized by the traditional form. Standard employment refers to the "situations where employers provide an employment contract, which sets out a long-term commitment to full-time employment." (Bradley et al, 2002:52) Hence, the standard form of employment denotes durability and implies 'jobs for life'. Being definite is the main component according to above authors: "these workers knew what they would be doing each week, when they would begin and end work, which people they would see at work and roughly how much they would be earning" (2002: 52).

The contracts were including social securities, holiday entitlements, health care, and right to join a trade union, determined regular working hours and other social benefits. Regalia (2006:6) acknowledges the expressions and argues that this kind of an employment model continued till 1970s when the world of work witnessed the emergence of atypical employment characterized by the absence of one or more of the standard features. In developed countries, the increase in the tendency to non-standard forms of work kept growing after that period. As an example "in late 1990s the incidence of non-standard forms of employment considered as a whole- part-time jobs, various forms of temporary employment, self-employment or independent contracting- was estimated for the United States at 30 per cent for men and 40 per cent for women" (Regalia, 2006:8), or "between 1990 and 1994 employment in

temporary agencies grew by 30 percent while overall employments actually declined by 2 percent" (Benner, 2002: 40).

Non-standard or atypical forms of employment include part-time work, temporary agency work, occasional temporary work, home-work, self employment, outsourcing, contracting-out and tele-working (Regalia, 2006:25, Benner, 2002: 40) These fragile employment relations do not guarantee any security in long-term even though the firm is doing well. Some atypical forms of employment are defined below:

Self-employment: This is the form of an employment where the employer and the employee is the same person. IT or consulting sectors are more prone to such an employment. The increase in the service sector gave way to the increase in such individual employment.

Part-time Employment: Part-time employment refers to the amount of time and effort spent by someone in employment. Part-time employment has risen after the participation of women and students in the world of work. As known, the big retail dealers in UK have more than a hundred types of part-time employment (Webster, 2000:124). Part-time employment does not present security or rights such as health insurance or unionization.

Outsourcing: Outsourcing involves getting a product from an outer source instead of producing it inside. Companies concentrate on specific areas and move and act easily in any case of restructuring. Large companies outsource from places unionist rights are weak or absent and labor is cheap (Bosch, 2000: 123).

Contracting out: This kind of employment is common among well-educated high-tech professionals. The contract is mostly done with IT companies or service firms which offer temporary projects. Referring to Kunda (1990), workers move between workplaces, filling particular positions and working on particular projects on demand (Benner, 2002: 43).

3.5.1.c Jobshift and Turnover

High levels of turnover are another component of the characteristics of high-tech work, pointing to the rapid changes in the employment conditions. As stated above, the 'new economy' conditions trigger short-term in a constant firm, and median job tenure has declined for years. According to a survey held by University of California, "only 21 percent of employed adults had been with their current employer ten years or more in 1998" and "almost half of California's workers have been with their current employer for two years or less" (Benner, 2002:47). The churn rate is also used to describe the turnover from company side. Churn rate measures "the extent of both firms failing and new firms starting as a percent of all companies" (Benner, 2002:47).

This turnover is driven either by layoffs and corporate structuring or by voluntary changes in employment. The skill obsolescence predominantly leads to layoffs. The latter one, i.e., voluntary change in the employment is due to the search of a job with better opportunities by workers. This implies a fact that highly skilled professionals voluntarily abandon their jobs and seek for better opportunities due to their self-reliance and qualifications. As one human resource manager says: "The job market for engineers is extremely volatile…People are moving from job to job, and can gain tremendous offerings from new places. The majority of our engineers have been with the company for two years or less" (Benner, 2002: 45).

3.5.1.d Rejuvenation of Work

High-tech industries tend to be preferred by younger workers, either those who recently graduated from university or in their early professional years. Younger workers, in particular, are less tied to a single firm, and often move in search of new work challenges and earning opportunities. As Sennett (1998) denotes, "flexibility equals youth, rigidity equals age." The new generation of work is highly dynamic, mobile and can more easily anticipate and internalize the unpredictable conditions of work and its requirements for continuous adjustment.

Young professionals have a good accumulation of knowledge but more importantly they have the potential to learn on the job and work on a project-oriented basis which sometimes necessitates long working hours and weekend working. From the company's point of view, young workers are lucrative enterprises: cheaper and less trouble. They are more inclined to accept temporary and short-term employment contracts without social security and rights. They are not bound or have to be loyal to anyone or have less responsibility since they do not often carry family responsibility. They are more likely to quit rather than struggle within the company. Sennett (2006) explains this situation as "[y]oung workers, more pliant, favor exit when discontented; older workers, more judgmental, give voice to their discontents." Thus, as one human resource manager in a major software firm explains, a lot of technically inclined individuals are "really ready to roll the dice" and "get to take a shot at this kind of thing once in life" (Benner, 2002).

This appears clearly when the conditions of 'dynamic' young workers are compared with the 'experienced' old workers. Experience has been replaced with the ability to move. The flexible employment practices that weaken the tie between worker and employer, requires workers to absorb many of the risks of economic uncertainty. The 'deadwood' older workers are particularly affected by this rapid change. Wages for older workers in information technology industries actually start to decline after years of experience (Benner, 2002). Moreover, it is most probable for the old-aged to be faced with long-term unemployment in search of a job. Hence, conditions of work in the new economy have a tendency to exclude older workers and trust to dynamism of youth.

3.5.2 Functional Flexibility

Functional flexibility is mostly described as task-oriented and involves a series of labor practices to adapt to the demands of organization, and focuses on the skills and tasks of labor force. Multipurpose skills, broad job categories, redeployability, teamwork are counted as functional flexibility methods.

3.5.2.a Rapid Skill Changes

The rapid pace of technological change in the production process and the changing competitive market conditions require continuous learning and following the latest technologies for the requirements of job. Yet, these conditions both lead to continuous skill upgrading and deskilling at the same time. The inconsistency and continuous change at work, namely the methods that are followed, equipment that is used, and final products that are shaped in the production process give way to developing new skills and upgrading them.

Compared with the solid structure of the cumbersome Fordist production, permanent alterations of skill are one of the crucial elements of new economy in these new methods of production. Even though the meaning of skill is questionable and deskilling as a consequence of these innovative processes is left aside, the pace of change in skill requirements is a key model in order to explain the logic behind the processes of 'new economy' conditions.

The meaning of skill includes the "information and knowledge that workers need to be effective in their work" within "the organizational context and social relations that shape individual's capacities to perform work" (Benner, 2002:27). Hence, when one mentions skill beside the information needed to perform a work, interpersonal relations and the structure of the organization carry vital importance as well. The price of deskilling means falling behind and becoming less valuable, obsolete and unsuccessful. The words of Michael Curran who is a director of an award-winning training center and workforce development resource in the Silicon Valley explains the situation better:

> The nature of industry in the valley is constantly changing, and employers just can't tell you what skills they are going to need two years from now…in the past, the skills that employees had lasted longer, maybe 8-10 years. Now a current skill set might be valuable for only 18 months. (Interview, June 1999) (Benner, 2002: 47-48)

3.5.2.b Reflexivity in Work Tasks

It is certain that meeting consumer demands which are much too volatile is up to a good interpretation of shifting consumer demands and their preferences. Demands,

ranging from a variety of areas, necessitate information technologies and their applications. Thus, those tasks are realized with a group of professional workers whose job descriptions are indefinite. Being reflexive, in that sense, is an important part of success in the competitive conditions of new economy. Reflexivity in work tasks entails workers to observe their own activity so as to improve their quality and hence firm's profitability. The unstable conditions compel workers to be actively engaged in the work practices, rather than following instructions driven by the top directors of the company.

3.5.2.c Teamwork

Self-managing teams replace hierarchical organizations under the new work conditions. Instead of a vertical top-down command and centralized organization and allocation of work, teams are built to respond rapidly and flexibly to the changes at the market.

Richard Sennett's (2006: 126) words very well explain how teamwork functions in the new conditions of new economy.

> The social skill required by a flexible organization is the ability to work well with others in short-lived teams, and with others you won't have time to know well. Whenever the team dissolves and you enter a new group, the problem you have to solve is getting down to business as quickly as possible with these new teammates. "I can work with anyone." is the social formula for potential ability. It won't matter who the other person is; in fast-changing firms it can't matter. Your skill lies in cooperating, whatever the circumstances.

3.5.2.d Project World

The replacement of work with projects is a clear example of the short-term characteristic that is rooted in the heart of the 'new economy'. It can be argued that the world is getting through jobless, yet not workless. Even though the traditional modes of employment and work are not extinct and people work for a single firm for years yet due to uncertain and volatile conditions, high-tech jobs are being replaced by projects, and people who carry out tasks compatible with these circumstances.

In a general sense, service networks, global production and high-tech works are often organized into projects, which have major consequences for competence profiles, work pressure, and the responsibility of the individual employee. The characteristics of project-oriented work can be counted as short-term commitments which are linked to the length of a project, instead of a commitment to an organization.

3.5.2.e Soft Control

Under the conditions of 'new economy', what is called organizational change, or more specifically, flattening hierarchies refers to increase in communication skills, self management, broadening of roles and loosening of control. Those qualities attributed to high-tech work portray more autonomous and free conditions without organizational constraints which reduces the speed and profitability. In contrast to the trends in high-tech work, the increasing formalization and codification of skills and a new emphasis on standardization have encouraged new forms of control. At the same time, control is increased through the application of computer-supported tools and monitoring instruments and the centralization of project management functions.

3.6 The Coming of Information Society in Turkey

It is not possible to say that the dominant production paradigm in Turkey is high technological which, in turn, is based on high qualified labor and depend on flexibility. It can be argued that Turkey has not yet succeeded in the economic leap in comparison to the developed capitalist countries.

Even though the information-based work necessitates highly qualified labor force, 61,9 % of Turkish labor force is composed of primary or secondary school graduates. (Alptekin, 2006:11) In addition, many qualified young people prefer to try their chances in countries such as US, UK or Germany. While the agriculture-based labor force is 33% in Turkey, it is only around 3-4% in EU countries (Ministry of Economy and Finance, 2004).

Table 3 World Economic Forum 2006-2007 Networked Readiness ranking in Global Information Technologies Report

Networked Readiness Ranking 2006-2007				
Countries	2006 score	2006-2007 ranking	2005-2006 ranking	Development
Denmark	5,71	1	3	↗ +2
Sweden	5,66	2	8	↗ +6
Singapore	5,6	3	2	↘ -1
Finland	5,59	4	5	↗ +1
Switzerland	5,58	5	9	↗ +4
Holland	5,54	6	12	↗ +6
USA	5,54	7	1	↘ -6
Island	5,5	8	4	↘ -4
UK	5,45	9	10	↗ +1
Norway	5,42	10	13	↗ +3
...	...	...	...	...
Turkey	3,86	52	48	↘ -4

Source:www.weforum.org/pdf/gitr/rankings2007.pdf, 28 April 2007

The situation is not really cheering in R&D statistics, which is one of the main indicators of the level of economic development, either. The share of R&D expenditures in GNP is lower compared with the developed countries such as Sweden, US or Japan. The level of R&D expenditures in Sweden is 4,6% of the total GNP, 3,1% in Japan and 2,8% in US, however it is only 0,06% is for Turkey. A similar situation can be claimed for the number of R&D personnel in total population. While there are 306 R&D personnel per million in Turkey, it is 5301 for

Japan, 4099 for US and 7100 for Finland (Bozkurt, 2005: 290). It can be deduced from above statistics that Turkey still needs participation of a larger population of highly qualified personnel and financial support for the development of IT sector.

Table 4 The Economist 2007 e-readiness ranking

The Economist 2007 e-readiness ranking (total 68 countries)		
Countries	2007 ranking	2006 ranking
Denmark	1	1
USA	2	2
Sweden	2	4
Hong Kong	4	10
Switzerland	5	3
Singapore	6	13
UK	7	5
Holland	8	6
Australia	9	8
Finland	10	7
...	...	...
Turkey	42	45

(Source:http://a330.g.akamai.net/7/330/25828/20070420205432/graphics.eiu.com/files/ad_pdfs/2007E-readiness_Ranking_WP.pdf , 28 April 2007)

Therefore, it is critical to build the bridges between academy and industry to realize the economic leap. The 'high technology' concept is first discussed with the Vth Development Plan in 1985. Later, developments such as the planning of increase in R&D personnel, increase in the budget for high technology and the establishment of

Turkish Patent Institute gave way to the first steps of establishing technopoles. Turkish Patent Institute is established and in 1994 and patent law is enacted to protect the R&D products (Harmancı&Önen, 1999: 28). After the establishment of METU-Technopolis in 1998 and enactment of the law of Technology Development Regions (see App.1) which provides tax exemptions, credits, support and rent-investment discounts, the number of technopoles increased either on university campuses as well as private regions supported by TUBITAK and other state institutions.

Table 5 Indicators of Information society

Indicators	Turkey	USA	Japan	EU
Number of researchers per thousand personnel	1.05	8.08	9.26	5.28
Share of R&D Expenditures in GNP	0.63	2.62	2.91	1.92
Number of scientific publications per million people	93	708	498	613
Number of annual patent per million	?	130	126	135

(Source: Turkey 2. Informatics Council Final Result Report (2004:431)

3.6.1 Research and Development in Turkey

In general, R&D is the activities which are conducted by specific units belonging to companies, universities and state agencies for developing new products, processes or services with the use of high technology. According to Wikipedia encyclopedia (http://en.wikipedia.org/wiki/R%26D), R&D refers to future-oriented, longer-term activities in science or technology, using similar techniques to scientific research without predetermined outcomes and with broad forecasts of commercial yield

Innovative thinking, improvement, having new technologies or competitive production efficiency are as important as price, advertisement and manufacturing in today's global markets. Therefore, R&D supports (see App.2) are critically significant for the production of new technologies and market-oriented products for Turkey.

Technology import is not a way to compete with the global markets, while technology changes rapidly. Thus, the production of technology and R&D activities gain enormous importance, so that entrepreneurs have an inclination to get into R&D and innovative processes rather than production.

R&D projects are expensive and risky due to the indeterminacy of the end product and the need to highly skilled personnel. State support is necessary to protect high technology firms and R&D projects. The big success of microprocessor producing companies in U.S. in 1980's and Samsung in South Korea has a lot indebted to the state support. TÜBİTAK (The Scientific and Technological Research Council of Turkey) has supports such as 'The Support Programme for Scientific and Technological Research Projects (1001)', 'Short-Term R&D Funding Program (1002)', 'Support Programme for Research Projects of Public Institutions (1007)', in order to thrive R&D projects in Turkey.

Even though scientific knowledge and technological superiority are the determining factors in our age, it is still overlooked in developing countries like Turkey. The ratio of R&D expenditures to GNP is a mere %0,64 in Turkey, which is very low compared to OECD (%2,24) and EU (%1,88) averages. The annual R&D expenditures per person is 39,2 USD in Turkey and 536,7 USD and 460,9 USD for OECD and EU countries respectively.

CHAPTER 4
IMBRICATIONS OF ACADEMY AND INDUSTRY: TECHNOPOLES

4.1 The Term 'Technopole'

The objective of choosing a high-tech workplace is to contribute to the discussions on the changing nature of work in the 'new economy'. As Benner states (2002: XIV), it is undoubtedly an exaggeration to say that how much making sociological research on textile industry is important in order to understand the first industrial revolution, or studying Ford's automobile factory in the early 1900s in order to understand the second industrial revolution, let alone making research on high-tech industrial workplaces such as 'science parks' or 'technopoles' provide clues about the information revolution.

Even though it is used interchangeably with such different names as 'technocity', 'technopark' or 'science park', I will prefer 'technopole' as Castells and Hall (1993) do. According to them, the French word 'technopole' is appropriated into English due to its different genders and meanings. *Le technopôle* is derived from pôle and *la technopole* is derived from *métropole* (1993: 251). The dual character of '*technopole*' strengthens the meanings attributed to it. There are some slight differences among different appellations, yet, more or less they point to the same organization of work (Taylor, 1985: 138-139).

The official definition of a science park by International Association of Science Parks is defined as:

> [a]n organization managed by specialized professionals, whose main aim is to increase the wealth of its community by promoting the culture of innovation and the competitiveness of its associated businesses and knowledge-based institutions. To enable these goals to be met, a science park stimulates and manages the flow of knowledge

> and technology amongst universities, R&D institutions, companies and markets; it facilitates the creation and growth of innovation-based companies through incubation and spin-off processes; and provides other value-added services together with high quality space and facilities. (IASP International Board, 6 February 2002).

A founder of the English neo-classical school of economics and pioneer of microeconomic theory, Alfred Marshall was the first economist who wrote about "industrial agglomerations" and related the concept with the new manufacturing clusters of modern age in his book *Principles of Economics* (1890). Based on a particular model of scientific investigation and industrial innovation, technopoles spread all over the world form U.S. where they originated, to the developing countries of Asia. From 1970's onwards, there has been a growing interest in development models through the application of science and technology. Technopoles emerged as a way for economic growth in which academic knowledge is applied to commercial products.

Some authors consider science parks as a 'passing fad' (Massey et. al, 1992) yet, they also acknowledge that science parks are a significant 1980's change in science and technology policy. Their scientific and technological content strongly interrelate with the social structure and meaning attributed to those high-tech workplaces. In that sense, they are more than clusters of high-tech production; but they also are, first of all, spaces of social production in which particular ideologies get in harmony with the current practices of scientific innovations. In other words, examination of technopoles is thus an "exploration of some of the key current relationships between science, society and space" (1992:3).

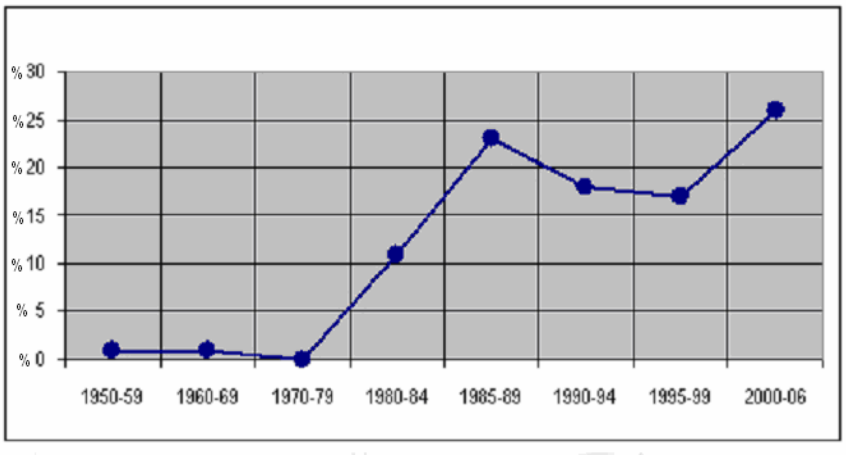

Figure 1 Development of Science and technology parks (%)

(Source: http://www.iasp.ws/publico/index.jsp?enl=2, 20 March 2007)

As shown in Figure 1, the number of science and technology parks has increased steeply in two periods. 23,9% of existing technopoles launched in the second half of 80's. The curves rise up in the first decade of 21st century and reached up to 26% of all technopoles between 2000 and 2006.

The idea behind the concept of a technopole is that, the scientific knowledge brings technological innovation to industries. In that case, technopoles are centers where new applied information is produced and scientific discovery is made. Universities as the 'repositories of scientific expertise and research' (Massey et. al, 1992: 34) transfer technology to technopole firms. The university-industry linkage carries vital importance in the transfer of academic knowledge according to the requirements of industry. Technopoles which are geographies of social and economic development, do mainly create employment opportunities for academic staff, motivate new technology-based firms and give access to academy to carry out research and development in technopole firms. In other words, technopoles create opportunities for new jobs and new industries.

4.2 Work and Employment in Technopoles

Technopoles exemplify a style of work organization and employment which varies from the conventional work structure. Flexible labor is deeply rooted in high-tech labor markets, which are characterized by rapidly changing skill requirements and volatile employment conditions (Weiss, 1985: 90). The pace of change pushes workers to be mobile. There are no strict job definitions of workers in the companies and they work mostly in-between the projects. The flexible organizational structure necessitates low levels of hierarchies and new forms of networking (Castells & Hall, 1994: 2-3). Work status is high and the workers are well-educated. A high proportion of employees on science parks have academic qualifications.

Furthermore, nonstandard employment is another prominent feature of high-tech workplaces. The rapid growth in various forms of nonstandard employment, including temporary, independent contracting and outsourcing employment, is one of the critical aspects which destroyed the long-term engagements. They are well-fit due to the growing trends that characterize its flexible labor markets (Beyhan, 1999: 48).

4.3 Linkage between Academy and Industry

The linkage between academy and industry places at the core of the concept of technopole. The scientific accumulation of universities and its capacity to reach and use new technologies attract the attention of industries which are highly innovative. Thus, according to Massey (1992: 56), technopoles as the 'nerve centers' of the new 'scientific management', do not promote science, but its application in technology. In other words, technological application of scientific knowledge constitutes the basis of the innovations in technopoles. In that sense, an advertisement prepared for the Cambridge Science Park is a good example to show the linkage:

> Three centuries ago Newton was researching in his rooms in Trinity. Many notable scientists have worked in Cambridge since. The fountain of scientific ideas flows here as strongly as ever. Achieving the commercial potential of those ideas-and applying the vast range of

local scientific expertise to helping high technology industry-is the aim of the Cambridge Science Park (1992: 89).

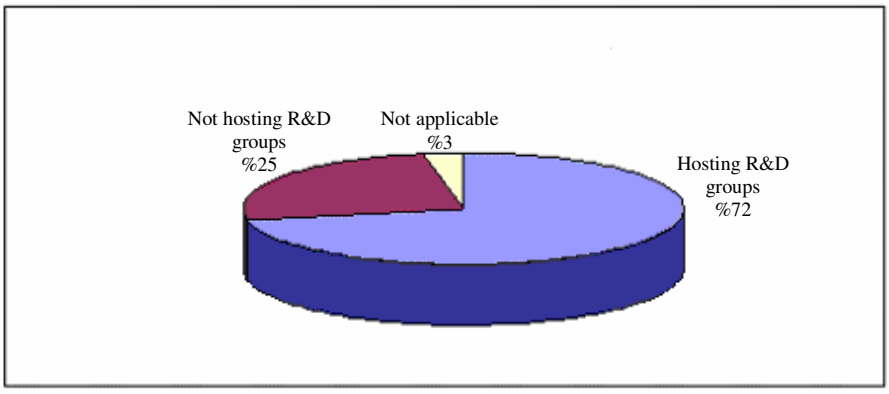

Figure 2 STPs and Universities - Hosting University R&D Groups

(Source: http://www.iasp.ws/publico/index.jsp?enl=2, 20 March 2007)

The relationship and interaction between universities and Science and Technology Parks (STPs) takes place in many different ways and with different degrees of emphasis. In an attempt to better understand and categorise these relationships, it is seen that 72% of the Parks host university research groups and teams.

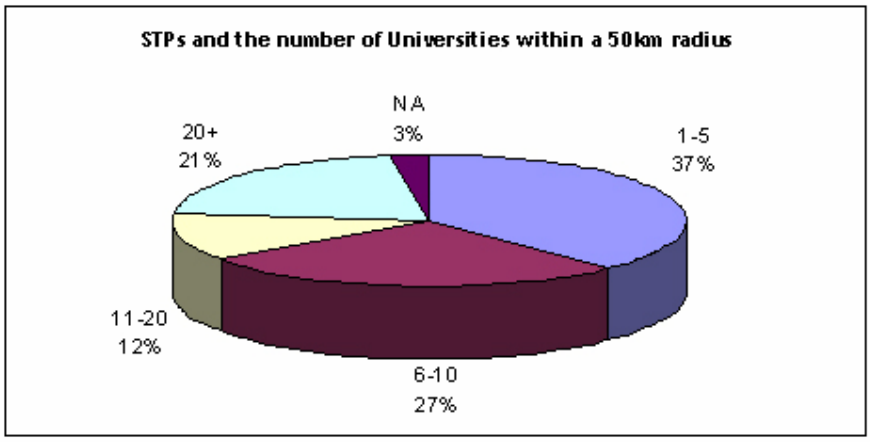

Figure 3 Science parks and the number of universities within a 50 km radius

(Source: http://www.iasp.ws/publico/index.jsp?enl=2, 20 March 2007)

Most of the science parks are concentrated in dense university areas. 60% of the science parks have more than 5 universities or higher education institutions within a 50 Km radius. Moreover, 21% have over 20 universities around them.

The application of university research corresponds to the needs of industry in particular ways. Primarily, technopoles presents opportunities for new firms established inside the university which are called "academic start-ups" (Massey et. al. 1992: 34). These firms are born inside the university and carry their research outside the laboratory and bring it onto the market. The other one is defined as 'tapping in' which means making use of university resources, technology and knowledge by the new establishments with no previous contact with the university or existing establishments relocating in the area (Massey, et. al, 1992: 34). This method as an encouragement for small firms which are not able to possess scientific equipment and other stuff, enable usage of high technology and employ researchers in related areas. In this way, technopoles play a seed-bed role for the appearance and maintenance of small, technologically-oriented companies.

4.4 The Case of Silicon Valley

The context of Silicon Valley is important to understand the economic changes and its geographical, political and cultural consequences as well. Silicon Valley presents the dominant ideology of the 21st century's economic system which is highly competitive and depends on advanced technology.

The 'rags-to-riches success stories, revolutionizing back-throughs, gee-whiz gadgetry, explosive business growth, headline-grabbing corporate feats, and extraordinary economic wealth' (Koepp, 2002: 1) made Silicon Valley more popular and a source of inspiration throughout the world. Silicon Valley became a role model or a 'trendsetter' for many newly established high-tech complexes. It influenced a large geography of technological change, and even the names of the complexes were imitations of Silicon Valley. As Koepp (2002: 1) denotes it shows how people are eager to claim their own version of Silicon Valley. He gave examples of:

> the mountainous pinnacles of Austria now protrude a *Silicon Alps*. A swath of *Silicon Tundra* can be found in the frigid latitudes of Canada. An industrial oasis known as *Silicon Wadi* graces the arid landscape of Israel. A *Silicon Fen* stretches over the green lowlands of England. The dykes of the Netherlands project a *Silicon Polder*. The high-tech product workhorse of the world, Taiwan is known as *Silicon Island*. Areas lacking the identifiable geology for siliconization simply localize the Silicon Valley title: Bangalore is called the Silicon Valley of India; Singapore and Penang vie for acknowledgment as the Silicon Valley of East Asia (2002:1).

4.4.1 Establishment of Silicon Valley

Referring to Silicon Valley, Castells (1998:53) states that "[i]f the first Industrial Revolution was British, the first Information Technology Revolution was American, with a Californian inclination. Silicon Valley was formed as a milieu of innovation with the generous funding given mostly by the Ministry of Defense and coming together of skilled scientists and engineers" (Saxenian, 1985:22).

The story of Silicon Valley can be traced back to the works of Frederick Terman, who was the ambitious Dean of Engineering Faculty at Stanford University (Sturgeon, 2000). His personal support to two young students (William Hewlett and David Packard) created now a world-known company named Hewlett & Packard. During the Second World War, the company had the chance to grow and later continued to expand. The war related aerospace and electronics enterprises contributed to the development of Santa Clara countryside which was an agricultural valley just ten years before. From 50's till today, Silicon Valley have seen cutting-edge technological breakthroughs, and transformed them into new industries. Referring to Benner (2002:X), semi-conductors in the 1950's, integrated circuits in the 1960's, microprocessors in the 1970's, powerful personal computers in the 1980's, internet in the 1990's, software development at the end of the century and nanotechnology in these days are the products of this relentless innovation.

Prestigious universities such as Stanford, Carnegie Mellon, San Jose, Santa Clara, National and De Vry are located in Silicon Valley and Berkeley, Davis and Santa Cruz campuses of University of California use its sources of research. Silicon Valley

is also hosting such pioneering software companies as Cisco Systems and Oracle, network companies like Sun Microsystems and internet portals like Google and Yahoo!. (Castells, 2005: 83).

4.4.2 Organization of Work at Silicon Valley

The newness of Silicon Valley leads to development of new forms of organization, networking and employment patterns instead of clumsy structure of traditional industries. Hence, the origins of Silicon Valley reveal strong commitment to the principles of information economy.

It displayed great success in the application of those abovementioned characteristics. Silicon Valley became the global center of innovation and production by constantly reinventing itself, extensive use of flexible labor, adaptation to the rapidly changing skill requirements, availability of technical expertise and nonstandard forms of employment (Florida&Kenney, 1990:68-69). There are three elements that characterize the labor markets in Silicon Valley. First, there is a considerable increase in the temporary employment, independent contracts and forms of non-standard employment. As an example, the percentage of the nonstandard forms of employment is 44% of total employment in the Valley (Benner, 2002: 48). As he states, even the permanent employment is shaped by short periods of time and rapidly changing skill demands. Second, job turnover and mobility is high among Silicon Valley professionals. Last, rapidly changing technologies and market conditions causes skill obsolescence.

Those characteristics of work led to a distinctive work culture at Silicon Valley. Professor English-Lueck who has been researching and directing the *Cultures@Silicon Valley* project for many years explains the work culture as follows:

> The culture of Silicon Valley, although filled with powerful institutions and organizations, nonetheless 'celebrates' individual accomplishment and places the burden of success and the failure on the individual. People believe themselves, as individuals, to be responsible for their fates and bear the social and emotional

> responsibility for life-long earning and strategic planning. This means that individuals constantly walk a fine line between needing to change,'re-invent' themselves, and staying on task long enough to reap the rewards of sustained expertise. They must both be flexible enough to capitalize on new opportunities and yet sticking with a skill set and type of work long enough to accumulate expertise.

In short, Silicon Valley is a model of innovation with its flexible labor market and dynamic structure in our age which focuses on technological change. Such characteristics of the information age as the separation of scientific technical knowledge, high-tech using companies and highly qualified labor is distinctive in Silicon Valley.

CHAPTER 5
THE CASE OF METU-TECHNOPOLIS

5.A THE SURVEY OF EXISTING MATERIAL CONCERNING METU-TECHNOPOLIS

5.A.1. Geographical Location

Located at METU Campus, METU-Technopolis lies in the western corridor of the main development axis of Ankara. METU is located at a point easily accessible with different transportation alternatives. It is positioned at a point which is 30 minutes to Ankara Esenboğa International Airport, 20 minutes to the train station, 15 minutes to Intercity Bus Terminal and 15 minutes to Kızılay, providing easy access for visitors. At the same time, the geographical closeness to prominent universities such as Bilkent, Hacettepe and Çankaya is an advantage to reach its potential.

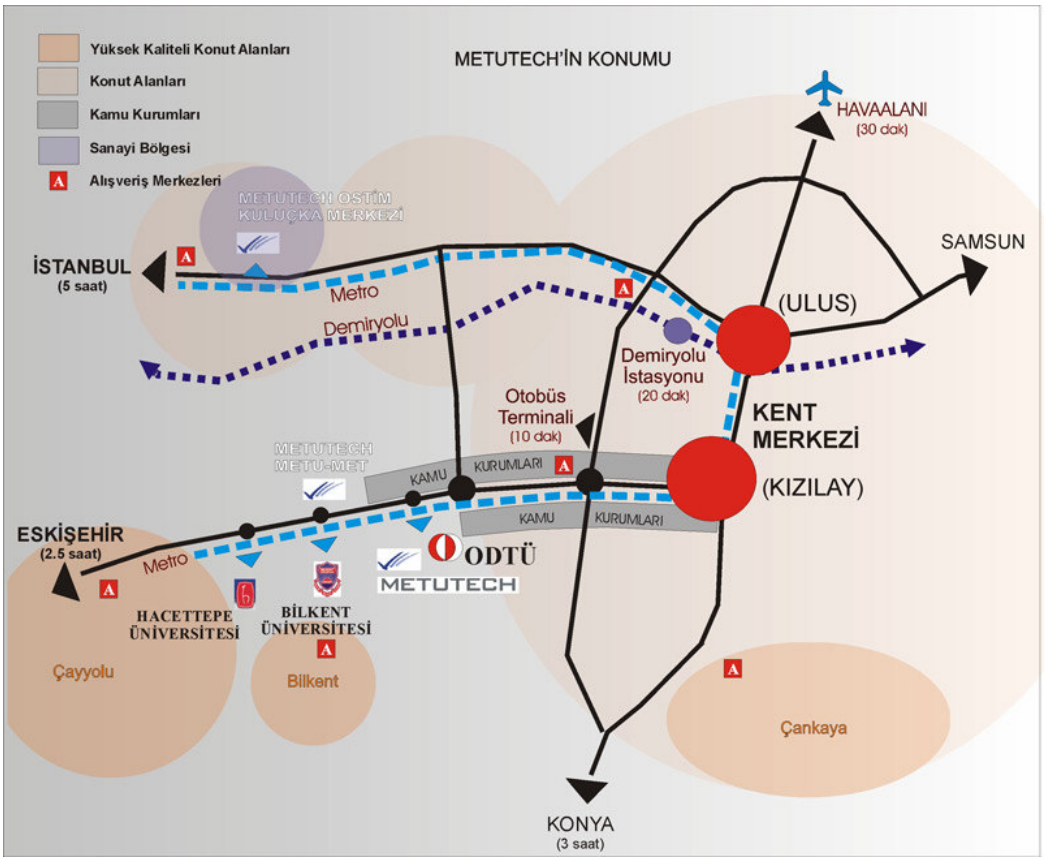

Figure 4 Location of METU-Technopolis (Source: Teknopark Co.)

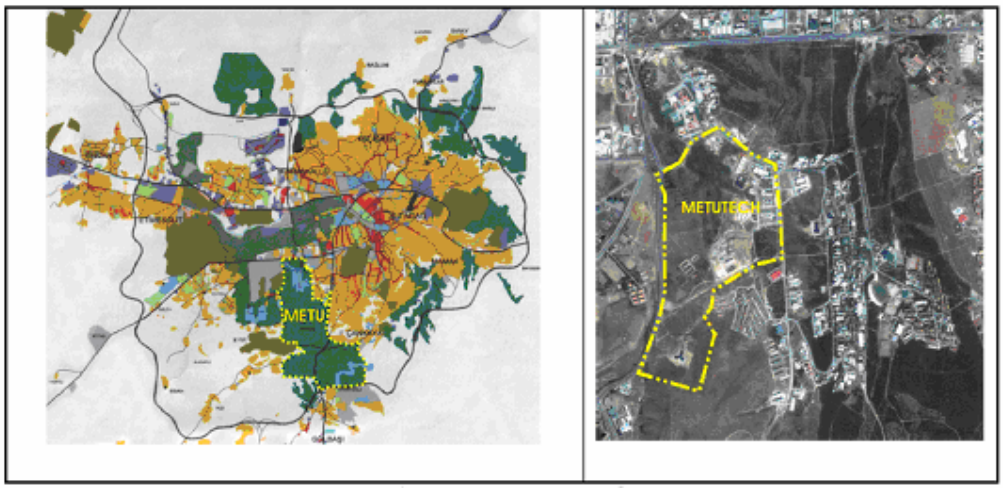

Figure 5 METU in Ankara, METU-Technopolis in METU

(Source: Kızıltaş, 2006)

5.A.2 A Brief History of METU-Technopolis

Before the enactment of the law of technology development regions, when there was not any technopole established in Turkey, yet Metin Ger, the general secretary of the Technology Development Foundation of Turkey (1994) was emphasizing the significance of university-industry linkage as follows:

> The contribution of universities in the innovation processes depends on sectors. However, even their contribution is in small amounts for now, universities should go on to provide the necessary infrastructure and scientific knowledge. Private sector enterprises have to cooperate with universities. Cooperation with universities will enable us to see technology from a different perspective (Ger, 1994).

Endeavors for the establishment of a science and research park to support the formation and development of high-tech production on METU campus started at the end of 1980s. Aiming to ensure the development of technology, and to maximize the university-industry cooperation, METU-SMIDO (Small and Medium Sized Industry Development Organizations) Technology Development Center was established in 1991 as the first step of the METU-Technopolis. The success of METU- SMIDO Technology Development Center led to acceleration of a larger scale science park project, and after the establishment of METU-Twins and Halıcı Software House in 2000 and 2001, METU-Technopolis is acknowledged as the first technopole of Turkey. By July 2007, METU-Technopolis was going to have a closed area of $80000m^2$.

Table 6 METU-Technopolis buildings

Name of Building	Date of Establishment	Number of Firms
METU-SMIDO	1992	31
METU Twins	2000	31
Halıcı Software House	2001	10
Silver Blocks	2002	31
Silicon Block	2004	41
TAI-1 R&D	2004	1
SATGEB Shared Building	2004	1
Havelsan (SATGEB)	2004	1
TAI-2 R&D	2005	1
Milsoft R&D Building	2005	1
Aselsan (SATGEB)	2005	1
Gallium Block	2007	-

(Source: METU-Technopolis catalogue)

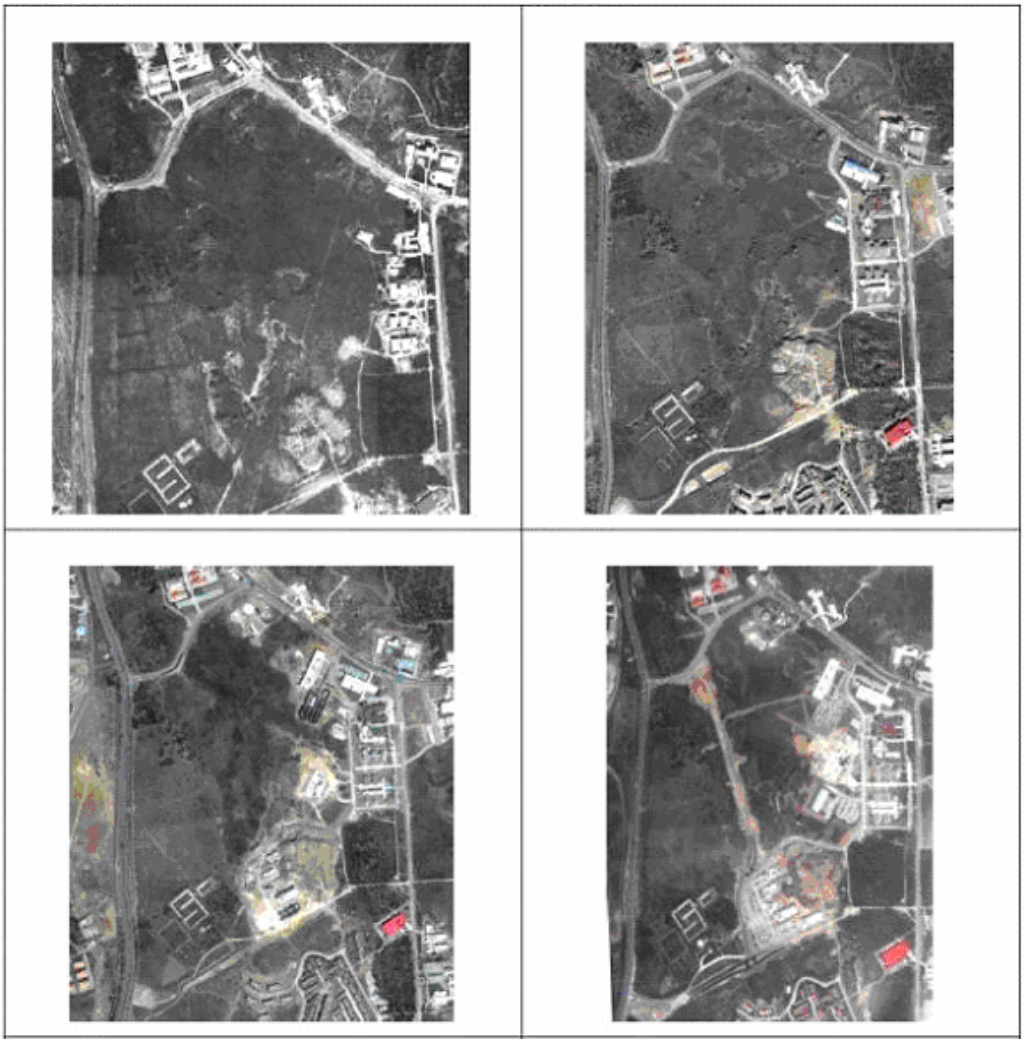

Figure 6 Air photos of METU-Technopolis (Source: Kızıltaş, 2006)

5.A.3 Future Prospects and Targets

METU-Technopolis has been continuously growing and expanding its facilities for prospective clients. As of 2007, the future prospects and the targets of METU-Technopolis are as follows:

1. Pre-incubation Centers

Pre-incubation centers aim at providing facilities so as to give the opportunity to master and doctorate students in specified areas as well as providing free training on preparation of work plan, company management, and the like.

Project groups will be mentored by company managers for the future cooperation. Successful project groups will be taken to incubation centers then they will have offices in METU-Technopolis according to their success levels. The business development coordinator of Teknopark Co., Mustafa Kızıltaş argues that METU-Technopolis will produce its own companies and will not need any external companies.

2. METU-BAN

The Business Angels Network targets to provide financial and managerial assistance to small start-up firms. Teknopark Co. will collaborate with celebrated businessman or companies in METU-BAN project.

3. Start-up Funds

Financial assistance from European Investment Fund will be used to support students who have new ideas and project proposals. The annual 'New Works, New Ideas' competition is organized and winners are awarded with financial support.

5.A.4 METU-Technopolis Companies

By the beginning of 2007, METU-Technopolis hosts 185 companies. The number of companies is planned to precede 200 by the end of 2007. It has reached an enormity of 3200 personnel of which 2200 are working in R&D areas. METU-Technopolis aims to host researches that employ results of academic researches in industrial projects to improve technological competence in Turkey. Mustafa Kızıltaş argues that successful firms can make the best presentation of a technopole: "When successful firms appear in METU-Technopolis, the entire world will hear about us. We know Silicon Valley with companies like Microsoft, Apple and Hewlett-Packard."

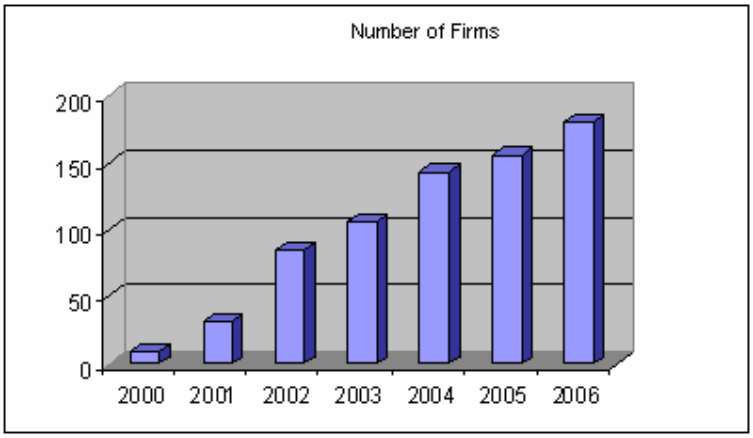

Figure 7 Number of METU-Technopolis firms since its establishment

(Source: Teknopark Co.)

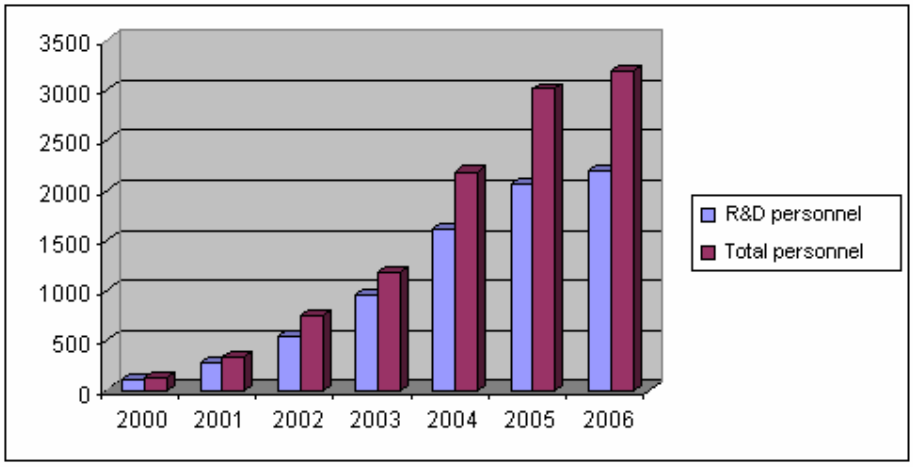

Figure 8 Number of total and R&D personnel in METU-Technopolis

(Source: Teknopark Co.)

METU-Technopolis companies can be classified by their areas of specialization, scales or head-branch office distinction. According to their fields of operation, 60% of companies are specialized on electronic, information technologies and telecom, 16% of are on industrial production and material technologies, 8% of are on energy and environment, 7% of are on physics and biology and 9% of are on specialized on other areas.

There are large-scale companies like Milsoft, Aselsan, TAI and Havelsan which have their own buildings as well as small start-up firms. According to the Teknopark Co.

statistics, 66% of companies have ten or less personnel, 18% have 10-25 personnel, 8% have 26-50, while 8% of companies have 50 or more personnel. As expected, high-tech using firms are principally small or medium sized.

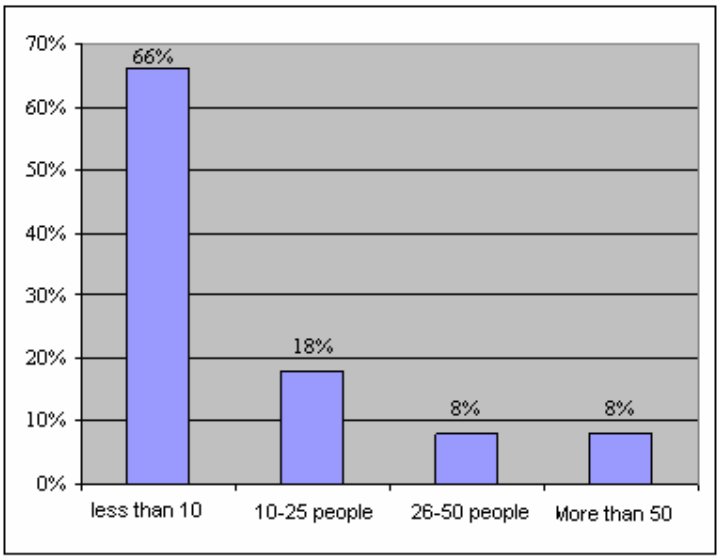

Figure 9 Distribution of METU-Technopolis companies according to number of employees (Source: Teknopark Co.)

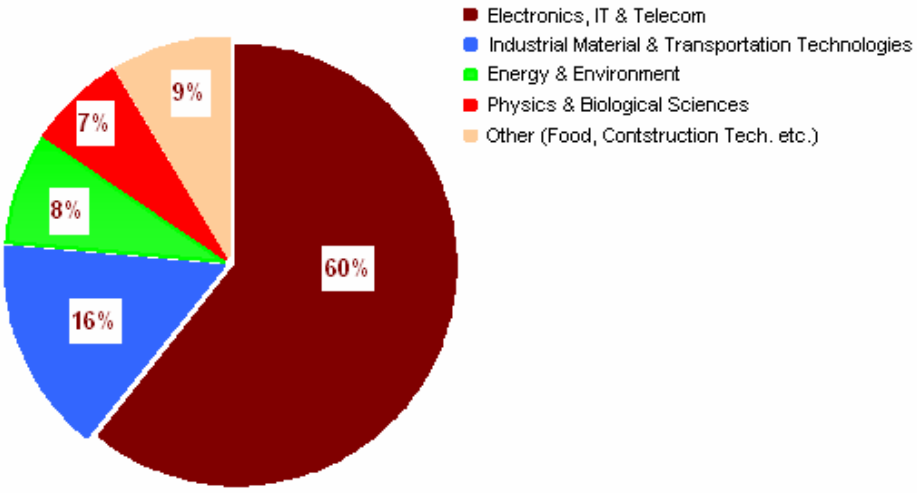

Figure 10 Distribution of METU-Technopolis companies according to their fields of operation (Source: Teknopark Co.)

As seen from Figure 13, most of the companies operate in software development and electronics sector. %32 of companies are specialized on simulation and visual data applications, %15 are on e-education, %14 are on medical automation, %13 are on e-state and e-trade, %11 are on GIS applications, %9 are on ERP and MRP systems and %6 on banking applications. According to head and branch office distinction, it is seen that more than half of the existed companies have the head offices outside METU-Technopolis. Many firms function as a branch office and work in behalf of head office's demands.

5.A.5 Industry-Academy Collaboration

One of the prior targets of METU-Technopolis is to enhance the collaboration between academy and industry. Hence, academicians are encouraged to work with the technopole companies.

The significance of METU-Technopolis project can be seen apparently in the strategic plan of METU for 2005-2010. In the foreword of the plan, it is written that "METU-Technopolis is a rapidly expanding project which is expected to play a key role in the development of Ankara and in the competitive power of our country." In the same document, the role of METU-Technopolis as improvements in community services is discussed under the title of 'Having METU Technopolis develop as a social responsibility project'. According to this strategic initiative:

Objective 3.1 : Monitoring the performances of the firms functioning at METU Technopolis; assessing the contribution of the METU Technopolis project to the development and competitive power of the Ankara region and Turkey.
Strategy 3.1.1: Ensuring that a comprehensive study is carried out on the collaborative work of the University and METU Technopolis firms and the work of similar groups of firms for the period of 2001-2004 in order to comparatively assess their performances and contributions to the economy (Scrutinizing the application of the dimension 'contribution to social development' as a priority criterion in being accepted to METU Technopolis and/or for support).

Objective 3.2 : Enabling the state universities in Turkey and those selected from abroad to benefit from the experiences of METU Technopolis.
Strategy 3.2.1: Preparing publicity materials for METU Technopolis with the collaboration of the University and Teknopark Co.; organizing programs for informative visits to the authorities of interested public institutions and state universities.

5.A.5.1 Opportunities of the University

METU-Technopolis companies have the opportunity to use more than 150 laboratories and 34 research centers of METU. A METU-Technopolis company should apply to related department or directorate of related research center to use the laboratories (see App.3).

Every METU-Technopolis personnel have the opportunity to use METU library with the borrowing card given by METU. By this way, technopole personnel have another source to research.

5.A.5.2 Qualified Labor

It is stated in METU Strategic plan 2005-2010 that, METU aims to create opportunities for students to do their summer practice and find part-time jobs at METU-Technopolis firms to improve the communication and collaboration with the industry.

METU-Technopolis firms do not have difficulty with finding skilled labor since companies are located inside the METU campus and close to Hacettepe and Bilkent universities. Many undergraduate students work part-time in METU-Technopolis companies while many others start working after graduation. A technopole personnel expresses the situation as such: “Technopole is for the benefit of companies. They can easily find highly skilled personnel. There is a huge qualified labor potential in technopole.”

5.A.5.3 Tax Exemption

Companies in METU-Technopolis have the advantage of exemption from taxes with the "Law of Technology Development Regions"

According to the Article 8, the provision of land, which is necessary for the establishment of the regions, infra-structure and construction of management building and the amounts of expenses that are not covered by managing companies can be covered by the subsidy of the ministry in a limited way. Moreover, the payment of R&D personnel, researchers, software engineers are exempted from all kinds of tax till the end of 2013.

5.A.5.4 Prestige

Many managers and personnel argue that working in METU-Technopolis is prestigious. The prestige of METU with the positive image of a technopole, increases firms' 'reliability'; make them appear more 'dynamic' and 'investigative'. For example, a manager of a company says that they are not known with their company names but known as 'company from METU'. It is certain that, both conducting R&D projects and being located in a technopole is very prestigious.

5.A.6 Criticism and Some Concluding Remarks

METU administration gives a lot importance to the development of METU-Technopolis. The office rent gathered from technopole firms became a significant income for the university. Even though, a part of income is spent for the R&D projects, some respondents argue that these incomes should be spent for the establishment of new research centres and laboratories for university instead of constructing new buildings in technopole area. One of the respondents state that: "University (METU) trains personnel to technopole. University is losing its mission. It should support academic researches and increase institutes and facilities for that."

One of the severe criticisms to METU-Technopolis is about the so-called R&D activities. As many respondents argue, due to the large amounts of office rent incomes, university does not apply strict control to the companies which do not conduct R&D activities. The renter firms in Gallium Block, which will be launched by the end of 2007, have already paid rents for seven years in cash. This amount of money, which is very hard to return in case of a dismissal due to inappropriate operation, creates a strong economical dependency of university to technopole companies.

According to the 'Law of Technology Development Regions', companies in METU-Technopolis have the advantage of exemption from taxes. The dollar-based office rents are higher than the standards but the economical advantage of tax exemption makes it still plausible to pay those high rents. The companies have to pay between 6-10 USD per square meter and pay 22% stoppage and 2,2-2,5 USD/m^2 monthly for the management expenses.

Emrehan Halıcı, the owner of the first company in METU-Technopolis, Halıcı Software House, emphasizes the probable abuse in an interview (20 May 2007, Hürriyet) by stating, " …Technopole executives should not see it as economic rent and, the companies should not prefer technopole merely for the tax exemption benefits".

However, despite the high rents and the other expenses, it is attractive for companies to have an office in METU-Technopolis. METU administration obtains high incomes with this privileged area. A company manager makes parallelism with the popular shopping center Armada and claims that there is no difference between METU-Technopolis and a shopping-mall. The manager stated that companies prefer Technopolis just because of the financial advantages and Teknopark Co. benefits from its given privileges with high rents. Hence, it is not so surprising that many universities attempt to build technopoles in their campus, considering the financial contributions.

Companies are inclined to abuse the advantages of tax exemption in METU-Technopolis as well. A technopole employee argues that: "…a company rents a small office in Technopolis and employs three people to work there. But the company declares that ten people are working at the technopole office and in the end, taxes of ten people are exempted." The activities of companies should be strictly controlled and the exploitation of the law should be hindered.

There are optic face recognition systems used in order to control the attendance of people working in METU-Technopolis. Within the new regulation issued at the beginning of 2007, every professional has to pay taxes for their absence. Nevertheless, this new regulation has also some negative aspects. The professionals have to leave their working place for a field test, meeting or participation to a fair related with their specific subject for a couple of days. The new regulation does not present any solutions to such excusable reasons. On the other hand, it is impossible for a company who doesn't have any other offices to abuse the above mentioned advantage.

Finally, technopole professionals have complaints about the weakness of communication among firms. They state that the meetings organized by Teknopark Co. are not sufficient for a communication in a real sense. In addition to that, respondents argue that the opportunity of having economic, commercial or technical partnership is very limited.

5.B METU-TECHNOPOLIS FIELD RESEARCH

5.B.1 The Method of Field Research

The initial period of research for the present study was composed of two phases. First, literature review and necessary methodological preparations were made. Initially, sample studies in Turkey as well as the world, related to new economy and work culture were surveyed. Especially, reports prepared for European Commission, assisted me to develop ideas. Considering the critical issues, titles, or most discussed points in those studies, the authenticity of METU-Technopolis is identified.

Moreover, this first period of the study served as a preparation period for the application of in-depth interviews which I regard as the most significant part of the whole study. Meanwhile, participant observations and explorations were conducted.

Then, a questionnaire was prepared and applied to 200 METU-Technopolis employees. The period immediately following was dedicated to the analysis of survey data and the data from in-depth interviews. It was advantageous to have contacts working in various companies at METU-Technopolis. Their invaluable help made easier to collect data and to reach and persuade people to agree to be interviewed.

Before the preparation of the quantitative and qualitative survey, I spent almost twenty days with METU-Technopolis professionals in their cafeteria, courtyard, or even in the workplace. The cafeteria is an important public space where people from different companies get together and talk on variety of subjects including their work or innovations in their sector. The comfort of being in public space allows one to meet with people and have conversation about relevant subject. The courtyard too is a popular public space where the professionals prefer either to have a drink or smoke. Thanks to flexible working hours, there were always people at any time of the day when one finds the possibility to speak.

As already touched upon above, after making an extensive literature review, the issues that will be investigated in the questionnaires have been decided. Then a questionnaire was prepared to scrutinize the predetermined issues. Before starting the real survey, eleven questionnaires have been applied to test the reliability and applicability of the questions on the basis of this feedback, questions were revised and new questions were added.

After this revision of questionnaires, I started to apply questionnaires (see app.4). Variables such as the scale of companies, age, gender and the job definition are taken into consideration in selection of respondents. A total of 200 questionnaires were applied either face to face or leaving the questionnaire to the respondent. All

questionnaires were controlled and the unfilled or inadequate questionnaires were presumed as invalid.

Data from questionnaires were analyzed statistically using SPSS program. The topics to be covered at in-depth interviews are prepared according to the analysis of questionnaires. Again, two sample in-depth interviews have been made before real application and some revisions made.

In-depth interviews usually lasted about thirty minutes to one hour, yet some took more than two hours. Appointments were made for a suitable time and place for in-depth interviews. Interviews have been made at work places, meeting rooms, cafeteria, cafés, even houses. The people met for the in-depth interview includes METU-Technopolis professionals including managers and company owners, an authorized person from Teknopark Co. and with Prof. Canan Çilingir who is the assistant rector of METU and the president of Teknopark Co. A list of brief notes about the respondents is given in Appendix 5.

However, I could not find the opportunity to carry out interviews with the employees of large scale companies of defense industry such as Aselsan, Havelsan, Milsoft and TAI due to their security precautions. Thus, this study is deprived of valuable information about such companies having distinct characteristics for organization, social relations and description of work. Questions are posed to respondents to get information about those companies and work organizations to fill this gap. After the evaluations and analysis of the interviews, the field research was considered finished.

5.B.2 A Portrayal of METU-Technopolis Employees

The information collected from METU-Technopolis employees is the subject in this part. Definitive findings such as demographic structure, level of education and income, work experience and satisfaction will be broadly discussed, supported with the statistics.

5.B.2.1 Demographic Structure

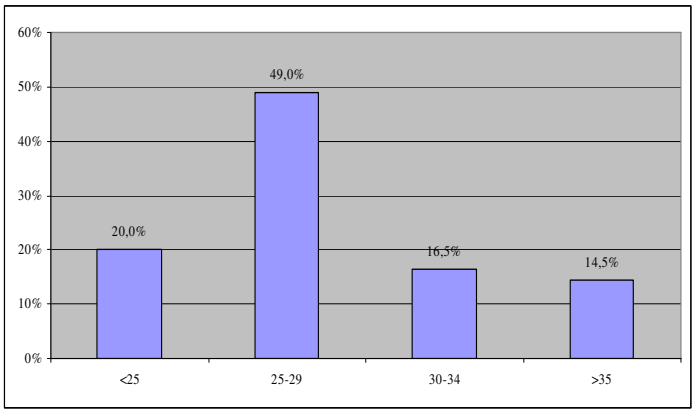

Figure 11 METU-Technopolis employees by age

As shown in Figure 11, METU-Technopolis has a relatively young population of workforce. Only14,5 % of respondents (29 people) are above 35. 49% (98 people) are between 25-29 years old and 20% (40 people) are under 25. Thirty two and half percent of the respondents are married. Considering the average age, this ratio is not surprising. Moreover, only 32 people have children, and the average age of the children is 8,4 and every one of two children is below three years old.

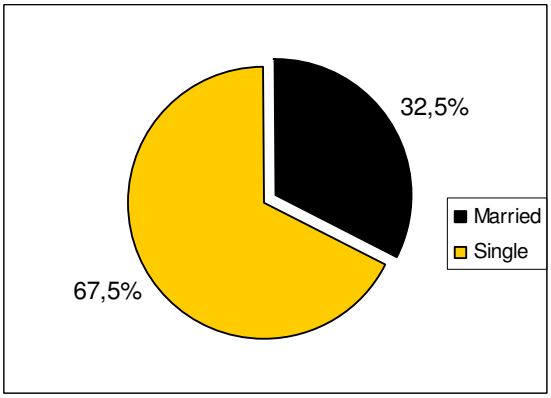

Figure 12 Marital status of METU-Technopolis employees

Thirty seven percent (74 people) of the respondents are women and 63% (126 people) of them are men. Even though the number of men is twice that of women, the percentage of women employees is still high, compared to the national average.

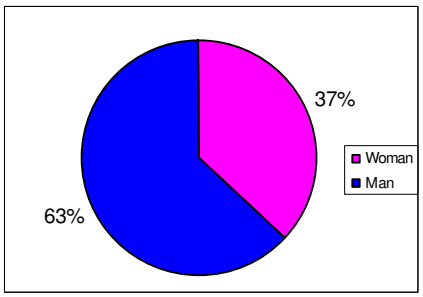

Figure 13 METU-Technopolis employees by sex

As seen in the Figure 14, most METU-Technopolis employees were born in Ankara or small cities. The percentage of employees born in Ankara is 39% and, the figure is 51,5% for small cities.

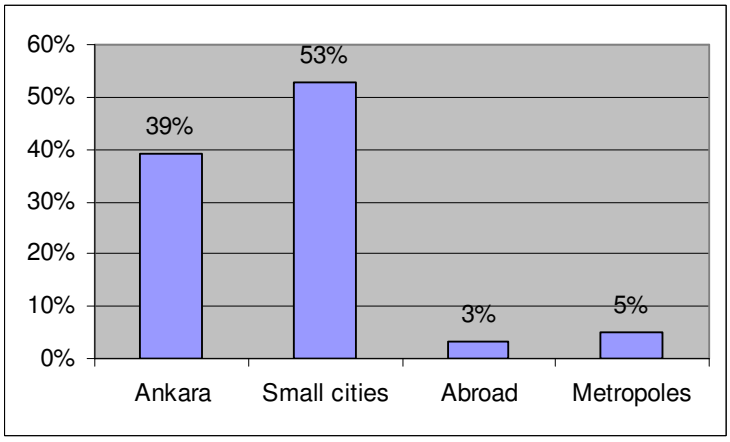

Figure 14 Birth places of employees

5.B.2.2 Level of Education

Data acquired from Teknopark Co. reveals that, METU-Technopolis employees are very well educated. Eighty percent of the employees have either university or master degrees. Besides, 14% are vocational high school (*meslek lisesi*) graduates and 6% have associated degrees. Education profile of the survey's respondents is very similar to that of Teknopark Co.'s real data. (Figure 15).

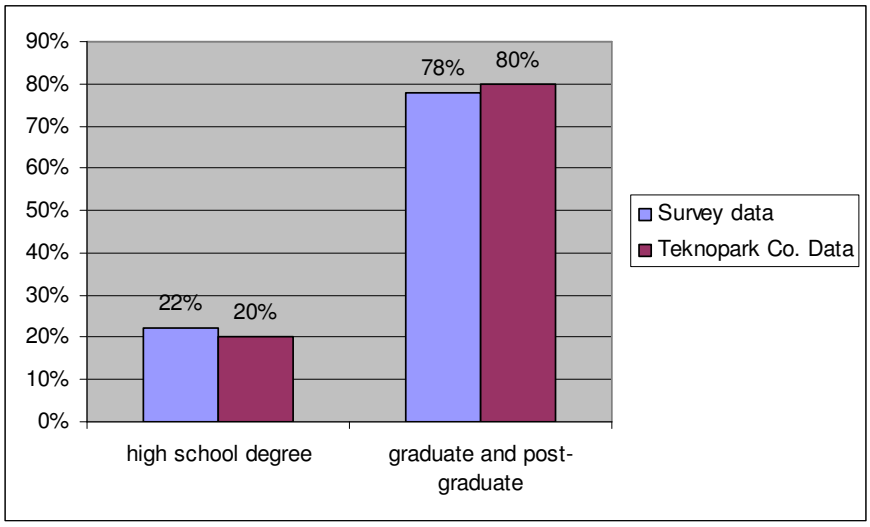

Figure 15 Level of education

(Comparison between survey data and Teknopark Co. data)

This parallelism between educational profile of survey's respondents and Teknopark Co. data shows that our respondents represent the employees well.

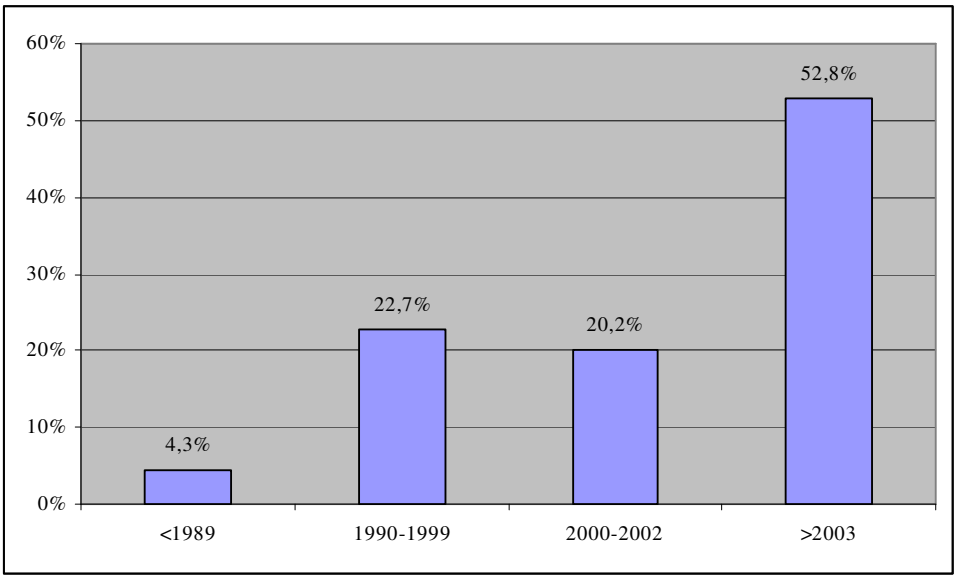

Figure 16 University graduation year of employees

Figure 16 shows that many technopole employees are recent graduates. The percentage of graduates after 2003 is 52,8% and after 2000 is 73%.

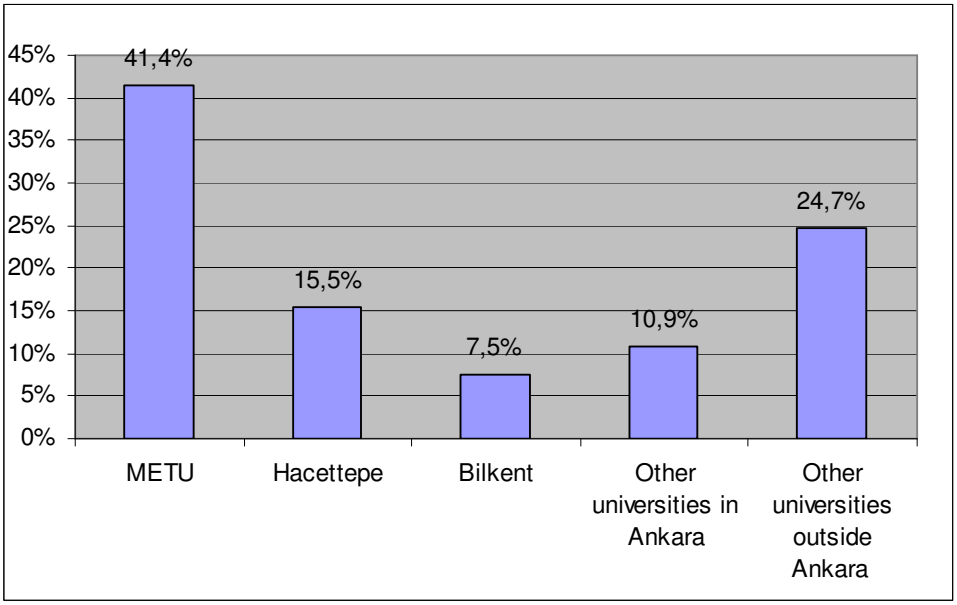

Figure 17 Graduated universities (alma mater)

Most of the METU-Technopolis employees had their university education in Ankara. 41,4% of the respondents have graduated from METU. The graduates of Hacettepe constitute 15,5%, Bilkent 7,5% and other universities in Ankara 9,5%.

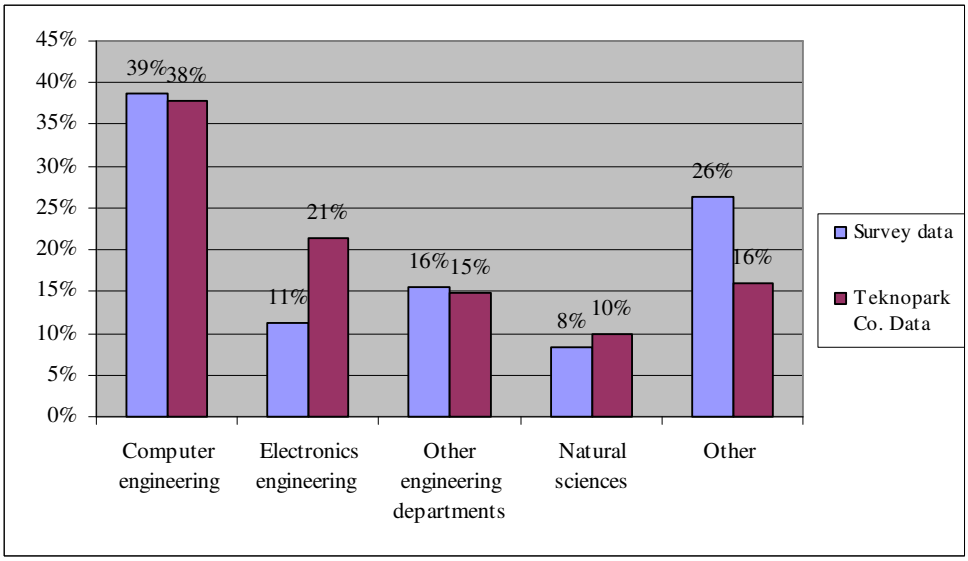

Figure 18 Graduated departments

(Comparison between survey data and Teknopark Co. data)

According to Teknopark Co. data, 38% of METU-Technopolis employees graduated from computer engineering department. The total percentage of engineers is 74%, and graduates of basic sciences are 10%. On the other hand, 39% of survey respondents are computer engineers and the percentage of all engineers is 65%, while the graduates of basic sciences are 8%. Again, proximity between the rates shows the quality of the survey data.

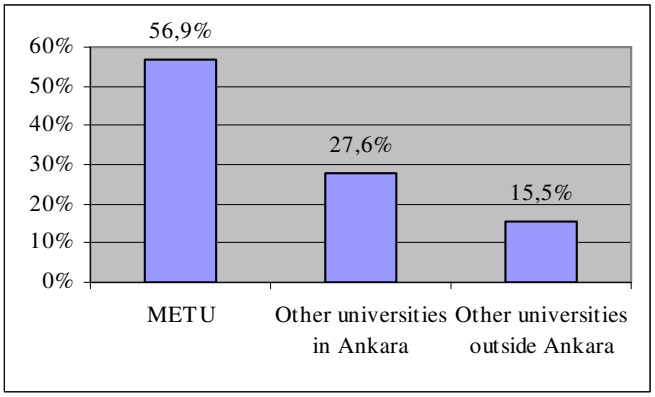

Figure 19 Universities attended for graduate studies (either continuing or finished)

Twenty nine percent of respondents are either graduate students or had already finished their graduate studies. The percentage of employees attending their graduate studies in Ankara is 84,5% and of these, 56,9% distinctly prefer METU.

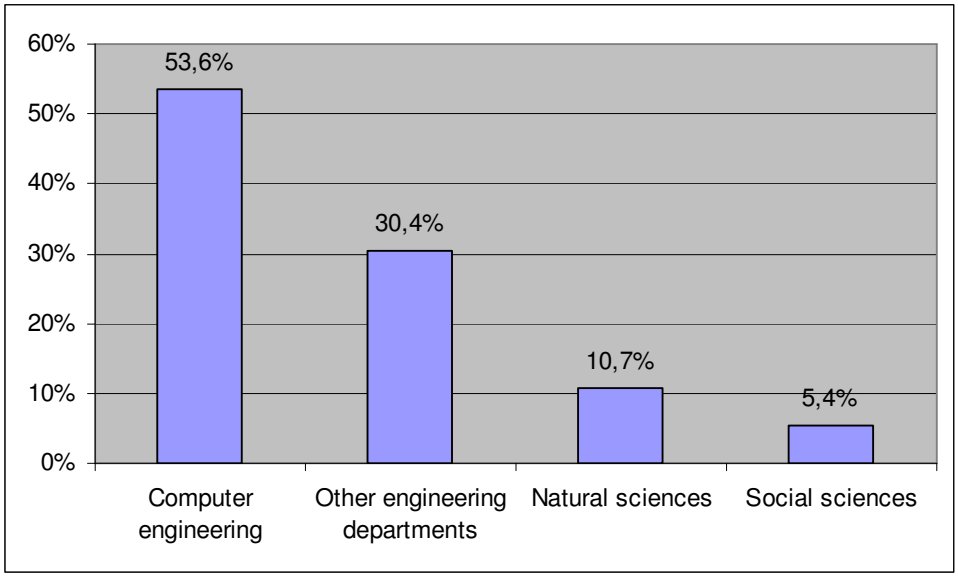

Figure 20 Departments of employees' graduate studies

Computer engineering and the other engineering departments are preferred among the people continuing their graduate studies.

The educational level of the parents of technopole employees is also very high; most of them are university or collegiate school (*yüksekokul*) graduates (Figure 21). Compared with the general average, METU-Technopolis employees have well-educated parents. While national average of men having university degrees in Turkey is only 9%, fathers of METU-Technopolis employees who are university or collegiate school graduates constitute a percentage of 53,6%. Considering mothers, the rates are 3,2% to 28,3%. Together with high school graduates, the percentage moves ahead to 63,4%. These statistics show that, parents' education level of the employees is very high compared to Turkey's average.

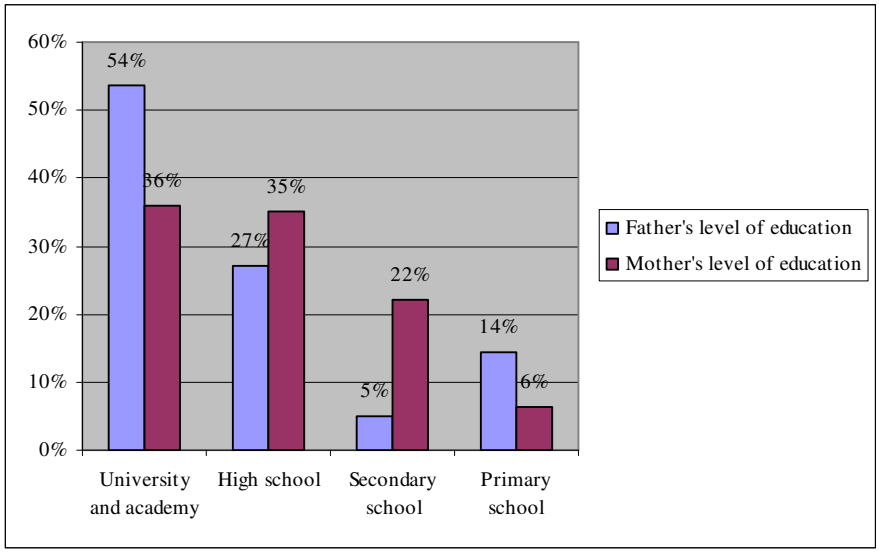

Figure 21 Parents' level of education

Even though METU-Technopolis employees' jobs are insecure, while their parents have relatively stable jobs such as instructor, engineer, lawyer or medical doctor (43,5%).

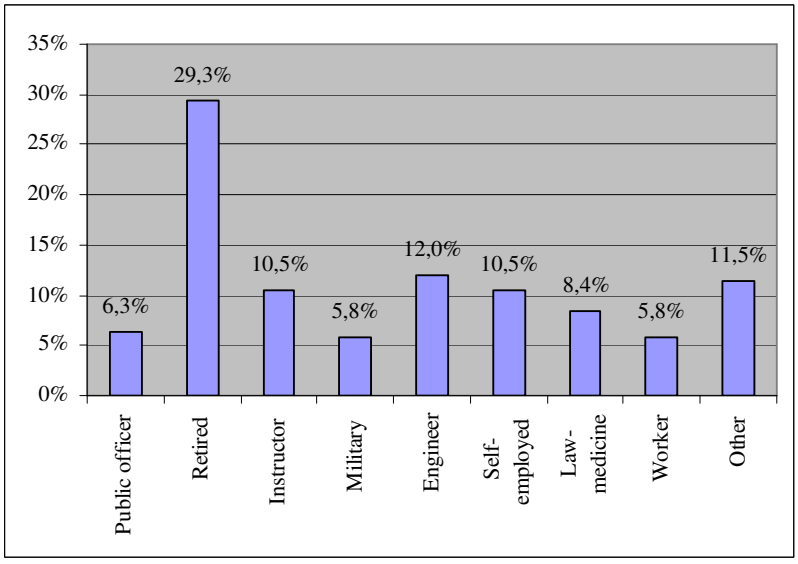

Figure 22 Fathers' occupation

More than half of the mothers are housewives (55,9%). Apart from that, percentage of instructors is 17%.

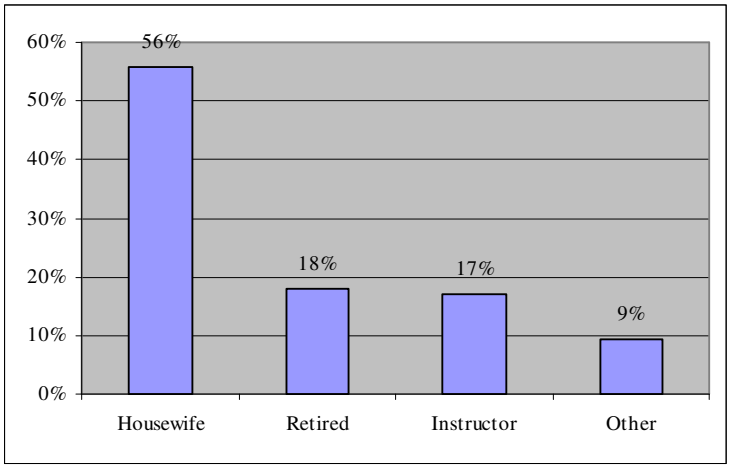

Figure 23 Mothers' occupation

When we narrow down the categories, we see that the percentages of university graduates are 28% and 36% for the mothers of engineers or managers respectively, while this percentage falls down to 7% for accountants or marketing personnel. Similarly, about 50% of the fathers of engineers and managers are university graduates, while this percentage is lower (27%) for the accountants or marketing personnel.

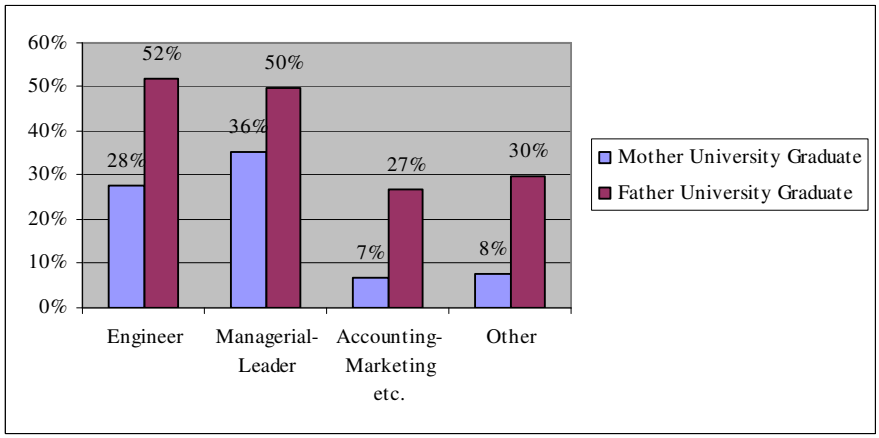

Figure 24 The relation between parents' occupation and position

5.B.2.3 Level of Income

A great number of METU-Technopolis employees (74%) stated satisfaction with their income. While every three of four people were under the age of thirty, the percentage of 53,5% having an automobile is another sign of the satisfaction with income.

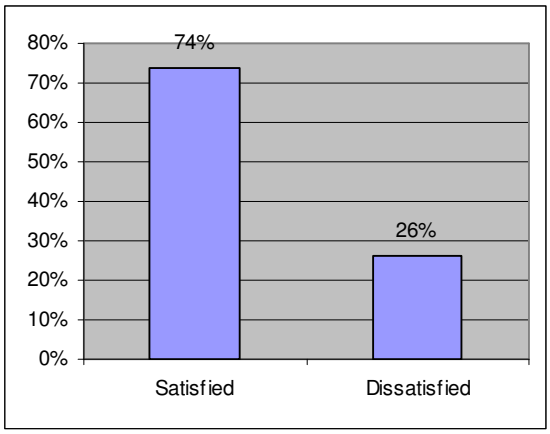

Figure 25 Income satisfaction

The most important expenditure is the house rent. Next comes food and transportation expenditures. We also asked the respondents to write the first three important choices that for which spend most. Considering these first three choices, food is counted the most among other choices. On the other hand, accumulation for future is the one of the lowest in both categories.

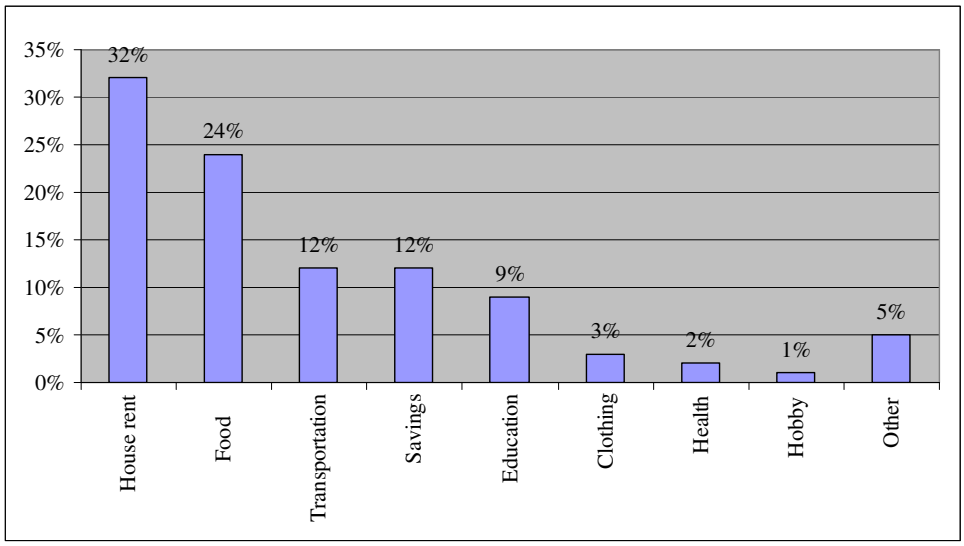

Figure 26 Highest expenditures

5.B.2.4 Work Experience

As is stated before, METU-Technopolis has relatively a young population in its workforce. The percentage of people who are in their first year of working life is %9, and people who work less than three years is 46,7%. Considering their work experience in METU-Technopolis, the percentages rise to 24% and 89%, respectively. People who have more than three years of work experience at METU-Technopolis is only 11%.

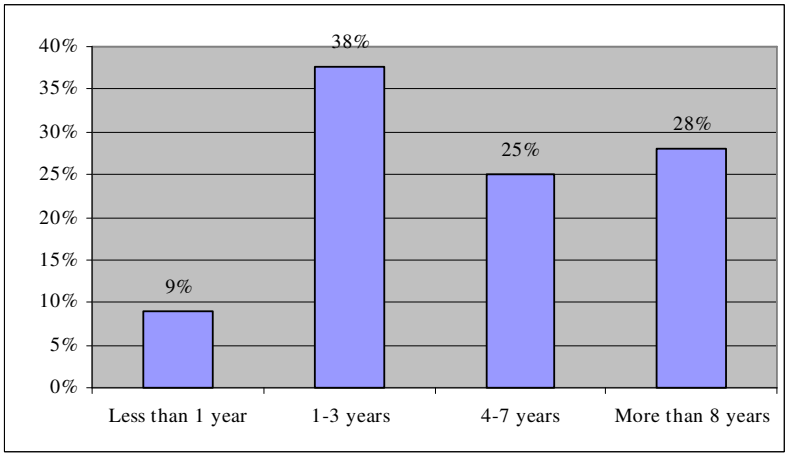

Figure 27 Work experience in general

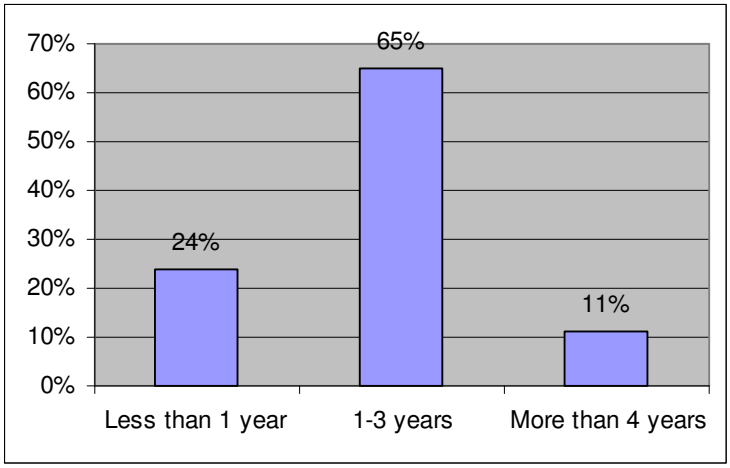

Figure 28 Work experience at METU-Technopolis

5.B.2.5 Job Satisfaction

The respondents were asked to provide three factors about their satisfaction with their jobs. 72,5% stated income as first among three choices; the occupational satisfaction comes next with 54% and social relations is third with 46%. However, social usefulness of the job is the last choice with the percentage of 4,5%. As stated before, METU-Technopolis employees are satisfied with their income; accordingly 67,5% of employees recommended their jobs to acquaintances.

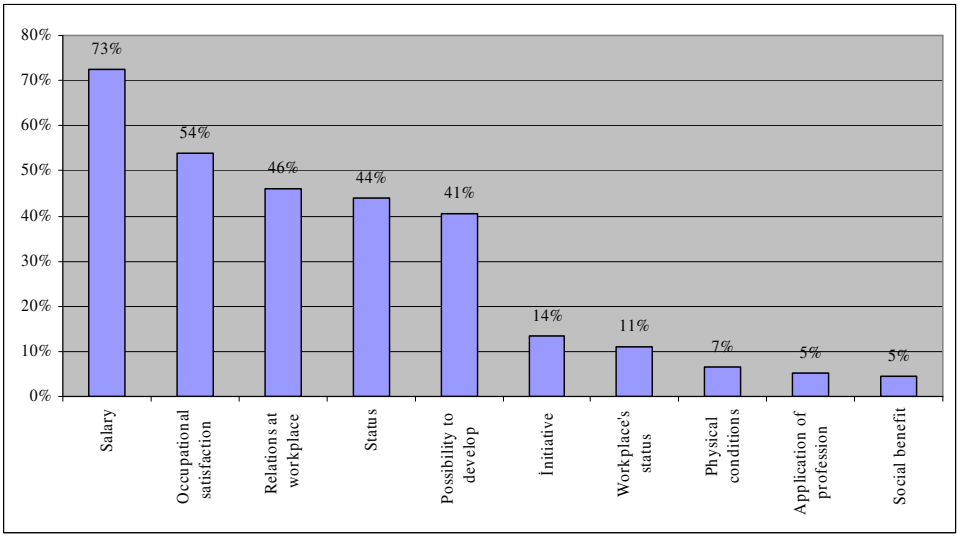

Figure 29 The most significant three factors for job satisfaction

Job satisfaction reveals differences among younger and older employees. Employees who are under 25 years old, see the opportunity to develop (or having a career) as the most important factor (35%). This percentage falls down to 7% among older employees and instead, income rises to 34% for elder employees.

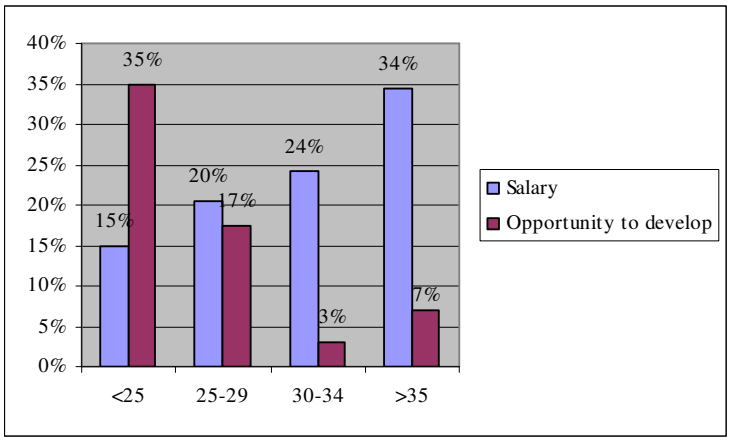

Figure 30 The relation between income and opportunity to develop

Forty nine percent of the respondents state that they can work more than five years in their present workplace. On the other hand, 29% of the employees state that they will work less than a year for the current company.

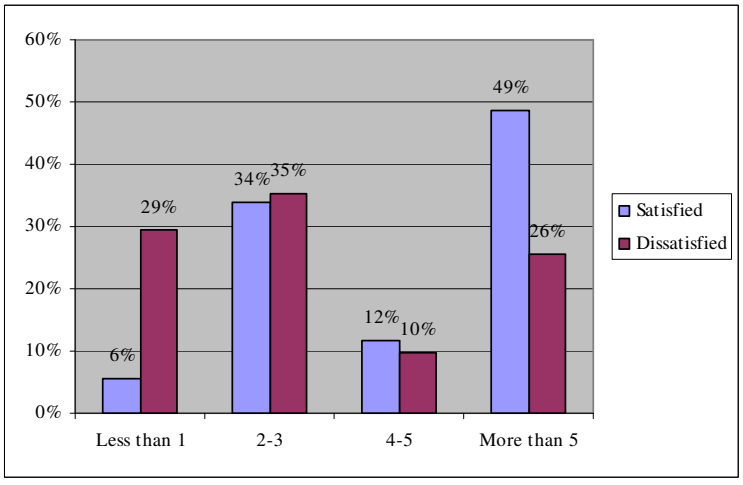

Figure 31 Relation between income satisfaction and working at the same workplace

5.B.2.6 The Advantages of Working at METU-Technopolis

Even though 74% of METU-Technopolis employees are satisfied with their income, only 1,5% of all respondents see income as an advantage of working at this workplace. Thus it might be argued that advantages of technopoles are less related with income, but associated more with other reasons such as a dynamic work environment (41,5%), prestige (18%) or opportunities provided by university (14,5%). Yet, almost one fourth (22,5%) of respondents stated that there is no specific advantage of working at METU-Technopolis.

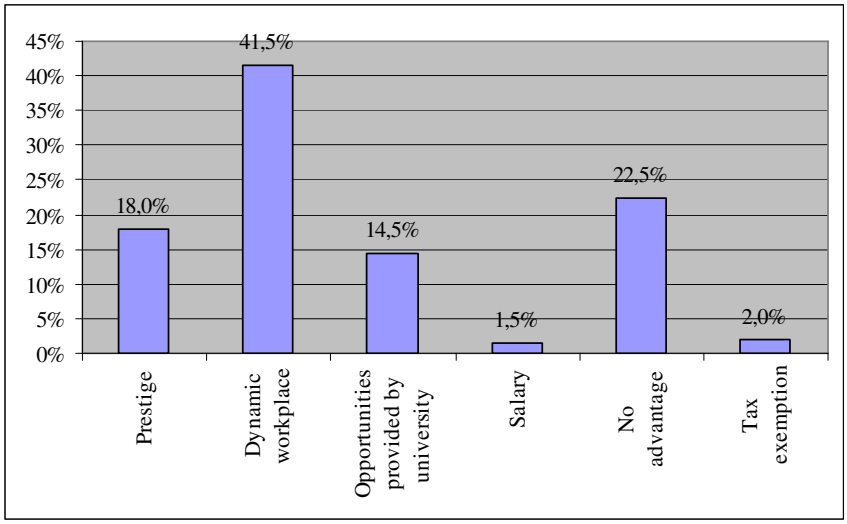

Figure 32 The perceived advantages of METU-Technopolis by employees

Yet the opinions of respondents on the advantages of working at a technopole vary according to work experience. For example, less experienced respondents who were in their first year claimed dynamic work environment (55,6%) and prestige (27,8%) as an advantage, whereas 41,1% of the experienced respondents who had more than eight years of experience, expressed that working at the technopole has no particular advantage. Additionally, there is an increase in seeing the choice of tax exemption as an advantage parallel with work experience.

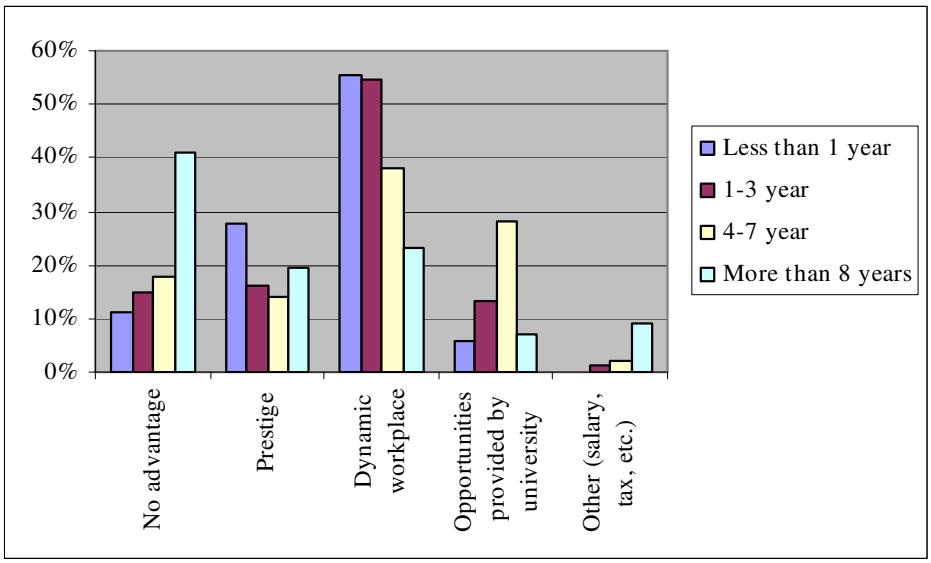

Figure 33 Relation between working at METU-Technopolis and work experience

5.B.2.6.1 Work Environment

The field research shows that work conditions are satisfactory in both social and economic aspects. An autonomous work environment is provided to employees as characteristic to that kind of high technology clusters. Relatively high income, project premiums and autonomy in work processes are accepted as advantages for many employees. Moreover, many employees who are still students are content with no dress-code constraints on their dressing.

This comfortable work environment can be assessed as a continuation of university life. Some apprentices indicate that, though they started to work, they live similar to university life and while now earning money. This is not only because of the relative freedom as far as the dress code is concerned, but also the horizontal organization instead of strict hierarchies. For example, one employee expressed that they sometimes play multiplayer computer games after work hours.

Furthermore flexibility in working times is another criterion for their comfort and satisfaction at the workplace. Several companies offer flexible working time at

METU-Technopolis, though there are others, where employees should work at regular work hours.

5.B.2.6.2 Work Experience

It appears that METU-Technopolis is a preparation phase to the relentless conditions of highly competitive business world. It is easier to 'begin in the kitchen' and then enter the real world of business after gaining some work experience. METU-Technopolis companies are flexible and provide opportunity to employees to continue their studies and work at the same time. Companies offer part-time work or internship opportunities to undergraduate students. Some people stated that they prefer METU-Technopolis to make some money before the military service. Moreover, it is certain that a work experience at METU-Technopolis appearing on their CVs is prestigious.

5.B.3 The Organizational Structure of METU-Technopolis Companies

5.B.3.1 A Comparison of Large and Small Scale Organizations

METU-Technopolis hosts around 200 companies organized in various scales. Despite great similarities among companies, such as the final product or areas of specialization, they reveal different characteristics in the work environment, social relations, number of employees, organizational structure, etc. As, will be mentioned later in detail, small scale organizations, shaped according to manager's general attitude, offer greater flexibility. On the other hand, large scale organizations are more disciplinarian, have strict organizational structures and are institutionalized and dominated by formal relationships.

5.B.3.1.1 Level of Hierarchy

It is known that in the so-called 'new economy', the hierarchical and central organization of labor processes is replaced with horizontal and decentralized organization.

Hierarchical structures are not very common in METU-Technopolis companies, especially in the small ones. Instead, there is a flexible atmosphere of social relations and work environment. One of the employees explains the situation as follows: "We are always face to face here. We chat all the time. There is no peeking order here."

5.B.3.1.2 Forms of Organization

The organizational structure in small scale companies is determined without written agreements and its limits are ambiguous. Large scale companies, on the other hand, have strict and determinate organizational forms. Directors or department coordinators sit at the top of this schema. Below them there are project managers whose numbers change according to the scale of the organization. Project managers can be identified as being around 35 years of age, having ten years of work experience, trustful, sociable and chosen from among people who worked in different sub-categories of the company. Each project group is assigned to a project manager. There are team leaders in the project groups who are responsible for the administrative tasks and regular organization of the projects even though they may not have detailed or depth knowledge on a project. As Richard Sennett (2005:95-96) states, a leader "is promoted not only when s/he fulfills the given task, but also s/he coordinates other professionals".

Project groups have limited relationships with others. Each project group is independent and only responsible to their team leaders and may be unaware of other project groups' tasks. Project groups have matrix type organizations and each of them is specialized in a specific area.

5.B.3.1.3 Organization of Work

Like many modern workplaces, organization and the structure of work is regulated according to projects at METU-Technopolis. In the beginning of a project, a schedule is prepared and work is divided into its parts. *Gannt* diagrams are used for proper maintenance of projects. However, project follow-up diagrams are prepared by large scale companies. Small companies, on the other hand, use more informal follow-ups and have no serious feedbacks.

An employee expressed that the biggest difference between her prior job which was in a small start-up firm, and the present one is the organization of work. She stated that division and the order of work is followed according to pre-determined schedule in large scale companies. In other words, institutionalization of large scale companies differentiates itself from small ones in order and efficiency.

5.B.3.1.3.1 Division of Work & Teamwork

Disparities between division of work and methods of constructing project groups are generally based on the scales of companies. METU-Technopolis companies have a spontaneous division of work. Employees get assignments according to their specific interest areas.

In large scale companies, work is divided for specific project teams. Each project has another division of task in itself. Hierarchical organization becomes flatter in these small units. The coordinator of a project is responsible both to the management and the organization of the project group. Team members are in coordination where a functional hierarchy is observed.

On the other hand, small scale companies have a more informal organization. First, a project coordinator is determined, and project team is chosen among people who have knowledge about the specific issue or from who has not so much workload at that time. Flexible specialization appears as an obligation in those kinds of organizations. In addition to that, management of projects is loose, compared with the strict order in large scale companies.

5.B.3.2 Social Relations at Workplace

5.B.3.2.1 Manager-Employee Relations

The relationship between managers and employees varies according to the scale of companies. That's why some companies are called 'boss companies' and some others are called 'institutional companies'. 'Boss company' means that the attitude of the manager shapes the organization of work and social relations. For example, some small scale company managers consult other employees about technical or

administrative decisions. In these companies, hierarchy is reduced almost to a difference in the separation of tasks. However, 'institutional companies' have formal relationships and every employee has the knowledge of his/her status in hierarchy.

Managers of small-scale companies share the same workplace with other employees or have an office which is visible by others. In that case, informal relations grow where all the employees of the company work face to face and closer to each other. Managers may join social or sportive activities with employees. One employee told that his manager is like a father to him, which means that his manager may both 'love' and 'beat' him. In small companies, however, people can be fired easily and suddenly due to the subjective evaluations of managers.

5.B.3.2.2 Employee-Employee Relations

In small scale companies, informal relations are more common. As one employee indicates, "nobody is having a manner of 'project manager'" or "you work like a human, not like a robot in small companies." Those people have more chance to develop relations during and after work. However, having time together does not always lead to faithful or strong relations (Hoşadam, 2002:129). For example, an employee from a small scale company expressed that they do not speak anything except for saying 'hello' or 'good evening' for months. As he says: "Work friendships are up to a point."

When the project is divided among employees, the feeling of shared-work is seldom. Every employee focuses on his/her work. Frequent use of computer, listening music with the earphones might harm established social relations so that a manager even called them as "zombies whose brains are invaded by aliens". Computer and communication technologies cause independence from spatiality and prevent face to face relations: "He can't reply you if you speak to him. Write to him from MSN, instead" is an example to show the irony and the lack of communication.

5.B.4 Contracts and Occupational Organization

5.B.4.1 Forms of Contract

Non-standard forms of employment provide relative autonomy to both employees and employers. Thus, regardless of themselves, both sides act independently. From the employer's side, an employee can be dismissed because of restructurings or low performance. On the other hand, an employee has the possibility to give up his/her job with no trouble when there is a better opportunity. The dependency of contracts has either no importance or applicable for only short periods. In short, contracts have lost their significance to guarantee long-term aims.

Non-standard forms of employment is rather an advantage for METU-Technopolis employees who have either open-ended or have no contracts. A large amount of the employees claim that a probable opportunity should be assessed in these indeterminate future circumstances. The risk of dismissal is ignored due to reliance on themselves to find another job in a relatively short time period.

Dependency is up to intra-firm relations where no contracts are signed or just done owing to procedures. In such kind of companies, it is not ethical to resign from job in order to have better salary. A number of employees contend that informal relations are more relied on formal regulations: "There is nothing that ties me to this company except for ethical reasons. I can pick up my jacket and leave tomorrow or they can give me the jacket." "According to me, contracts are made to guarantee defined and stable works for both sides. There are two types of trust: formal and informal. I believe in informal trust."

5.B.4.1.1 Contract Periods

Open-ended contracts are used frequently at METU-Technopolis. This contract is valid till the employee gives up his/her job or is dismissed. Project-based contract is another type that is frequently used at METU-Technopolis. Companies prefer project based contracts instead of more formal stable contracts.

Thus, many employees have no contracts and employees who have contracts are subjected renewal for every year. Companies hold the advantageous side in contracts: “If you want to give up, you are forced to finish your work. But if they want to dismiss you, I may be fired any time tomorrow.”

5.B.4.2 Occupational Organization and Unionization

Innovative technologies started to dominate production process from 1970’s onwards. Widening of service sector accompanied with technological change, narrowed down the capacity of labor-intensive sector. Consequently, labor unions have receded and gradually lost their power and significance.

Flexible production refers to a process where the share of industrial sector in added value decreases, and forms of employments are reorganized according to changing needs, especially in the service sector. In today’s world, it is almost impossible to define the functions of labor unions solely with the amelioration of working conditions and increases in salaries.

In the world of new work, trade unions have no place. There is a general feeling that ‘we don’t need unions’, because employees are ‘well treated’ and feel that they are in ‘a good environment’. (Massey et. al, 1992: 104)

As an example, unionization declined from 48% to 35% in Austria, from 18% to 9% in France, from 35% to 26% in Holland, from 50% to 34% in UK. (Işıklı, 2007). According to the data for engineers and architects gathered in Turkey, only 0,5% of these professions are members of a union. (Köse&Öncü, 2000:214)

A labor union for information technologies employees still does not exist. Therefore, employees are organized solely around their professional chambers. Fourteen and half percent of men and 1,4% of women at METU-Technopolis are members of any chamber with a total of 9,5% percentage of unionization in general.

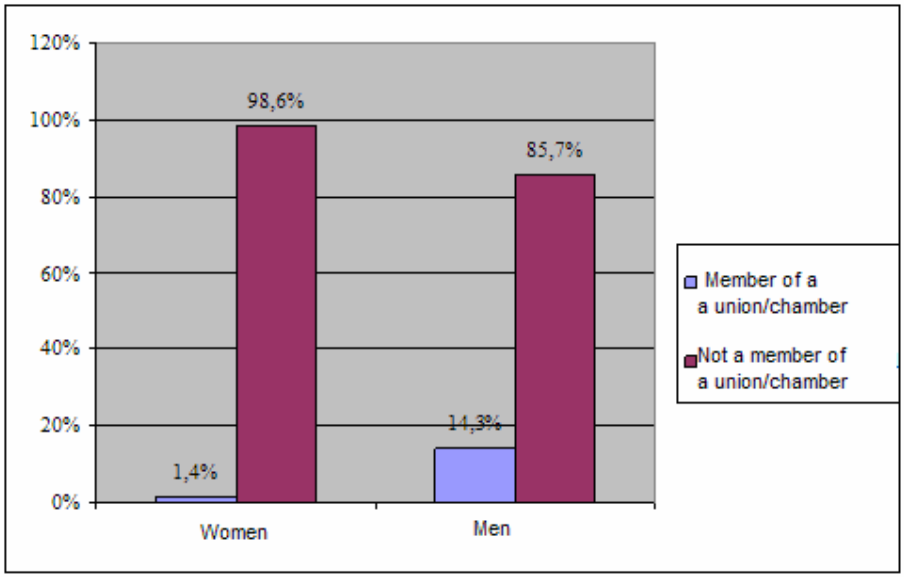

Figure 34 Relation between gender and membership of a union/chamber

It is interesting that membership is correlated with occupations (p=0.008). While the percentage of unionization for engineers and managers is 15%, for the other categories (administrative and other) no person has any membership. In other words; none of the secretaries, marketers, or accountants are members of any union.

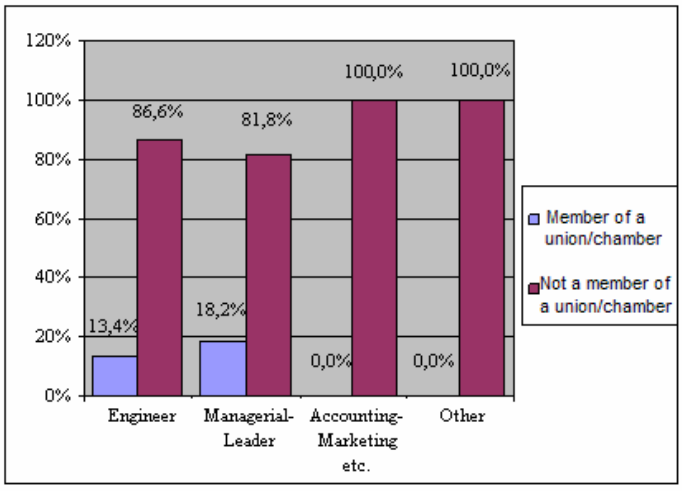

Figure 35 Relation between position and union/chamber membership

However, there is not a statistically meaningful relation between income satisfaction and unionization (p=0.106). Unionization rises in parallel with income satisfaction.

While the percentage of unionization is presently 11,8% for the satisfied at METU-Technopolis, it is 3,8% for the dissatisfied. One might argue that it is due to the relatively higher rates of engineers and managers against other categories.

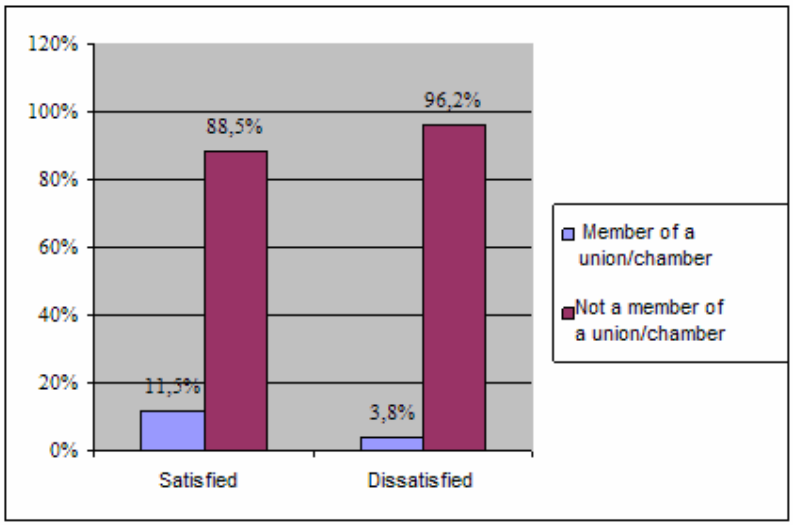

Figure 36 Relation between income satisfaction and union/chamber membership

Many employees argued that they do not need a union; The likely reasons being:

Company Scale: As can be seen from below (Table 7), the percentage of unionization is inversely related with company scale. The high number of small scale companies at METU-Technopolis might be the reason for the low level of unionization.

Table 7 Unionization according to the size of the workplace (2004-2005)

(Source: Ministry of Labor and Social Security, Statistics of Labor Life (2005) [quoted by Aziz Çelik, 2007: 131)]

Scale of workplace	Number of unionized workplaces	Ratio of unionized workplaces
1-50 employees	2706	0,5%
51-100 employees	130	1,8%
101-250 employees	269	6,5%
250+ employees	329	24%
Total	3434	0,7%

Small scale companies have closer and intense relations, so that unionization is understood as an indicator of distrust by the manager. Employees expressed that they do not need a union when their demands are realized and when they have managers respecting employees.

Forms of Employment: Temporary employment or project-based employment hinders unionization. The number of part time working employees and high mobility from one company to another are other factors that led to low rates of unionization at METU-Technopolis.

Employee Profile: Employees do not seriously feel the threat of being unemployed. Therefore they do not need a union which would protect their rights. A software engineer stated that "Everybody can carry wood; a wood carrier can be replaced with another. But, a software engineer can not be replaced easily. It is hard to find an engineer with the same qualifications. Adaptation to work is expenditure. Union is necessary for the wood carrier, not for the software engineer."

Especially young employees do not have knowledge on how unions work and what they can bring in. METU-Technopolis employees do not believe that the unions will be functional in protecting their rights. It is not surprising that not one of 40 employees under the age of 25 (i.e. born after 1982) is a member of a union. Besides, the sway of individualism in general is another reason for being against unionization.

5.B.5 Changes in Skill Requirements

5.B.5.1 Skill Updating and the Feeling of Uselessness

The necessity of skill updating appeared with the changing conditions of innovative technologies. The rapid pace of work processes obliged employees to have and update their skills. This process ends with decreasing importance of work experience acquired through years. Skills became valuable for short-term and at the same time became easily obsolescent.

A software engineer had to learn and used the program called 'Ajax' just after he finished his military service. As he argues, there was no program called Ajax, yet he had to learn and make applications with it. Another engineer marks: "My project manager is still learning…I know that I have to learn all my life."

Continuous learning and the necessity of skill updating is not seen as a problem for many engineers. They argue that dealing with various problems lead to more creativeness and possibility to develop and they oppose dealing with similar issues all the time arguing that it will be boring. Moreover, some of them cited that they enjoy their jobs because of this 'dynamism' in their work. As one says: "It is disappointing for me and for a METU graduate to accept standard and definite jobs."

Skill updating is more than a necessity; it is an obligation under the new market conditions. From companies' side, they have to satisfy the changing demands of the market and the customers. "When a customer demands, I have to know something about HTML, PHP or dot-net" shows the significance of customer demand as a determining factor in customer and market conditions.

Even though skill updating necessitates learning new things, this change causes the feeling of uselessness. Some examples are given below as to when the employees will be useless after they stop what they are doing now:

"If I give up learning new things in this project, I will not be able to continue on this project for another month…I will totally be useless after two or three years. Programming languages are changing, technologies are changing. Before, there was a database called DB2, today nobody talks about it."

"If I give up everything now, I can exist until that product exists. In five years, the technology of the product changes and the old one becomes useless. You start to feel bad after two years and be totally useless in five years…You become worn out in two years and you can not find any work after five years."

"If I give up learning now, in two years' time, they will laugh at me when I tell them what I am doing…You start to learn how it can be configured; then while you are configuring, its *open source* emerges."

The feeling of uselessness appears since the skills and information are valid for only short-term, easily worn out and rapidly changing. This situation results with de-motivation after spending many hours or days for a specific work and seeing it as useless in a shorter time. One software engineer remarked that: "What you know is not valuable. This is a weird sector that you have to learn everything anew after two years, and can easily be unemployed if you are not fast enough. You have to eat one kilo of carob for a one gram of honey in the software sector."

The pace of technology later becomes routine and innovation is standardized in the software sector:

"You think that I should make a connection tool to make it work faster. You work for two months. Six months later, your work is already designed. You click on some windows, in the end you click on 'ok', and then things become 'ok'. So, you start to

think that why you are learning all these. It is valuable only for one year. It will be very easy one year later. A one million dollar project will be one hundred thousand dollars worth for the next year. This is the most disappointing part of software engineering."

5.B.5.2 Learning by Project

In addition to the rapidly changing market and technological conditions, employees of innovative technology companies have to learn new skills in accordance with the project based work.

Many METU-Technopolis companies carry out projects that they are not familiar with. Regarding this, project teams have to learn or update their skills with every new project. Project teams might become consultant to other project teams at the end of their project, while they did not know anything in the beginning. However, project teams have to spend even months to figure out what the project is about at first and whatever is needed. For example, an engineer working on numerical communication protocols expresses it as follows: "The existing protocol is now 'http'. Yet, one day your manager tells you that there is an IP protocol used in mobile phones to make the connection between proxy servers in the internet world. You do not know anything about it. Nobody knows anything about it; yet you have to learn."

Even though the employees have knowledge of many things, experience is replaced with the potential to learn under the so-called 'new economy' conditions. Richard Sennett compares experience and ability to learn as follows: "New forms of work require people who are good at moving from task to task, job to job, place to place. In part this is due to shifting demand in the global marketplace; organizations must change their functions, business plans, and products on short notice. The ability to learn new things quickly becomes then of more value than the capacity to go ever deeper into an existing problem or body of data. And, since such ability is worth more than fixed knowledge, the potential for learning is more serviceable than past achievement. This is the economic premium put on 'potential ability'" (2003:80).

Even though, experience is losing its value, it will not be proper to argue that experience became a total waste of time. Experience enables one to look from a broader perspective and understand the ways of solutions to the standing peculiarities of changing technologies. Therefore, a number of companies try to keep experienced professionals with high salaries.

5.B.5.3 Flexible Specialization

Flexible specialization is frequently applied in METU-Technopolis companies. The situation in METU-Technopolis is that the numbers of employees are less and the numbers of projects are many. Therefore, multi-skilling, and job replacements are common among companies.

As an example, an employee might prepare documents for a meeting, do research, arrange company talks as well as his/her technical duties. Variety of tasks might crop up due to the technical qualities of the given job. An employee explains it as: “You use a plenty of programs to do a job. You use database, you use interface, etc. You should know how to connect them. You have to know how they are working.”

Even, there is not a statistically meaningful relationship between one’s position and necessity of various types of information, it is determined that engineers should know much more on different subjects. Such as 83% of engineers and 80% of technical leaders and project managers have to know about various subjects.

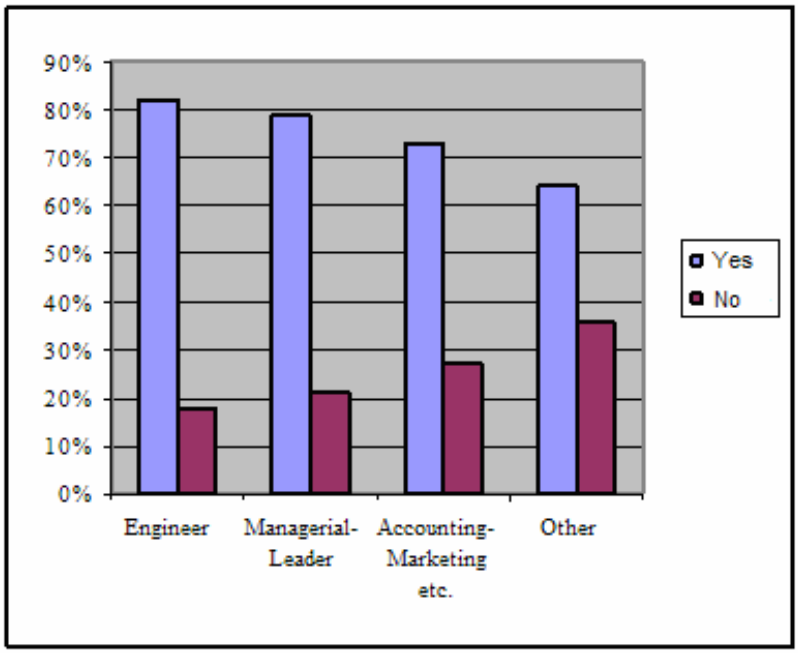

Figure 37 Relation between position and necessity of having various skills

5.B.5.3.1 Multi-tasking in Different Projects

Technopole companies prefer demand-oriented, just-in-time work instead of standardized production. Jobs are replaced with projects or working areas and employees are compelled to work in different projects at the same time.

The need for increasing financial resources and growth, enable companies to carry out different projects. Thus, project-based work necessitates multi-tasking, and employees have to work in these new areas. One employees explains her situation as: "For the last three years, I have always been working on three or four projects. One is in the beginning phase, the other is in the mid-phase, third one is about to finish and the last one is I have to check and write its report. Whomever you ask, that is the situation."

The questionnaire results affirm those sentences: 73% of the respondents worked in more than one project in the last year. In addition to this, 61% of the employees worked in different projects at the same time.

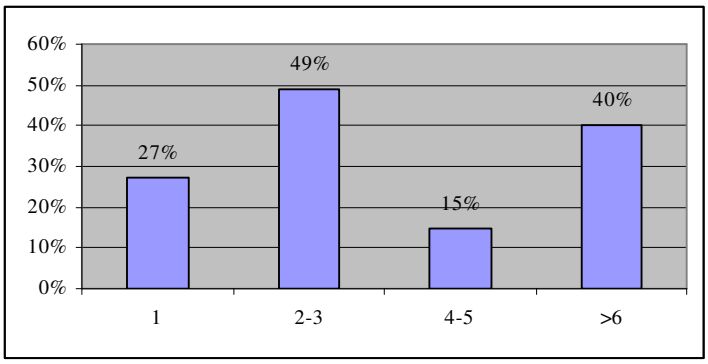

Figure 38 Number of projects conducted within last year

5.B.5.4 Ways of Learning

"Everyday there appears absolutely a new thing", one respondent states his position as such on the necessity of continuous learning. Institutional training carries a lot importance due to the diversification of work areas and continuous developments. For this reason, companies sustain intra-firm trainings, individual learning or seminars given by private companies. However, the role of university is worth mentioning.

5.B.5.4.1 The Contribution of University Education

The contribution of university education is rather on the discipline and the culture of learning instead of teaching technical knowledge. The basic ability that the university brings in, is the discipline of teaching how to learn. As some managers admitted, they prefer graduates of METU or Boğaziçi just because they have high ability to make research and learn. It is apparent that work is gradually depending on the potential of learning instead of having knowledge.

5.B.5.4.2 Individual Learning

One employee said the necessity of doing research for one's job as: "There is not a single day that I am not searching on Google for my work." Companies let their employees to learn about the specific subjects very often.

"Nobody teaches you the job here. They say, this is the project, these are the partners. We'll have the first meeting together. Thereafter, you will continue it all alone."

"If we get this job, it has great prospect, says the manager. Yet, nobody knows about it, manager just gives the order: go and learn."

The respondents state that they follow web forums, blogs, frequently asked questions, web-pages of magazines or e-mail lists related with their sector. They follow these regularly or whenever they need.

One employee argued that, practicing the learned subjects brings more experience than the theoretical knowledge taught in the universities:

"Knowledge and experience is acquired more when you work. We forget the things taught at the university. When you make a fault during work, you do not forget it."

5.B.5.4.3 Institutional Training

The data collected from questionnaires show that many companies provide intra-firm training, both technical (Matlab, database management, visual studio, dot-net technology etc.) and managerial (marketing, time management, leadership, teamwork). Sixty one percent of the respondents stated that they had training in their workplace.

Some of the types of trainings are given by the experienced staff of the company. But private companies may also organize private training on a variety of subjects. The know-how agreements between companies are an example for such inter-company trainings.

5.B.6 Future Uncertainty

High and rapid changes in the conditions of 'new economy' lead to ambiguity concerning the future. Despite the ambiguity of future, METU-Technopolis

employees are not so stressful about their prospects in general. Some employees start working just after the graduation without feeling the anxiety of getting unemployed so that they do not feel stress about their prospects. Meanwhile, they have no anxiety and no plan:

"I do not think that I should do these and those in two years. Having a job was chance for me. I was not looking for a job, but I got a job. I decided to have a master's degree in second semester. I just wanted to stay at the university environment. Things developed that way, randomly. After, will I continue doctorate or work here? It will be by chance. I am not thinking about it."

METU-Technopolis employees have reasons not to be stressful about their future despite they have no words for their future. First, high-tech work is a new phenomenon in Turkey, they have the knowledge and they are highly-qualified. Moreover, there is a big gap in high-tech sector, hence they feel comfortable.

A number of employees state that they can easily find another job if they are dismissed. Thus they do not feel any dependence to a specific company. Employees know that they can do the same job in another company. An employee stated that he relies on his skills more than his knowledge.

However, it should be indicated that reassurance is higher among younger employees; employees feel more anxious about their future with the increasing responsibilities such as marriage or having children.

As shown in Figure 45, 51,3% of the employees has no anxiety about their future. Being unemployed is 16,1% and career anxiety is 13,6%.

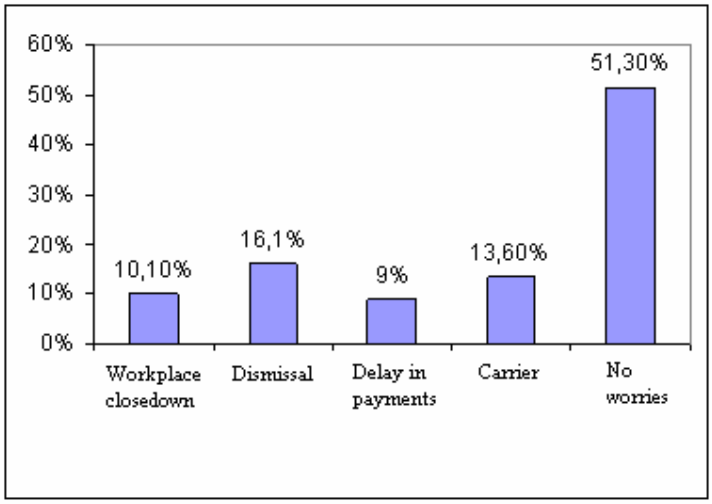

Figure 39 Work-related types of anxiety of METU-Technopolis employees

Men and women employees have different worries (p=0,005). Men are less worried than women, and women who are worried about unemployment are three times higher than men.

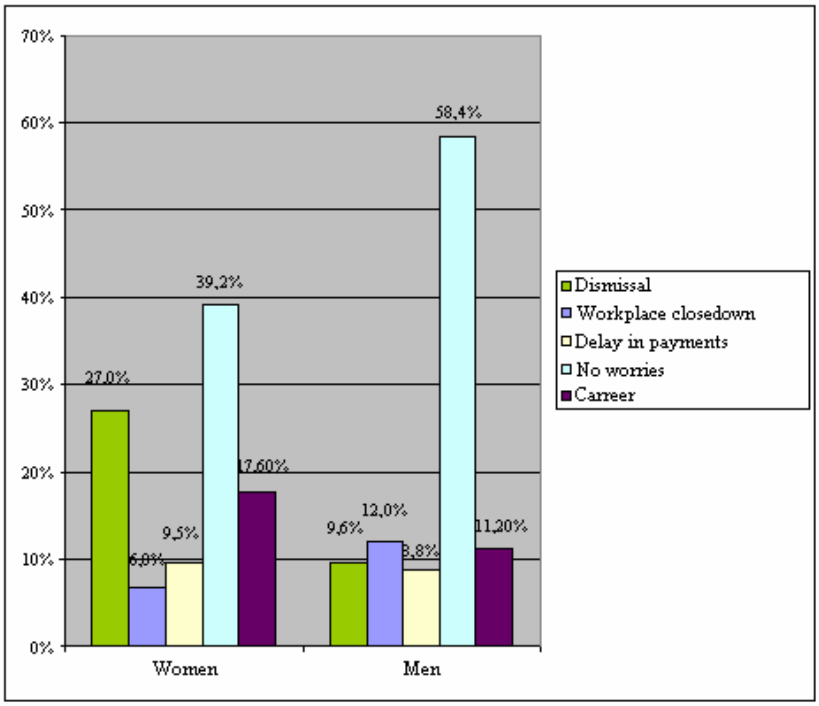

Figure 40 Relation between work-related anxiety and gender

5.B.6.1 Market Conditions and Uncertainty

The situation becomes harder, with global economy focused increasingly on short-term and the insecure characteristics of Turkey's economy.

Expectedly, there is a statistically meaningful relation with income satisfaction and the ease to pay for long-term (p=0.028). Employees are not so willing for long-term payments which are also a sign of the insecure and indeterminate characteristics of the nature of work. Apprehension shows itself in the payment for long-terms. The situation is more interesting even though employees of METU-Technopolis are satisfied with their income and feel less worried about the future; while they feel reluctant to make future plans. Seventy four percent of employees stated their satisfaction with their income, whereas 63% of them are not keen on payments longer than a year.

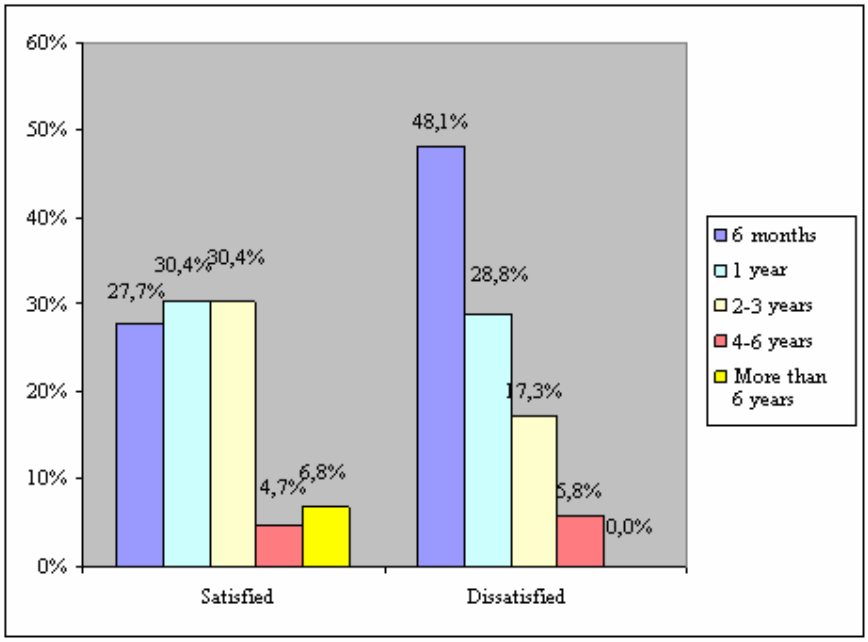

Figure 41 Relation between income satisfaction and willing for long-term payments

There is a meaningful relationship between work experience and the ease of payments (p=0.017). Only %5,6 of the employees who have work experience for less than a year, state their will for long-term expenses, on the other hand, 50% of them state their will for expenses not longer than six months. Compared with younger employees, experienced employees are more willing for long-term payments. However, 33,2% of the employees who have more than eight years of experience, still stated their reluctance for payments longer than six months. It reveals that, even though those employees have some accumulation and experience, they still are not able to predict their future.

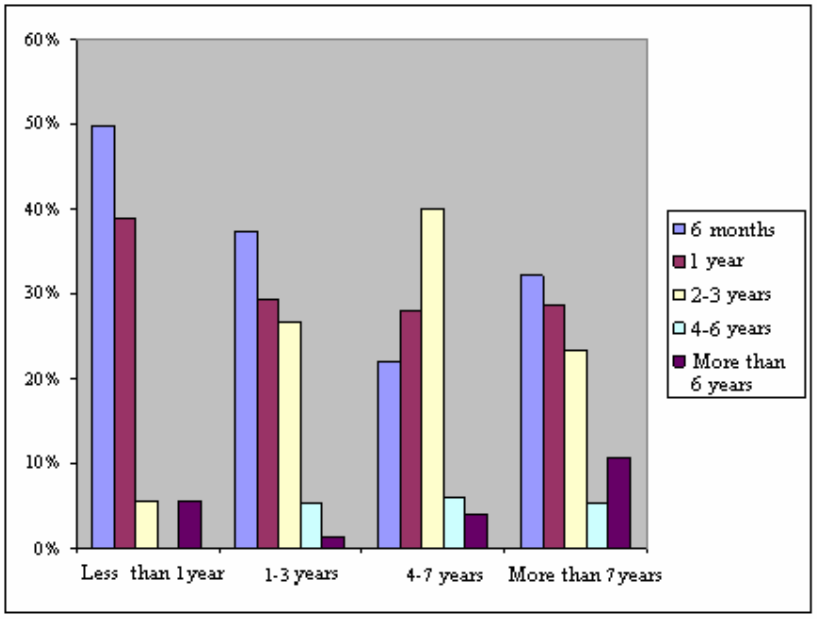

Figure 42 Relation between work experience and willingness for long-term payments

5.B.7 Stress and Anxiety

The necessity of acquiring new skills gives rise to increase in stress and anxiety as well as insecurity and ambiguity.

> Anxiety attaches to what might happen; dread attaches to what one knows will happen. Anxiety arises in ill-defined conditions, dread when pain or ill-fortune is well defined. Failure in the old pyramid

> was grounded in dread; failure in the new institution is shaped by anxiety. When firms are reengineered, employees frequently have no idea of what will happen to them, since modern forms of corporate restructuring are driven by issues of debt and stock-price value generated in financial markets, rather than by the internal workings of the firm (Sennett, 2006:53).

In the following section, therefore factors contributing to stress and anxiety will be explained.

5.B.7.1 The Necessity of Skill Updating

Every employee has the potential capacity to compete with other employees under the conditions of 'new economy'. With changes in forms of competition and market conditions, employees have to adapt their knowledge and skills to new volatile conditions.

Companies choose people who hold the necessary skills. In this severe process, if the employees can not update their skills, they are easily excluded from the job market. Hence, having a stable job in the market has become harder than ever.

Beside the accumulated knowledge through years, employees should add new skills. An employee says that he had to learn new skills; otherwise he can be replaced with newcomers. In that case, senectitude appears as a stressful phenomenon since it becomes harder to update and develop new skills. According to an employee, "Nobody is indispensable; even the major man can be fired."

It causes another problem in case of health problems which decrease production efficiency. Under the 'new economy' conditions, employees have to be healthy and dynamic for 7/24. When the economy is dependent upon short-term, any breakdown, due to an illness or pregnancy, should be avoided.

However, employees prefer those kinds of insecure jobs despite the hardship involved. Challenge of technology and other employees is preferred.

5.B.7.2 Project Based Work

Employees work for long hours intensely to overtake arrears of the projects before their deadlines. Companies have responsibilities to the intense work of the employees given that, companies propose a shorter time framework for the project to get the project adjudication. Routine working hours are eliminated and employees are forced to work including late hours and weekends. Furthermore, the responsibility of project is weighed on employees, so the autonomy at work turns into increasing work pressure and stress when the project sources are decreased. As Sauer denotes, "autonomy is pre-requisite for the information economy."

Besides, according to European Agency for Safety and Health at Work, work related stress emerges when the demands are more than the employer can meet. Stress is closely related with developing new skills, being flexible and creative and having social skills. Therefore, stress is widespread among organizations based on teamwork.

Teamwork at METU-Technopolis could be given as an example to the situation cited above. People who have various areas of interest, come together for a specific project. When the members of a team do not know each other, it will be indispensable to have weak relations and problems accompanied with apprehension instead of wonder of and attraction to work.

Projects were followed by new projects, and employees had to learn things from the beginning and had to participate in projects which they do not know anything about. "In (METU)-Technopolis they throw you into the sea and force you to learn swimming by yourself" is an apt expression marked by an employee. Employees have more trouble in the learning phase of work: "It is hard to guess a time for a work that you are unfamiliar with. Usually you offer an approximate time. If you can not finish at that time, there starts problems, project is delayed."

Another employee expressed his responsibility and stress as such: “Manager asks me when I can finish this work. I say, ‘I can do this in a week’. Yet, you may still have to deal with it even after three weeks.”

The most appreciated characteristic of project work is to deal with various tasks. This allows individuals to build their own ‘network of mobility’ and ‘map of employability’ (Valenduc, 2006:126). Nonetheless, multi-tasking causes multi-stress at the same time. Especially, small firms do not have well-defined programs, multi-tasking and working in different projects meantime led employees to distraction from concentrating on a single, specific project.

Small-scale companies in fact take more projects than they can realize in order to create a financial source and to grow in the market, and this results in heavier weights on employees. An employer indicated: “I conducted four projects at the same time. One of them was about mechanical drawings. I am totally unfamiliar with that. You are divided into your particles.”

In addition, multi-tasking brings about solely to have a sense about that thing. Employees do not work and learn deeply about the subject. According to the field research, METU-Technopolis professionals know barely ‘enough of something’ and learn only the surface information which would be sufficient to fulfill the project due to time limitations of projects. A software engineer indicated that:

“Before, when I want to learn new things, I surf on the internet and look for how and where it is used, what logic of it is. Now, I am looking if there is similar project done about that. I am trying to learn only the related part. I do not try to learn its depths and do not think if it can be done in a different way. If I write its test code this way, it takes three hours, program works in ten hours, but if I write its test code that way, it takes five hours, but program works in two hours. You think that I will not work; the computer will work and you decide to choose the first one. Before leaving the workplace, you click on the button, and when you come in the morning, you see it’s ready.”

5.B.7.3 Intensification of Work

There has been a significant increase in the informal 'self-organized extension of working time' (Voss, 2005: 136). Work becomes more intensive due to reasons such as constant restructurings, project-oriented work or pace of organizational change.

Flexibility works rather in the interest of companies. Called as 'honey trap jobs' promising autonomy and the control of time, employees in fact sink into the heavy load of work and forced to work for more 'flexible' hours.

As with work-related stress, burn-out is also becoming prevalent under the modern conditions of work. Burn-out, as mentioned here, is characterized with 'emotional exhaustion', 'de-personalization', 'experience of poorer performance', and 'cynicism' (Altieri et. al, 2005:158). Burn-out is common especially among managers or young professionals due to intense work.

Still, flexible work continues to be used in the advantage of companies. In many companies, employees who are in their first earning years have no right to have holidays or overtime premium, and weekend work is not awarded. This one-way time-lengthening flexibility is valid almost for all companies in METU-Technopolis.

Moreover, the impossibility of maintaining the heavy tempo of working intensely causes anxiety for the young employees. As an example, an electronic engineer aged 26 expresses: "I can work with a high performance for now. I have headaches, backaches, but I can resist. I know I will not show such a performance when I am thirty five. I have to have a level of experience, knowledge or I have to be indispensable for the company, otherwise fear takes place…I want to work more on design and write codes less after thirty five."

This employee along with many others is after another thing, thinking that they will not be able to carry the mental and physical load. The most popular 'career path' is to have a job which is more administrative, necessitating teaching or managing instead

of learning. For example, small company employees intend to have managerial positions for larger companies or more defined jobs. On the other hand, employees of large-scale companies intend to have better managerial positions or planning to have their own companies. Supporting the above argument, a software engineer aged 27 says: “Nobody wants to work as a rank-and-file engineer after thirty five.”

5.B.7.4 Increasing Responsibility

The flexible particularities of work cause impatience and apprehension. Flexibility led to increasing autonomy, yet an increase in individual freedom is highly debatable. Teamwork based organizations may become efficient; yet increase in autonomy does not compensate for the increase in the workload. Mostly, employees feel the responsibility of the results of work. When work is done by a team, all team members become equally responsible for any development. According to Altieri et. al, (2005:158) “The members of the team often attribute stress to their fellow team members and thus stress can become a shared experience.” Altieri adds that while the manager was putting pressure on the employees before, today it is often one’s own colleagues who constitute the main stress factor. This situation can also be called as the horizontal-ization of pressure.

5.B.7.5 The Fear of Unemployment

The fear of being unemployed is valid mostly for people who are not promoted till his/her thirties and continues to work as a rank-and-file engineer. The only way for the one who ‘knows the reality of life that two young new graduates can be employed’ instead of him/herself or who ‘knows that might happen to him/herself as well as everybody’ is to work harder, have close relationships with manager and look for other job opportunities. Besides, it is not so possible not to find a job for a long period.

So, aging is the main factor that contributes to unemployment in high-tech conditions. Employees demand more salary due to their work experience, but at the same time they feel the fear of unemployment:

“After a certain age, it is not easy” an employee said, “You have an accumulation of experience, qualification. When you start in a new company, they tell you that if they employ you, they have to employ you as a manager. But they can not propose the same salary to you as a newcomer. They can not treat you same. For example, the manager is 27 and I am 42 years old, how will he order me to work?”

In that case, company owners or managers prefer young people who cost and demand less while working. Thus experienced workers who demand more and are less dynamic become easily disposable, far it is meaningless to employ such. An electronic engineer who has eighteen years of experience and fired from his job at METU-Technopolis explains his situation: “Managers say: ‘We have a lot of young man who are willing to work with us. I can employ two of them with the money I pay you’. They do not pay much to young people during ‘preparation period’. Moreover companies train apprentices according to their future targets. That’s why it’s more profitable to employ young ones. They will also be more flexible. They will order him, ‘do this, work at weekend’ easily…Young can work longer and they do not dissent for anything. Managers call them to work on weekend and they come to work. But I can not.”

Predominantly, large companies employ people above thirty who are not project managers but work as engineers. Hence, this severe ‘state of workplace’ is most probable in large companies. As one employer states: “You can not turn up your nose to the employer’s salary offer at the age of forty.”

Employees working at critical positions are excluded from this relentless selection. A manager can not fire an employee who is critically important for the company and have precious experience and knowledge. A respondent indicated that the METU-Technopolis companies can also be categorized with age. According to him, young employees work generally in small scale companies. Then, they prefer larger companies such as Milsoft, Siemens, MNG, Aselsan and Havelsan in their thirties. Larger companies have certainly more advantages in the ‘career paths’.

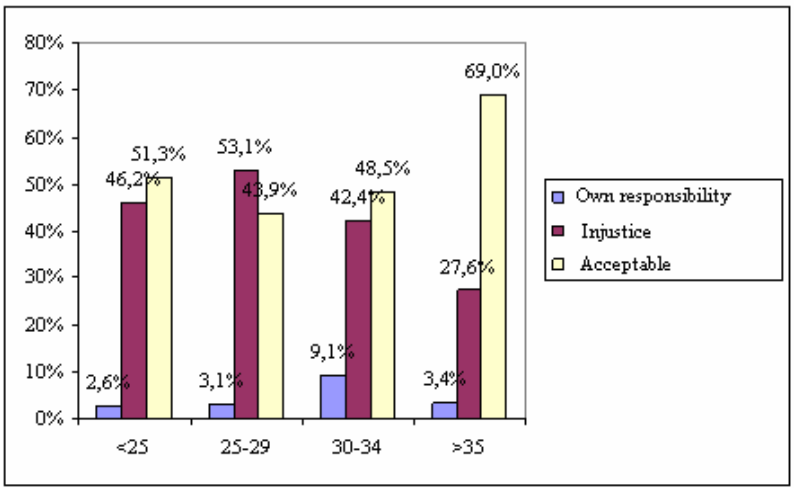

Figure 43 Relation between reaction against dismissal and age

Although there is not a statistically meaningful relationship between the age and reaction against dismissal (p=0.185), the employees who find dismissal acceptable, form highest percentage in the age group above 35. It can be deduced that experienced professionals take dismissals as acceptable, since the anxiety of unemployment rises with age. The innovative reflexes of high technological work conditions, rapid change and high competition are accepted as normal by the mid aged professionals who lost their former dynamism and experiencing insecurity.

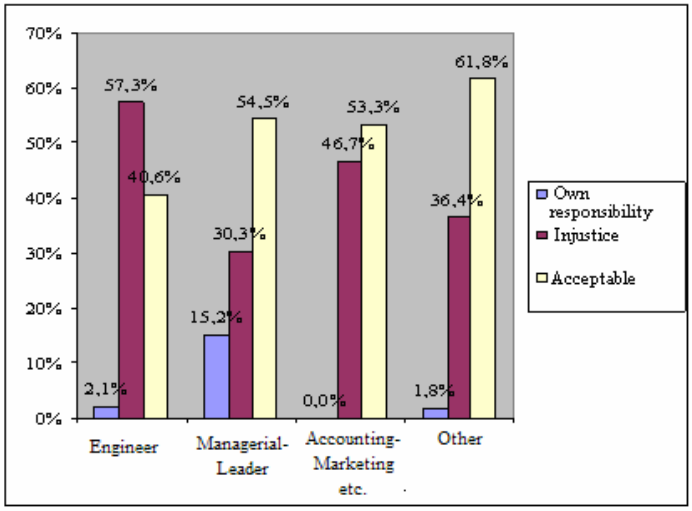

Figure 44 Relation between reaction against dismissal and position

As is shown in Figure 44, there is a statistically meaningful relation between position and reaction against dismissal (p=0.002). According to the figure, engineers have the highest percentage in seeing dismissal as injustice (57,3%). This is lowest among managers and leaders (30,3%). Furthermore, managers and company leaders have the highest percentage (5 out of 33, 15,2%) about feeling responsible about their dismissal, only 2 of 96 (2,1%) engineers feel personally responsible. As indicated before, engineers have the workload while managers have the responsibility. A manager says: "If the things do not go well with the company or if the company goes bankrupt, an engineer can leave the company and find work in another company. But what will I tell everybody? Do I tell that we have a company and we went bankrupt?"

5.B.8 Loyalty

The insecure conditions and the short-term relations in the so-called 'new economy' result in diminished occupational loyalties. Continuously changing organizations can not be a place for the flourishing of informal relations of trust. Institutional synergy became important for the restructuring of companies, and concepts such as 'team spirit' and 'company family' displaced and took the place of trust and loyalty. High levels of competition are also another factor that corrodes mutual trust and occupational loyalty.

Loyalty is perceived as a behavior to obstruct career paths. An employer thinks s/he can be more successful and create career opportunities when s/he is not loyal to the work and this is the dominant idea of a competitive understanding. As Richard Sennett remarks (1998:25), "a consultant who managed a recent IBM job shrinkage declares that once employees understand (they can't depend on the corporation) they are marketable." It is more 'functional' or 'useful' not to have loyalty neither to work nor to the workplace. Factors influencing the relations of loyalty can be counted as follows:

5.B.8.1 Loyalty and Age

During in-depth interviews, I met a man who was working as a software engineer in one of the METU-Technopolis companies and fired from his job after nine years of working in the same place at the age of 42. I have heard his name while I was interviewing another young employee. The young employees were in fact talking about a man whom everybody saw as a mentor and could speak with on any related subject to get his opinion. I learned his story, what his position was inside the company and how he was fired. I learned his contact details and wanted to have an interview with him.

Apparently, after he was fired, he could not find a job for nine months. He told me later in the interview that he went through hard times and had problems with his wife and children. He had different opinions concerning what the other young professionals told me. Although he was fired, he was saying that he is still faithful to his company, adding that he has learned and contributed a lot to the company. According to him, there was a mutual relationship between an employee and the workplace where 'you earn your bread'. "If the company develops, then our share increases. Second, if we do our work properly, we all win." he says.

He added that employees were loyal to their workplace before, and the company was trying to make its employees loyal as well. However, the new employees did not have such vision, just 'writing code and getting money' simply moving along their present interests. "The feeling of belongingness does not exist. They go wherever they can make more money, moving from here to there without any qualm."

Under the new work conditions, older employees are more judgmental and positively acquisitive on behalf of younger ones. Younger employees leave the job easily when they are dissatisfied with their job or work environment. Hirschmann defines it as 'exit' and 'voice'. Young employees are more flexible, and they choose 'exit' when they are discontented with the situation at workplace. On the other hand, older workers show their 'voice' and judge their environment since they have been working there for some years (2006: 96-97). A young professional expresses his

feelings when his company demands him to go to another place even if he does not want to: “The company might want me to go, but I don’t. If they pressurize me, I leave the work. That’s my character. I don’t do that. I leave the job, at the most. Anybody who *trusts* himself, does the same.”

5.B.8.2 High Mobility

The absence of loyalty to the work and workplace creates a type of employee called as ‘entreployee’ (*Arbeitskraftunternehmer)* which is a combination of ‘entrepreneur’ and ‘employee’ (Pongratz & Voss 2003). An ‘entreployee’ is simply the entrepreneur of his/her own labor power. ‘Entreployees’ are frequently found in knowledge-intensive sectors such as IT and multimedia. ‘Entreployees’ have independent self plans and commercialize their potentials on the labor markets.

The concept of ‘entreployee’ is applicable to the young professionals in METU-Technopolis. One employer summarizes their position as follows: [the]‘sector is very slippery and mobilization is too fast.” The mobility of employees and the changes in project teams causes short-term relations. The temporality and continuous change with the relations prevent employees to have strong and trustful relations.

5.B.8.3 Effects of Company Scale

The scale of companies influences the loyalties as well as social relations at the workplace. Employees have stronger relations in small companies when their contribution is appreciated by others. The satisfaction of employees enhances loyalty to work and workplace:

“Gradually, we start to devote ourselves to the company. The company is becoming our company. We do not have such an aim to break something off the company. If the company goes bankrupt, I won’t claim anything.”

Nonetheless, the influence of an employee’s contribution is harder to be recognized in larger companies. Moreover, manager’s attitude can contribute to loyalty at the

workplace. Loyalty can flourish where the employees feel themselves comfortable and safe. As Sennett (2005:120) signifies: the manager's character becomes important if the work life will be satisfactory both qualitatively and sentimentally. The manager brings in partly this sentimental meaning by being as a man worth working for."

5.B.9 Health Problems Related to Work

The intensification, high speed and changes in the forms of work reflected the appearance of new types of work-related problems. Eye problems stemming from continuous working in front of computer, musculoskeletal disorders such as backache, neck hernia, and problems related with the spine, wrist and finger articulations, slimming of leg muscles and getting fat and psychological problems such as stress and insomnia are becoming prevalent with the changing work conditions. Employees are advised to give short breaks frequently as well.

Altieri et.al, (2005:156) stress that there is a strong correlation between a high level of work intensity, repetitive work and the above mentioned health problems at work. Besides, working life would result in less risk of encountering 'traditional' physical hazards, such as exposure to dangerous chemicals, and work tasks demanding great physical effort. According to researchers, those health problems related to work has increased excessively for ten years. A survey conducted in all EU member countries by European Foundation (2001) showed that, 33% of employees suffer from backache, 28% have stress, 23% have muscular pains in the neck and shoulders and 23% suffer from overall fatigue. Furthermore, wrist aches are prevalent due to extensive use of clavier and mouse (Bradley, 2002: 105).

Even though, these problems occur due to long hours of stressful work, it is indispensable for METU-Technopolis companies to work for long hours including all night and weekends when the project deadline is closer. Although these periods are seen as temporary, indeed intensive work rhythm has become normalized and regular. An employee marks that: "If you are in software sector, you have to stand it. This is the part of it."

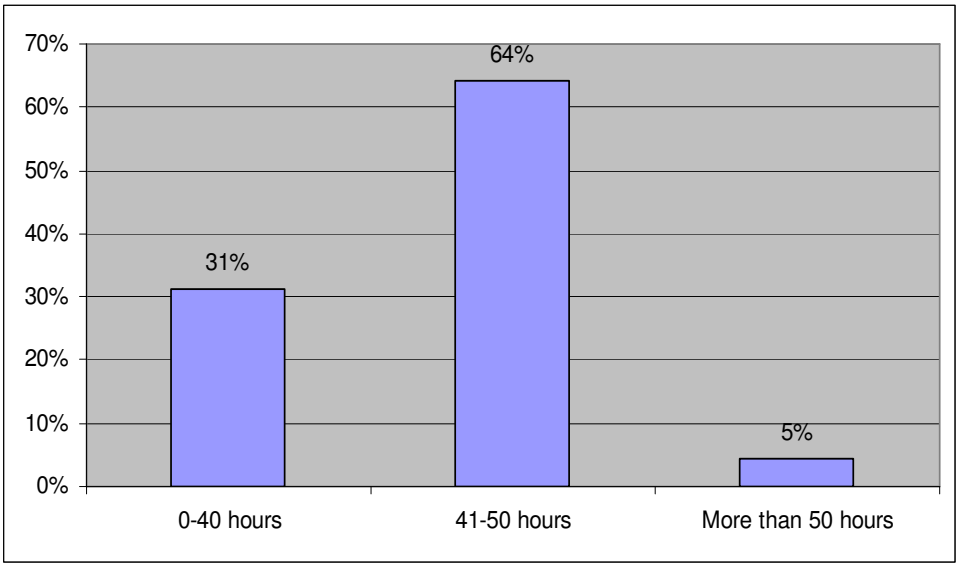

Figure 45 Weekly working hours in front of computer

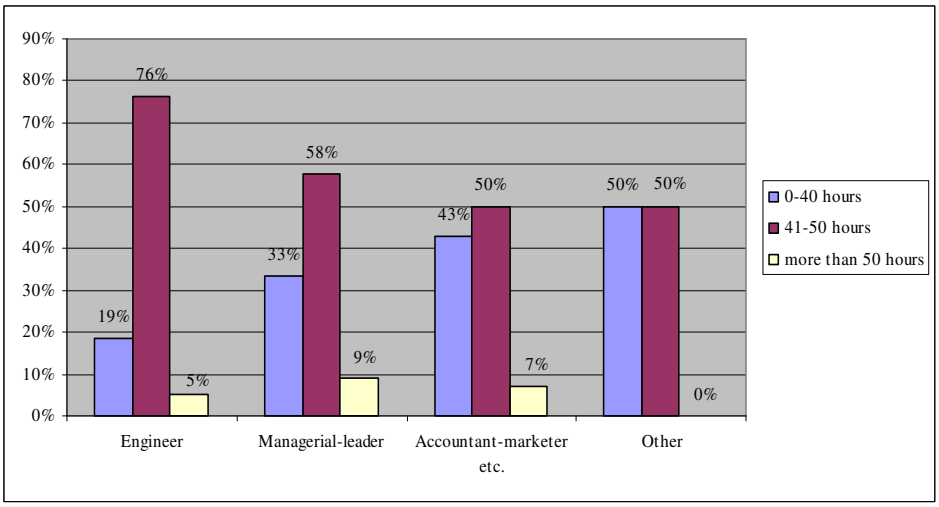

Figure 46 Relation between position and weekly working hours in front of computer

According to our survey, 69% of the respondents are working more than 40 hours in a week in front of computer and, expectedly, engineers have higher numbers (81%). Besides working in front of computer, employees use it as well as in their free time or break for education, communication and entertainment etc.

Many respondents are suffering from those above mentioned problems. Ironically, an employer denotes: “Smoking is not harmful to health in software sector. You go out to smoke; you also have fresh air and walk. I rarely leave my table since I gave up smoking.” Several employees use anti-RSI software such as ‘Workrave’ which enables the user to give breaks regularly, limit their working time and remind to make physical exercises. Moreover, employees use programs working with voice commands instead of wrist problems due to extensive use of mouse and clavier known as carpal tunnel syndrome. These software programs reveal apparently the hazard of working for software.

If serious precautions are not taken, then important problems will arise indispensably. R&D employees are appreciated with the work they have done, yet a serious threat is ignored for the supreme efficiency. Managers should remember the responsibilities and take the necessary precautions.

CHAPTER 6
CONCLUSION

This study aimed at analyzing the personal consequences of work and the work culture under the conditions of 'new economy'. This research is the product of an attempt to ascertain and examine the organizational forms and work structure of companies using high-technology and the relation between the professionals and their work under rapid changes taking place in the technology they use.

Throughout the research, the cultural consequences of work and the changing understanding of work and production were investigated specifically via highly skilled professionals. Hence, the changing production forms and their reflections on cultural arena was considered.

Political theoretician Antonio Gramsci once argued that (1971:302), "the new methods of work are inseparable from a specific mode of living and of thinking and feeling." Being aware of the effects of Fordism, not only with respect to working hours, income or division of work, Gramsci associated the family life and social relations with Fordism in a broader sense. Later, Kumar was going to affirm Gramsci arguing that 'the planned thing was not only the production, but also the man'. Both thinkers asserted that Fordist production model and its relations are not limited with the factory gates, and they argued that Fordism was a determining factor in people's life narratives. As Gramsci (1971:304) stated: "The attempts made by Ford, with the aid of a body of inspectors, to intervene in the private lives of his employees and to control how they spent their wages and how they lived is an indication of these tendencies." Those inspectors mentioned in the quotation were hired by the 'Department of Social Relations' of the company. Henry Ford, indeed, worked and observed his employees not so different than the inspectors. He wrote in his biographical book, *My Life and Work* "…if a man feels that his day's work is not only supplying his basic need, but is also giving him a margin of comfort and

enabling him to give his boys and girls their opportunity and his wife some pleasure in life, then his job looks good to him and he is free to give it of his best. This is a good thing for him and a good thing for the business. The man who does not get a certain satisfaction out of his day's work is losing the best part of his pay. For the day's work is a great thing-a very great thing! It is at the very foundation of the world; it is the basis of our self-respect."

It is obvious that Fordism was an important ideology that shaped people's lives. In the end, a stereotypical model came out of the Fordist production system. A non-qualified, full-time standard worker model having stable income appeared with Fordist production methods. Nineteen thirty-six production, 'Modern Times' by Charlie Chaplin was a visual criticism of that model, expressing humorously the standardized work of Fordist production.

On the other hand, the stability and predictability of the factory order led workers to plan their own future and remaining faithful to their working place by sacrificing individuality and freedom against mechanization and the increase of production. For the first time in their lives, workers had the future plans of owning a house or their children's education. As Sennett argues, "the iron cage is a prison; it can thus also become a psychological home (2006: 32).

Weber's work ethic was about man who proves himself with his work. Before, work was valued as a religious path to salvation. As Mills argues, "the psychology of the religious man and of the economic man coincided, as Max Weber has shown, the sober bourgeois entrepreneur lived in and through his work" (1956: 216) That means the hope of pleasure in the work, the tie between the product and the producer, being the master of the activity and of himself, seeing work as a means of developing skill, as well as a means of developing himself as a man (1956:223).

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In the 1970's, the crisis of Fordism due to the sudden changes in demand both in local and global markets gave way to severe discussions on Fordism. Based on scale economies and large amounts of stock, Fordist economy could not respond to the

unexpected churns by adapting flexibility to the crisis. Reaching the top point of mass production, sudden changes in demands, decrease in the dependence to a specific place, and problems of renovating technologies all led to a replacement of an economic regime based on standardization, mass production and scale economies.

In the last thirty years, the global attack of bureaucracy, global finance and technology and labor market which can also be argued as the reorganization of economy, could bring many utilities, yet a more qualified institutional life can not be counted with these. New economy preferred flexibility to give more autonomy and break the fences of iron cage. However, long-term, predictability and the understanding of workplace as home is sacrificed, along with the new path.

In the modern work-world, work in all its dimensions has become more volatile and more unpredictable. Flexibility in that sense appears as a guaranteeing factor to adjust to the changing technologies and labor market conditions. In the conditions of 'new economy', jobs are replaced with short-term projects; working skills change rapidly and the white collar middle class faces finally the anxiety and uncertainty which was characteristic of blue collar workers. The job itself became less important for social relations and is now no more defined as a reference point for permanent purposes. The new context introduces a model whereby using high technology, drifting from one job to another, no loyalty to the job, ability to make only short-term plans, having to update skills every time, and working intensely for long hours takes precedence.

The above-mentioned significance of globalization, network and innovation reveals the ambiguous and dynamic character of information-based economy. High competition and rapidly changing market conditions throws the economy out of its balance. Therefore, the ambiguity in the work world is more than an interesting new economic phenomenon; it corrodes the man, social relations and the feeling of security.

In that sense, analyzing technopoles and their cultural consequences is vitally important for Turkey to formulate future technology policies which prefer to produce

technology instead of purchasing it. This research, therefore, strived to examine the use of high technology and academy-industry linkage from a sociological perspective. In this respect, the outcome of this research may help to policy-makers and managers for their future policies. Moreover, the METU-Technopolis field research provided an overview of the internal worlds of well-educated, highly-skilled young information technologies' employees. It also showed the other face of the so-called 'innovation atmosphere' which is uncanny, perilous and insecure; leading to corrosion and continuous constitution of character.

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At the present time while work promises more welfare, it means a pitiless competition for unending needs. The situation of the people is disregarded in this innovation atmosphere, and flexibility is acclaimed with technology drunkenness. It will be proper to remind Ahmet İnsel's (2000:40-41) words in his criticism of the ideology of economics: "Is it freedom to work in a job that is totally alien to its purposes? How can the modern societies be defined as societies of freedom where the enchantment of work is lost, forcing people to work for material motives? Does this kind of freedom aim at the happiness of people or covet the maintenance of a dominance based on economy?"

In short, this study aimed at having a critical view of the consequences of high-technological work in the case of a technopole which is developing rapidly and becoming a center of production. When the 'new economy' is taken into consideration with all the risks and ambiguities it brings, does 'new economy' confirm the evil that it targets to demolish? Even if we accept that the routine benumbs our character, how will the flexible conditions of 'new economy' allow us to intervene in life? That is the question.

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APPENDICES

Appendix 1
LAW OF THE TECHNOLOGY DEVELOPMENT REGIONS
Law No. 4691 / Date of Acceptance: 26.6.2001

Aim

Article 1 – The aim of this Law, through the cooperation of universities, research institutions and the production sector, is to create technological information in order to give the industry of the nation a structure fit for international competition and exportation, to introduce innovations in products and production methods, to raise the quality or standard of products, to increase productivity, to decrease the costs of production, to commercialise technological knowledge, to support production and entrepreneurship, to enable small and medium-sized enterprises to adapt to new and advanced technologies, to create opportunities of investment in technology intensive areas by taking into account the decisions of Science and Technology Higher Council, to create job opportunities for researchers and qualified persons, to help the transfer of technology and to provide the technological infrastructure which will quicken the entry of the foreign capital which, in turn, will provide high/advanced technology.

Content

Article 2 – This Law covers the foundation of the Technology Development Regions, and their manner of operation, administration and control. The Law also covers the task, competence and responsibilities of the persons and institutions involved.

Definitions

Article 3 – **The definitions of the terms mentioned in this Law are given hereunder:**

a) Ministry: Ministry of Industry and Commerce,

b) Technology Development Region (Region): **A site which has an academic, economic and social structure or a technopark which has these characteristics, where companies using high/advanced technology or companies that aim at new technologies produce/develop technology or software by benefiting from the opportunities of a particular university or higher technology institute or R&D centre or institute, where the companies work to change a technological invention into a commercial product, method or service, thus contributing to the development of the region, which is in the premises or close to the same university, higher technological institute or the R&D centre or institute,**

c) Research and Development (R&D): **The regular work done to obtain the new information that will enable the development of science and technology or to create new equipment, products and tools with the available information, to create new systems, processes and services including software production or to improve the available ones,**

d) R&D Centre or Institutes: Publicly owned sites which contain machinery, equipment and software based on qualified human workforce and current modern technologies, where AR-GE activities that aim at the development of technology and products are carried out,

e) Production Units: The production units that are formed or used by the real or juridical persons in the Region who work in accordance with the aim of this Law; the production units that are based on new and high technologies and that do not harm the environment,

f) Entrepreneur: The real or juridical persons who want to benefit or who are benefiting from the service and opportunities of the Region,

g) Innovation: To convert an idea into a new or developed method that is used in the production of a new or improved product or good and service,

h) Product Innovation: A product, which, when compared with the earlier range of products, shows technological differences in material, parts and function,

i) Innovation in Production Methods: The method which is used in the production of new or improved products or in the production with new techniques of the products which are currently being produced and which cannot be produced in traditional facilities,

j) University: The universities which have been approved by the Council of Higher Education as having completed their formation in the branches of engineering and basic sciences in both human force and technical equipment, and as having a sufficient number of research staff at the level of doctorate students,

k) Founding Committee: The Committee which is formed of the representatives of at least one university or higher technological institute or public AR-GE centre or institute and the representatives of other institutions that are in the Region or in the province where the Region is situated,

l) Managing Company: The company which is founded in accordance with this Law and as a joint stock company and which is responsible for the administration and management of the Region,

m) Software: All of the documents and services which contain the series of commands or the programmes and their code lists, and their operating instructions that enable a computer, communication device or any other device that is based on

information technologies to operate and to do the required operations according to the data that is given to it,

Foundation

Article 4 – Applications related to the Region are done by the Founding Committee. To assess the applications of Regions an Assessment Council led by the Director General of the Ministry has been founded with the participation of one representative each from the Ministry of Public Works and Resettlement, State Planning Organization, Council of Higher Education, Scientific and Technical Research Council of Turkey, the Union of Chambers and Stock Exchanges of Turkey and a private institution that operates in the field of technology and that will be selected by the Ministry.

The Regions are determined by the decree of the Council of Ministers upon the approval of the Assessment Council and the proposal of the Ministry, and are published in the Official Gazette.

During the planning process in the Regions, the development plans and their modifications, and the plans of land apportionment and their modifications are prepared by the managing company of each Region in accordance with the regulations and become effective upon the approval of the Ministry. The final plans of development are sent for information to the institutions concerned. The use of land, the organisation of buildings and institutions, and the licence and authorisations related with the construction and use of buildings and institutions are given and controlled by the managing company. Expenditures related to the procurement of land, planning and organisation, and the construction of infrastructure and superstructure belong to the managing company.

The lands needed in the Regions can be provided according to the provisions of the Law of Expropriation No. 2942.

The university lands situated in the territories of the Region, upon the approval and permission of these universities, can be given to the managing company that will found the Region on condition that its ownership stays with the university concerned. This same is also valid for the lands that belong to public institutions.

For the foundation of the Region the condition that is sought for is the presence, in the decided area or within the boundaries of the province where the Region is situated, of a university or a higher technological institute or R&D centre or institute and a sufficient R&D and technological potential in the area. The criteria about the sufficiency of R&D and its technological potential are determined with the regulations.

The lands determined as regions should on no account be used for other aims.

Managing company
Article 5 – Among the founders of managing company that is responsible for the management and running/undertaking of the region, there exists at least a University or a Higher Technology Institution or public R&D center or institution which are located within the region or city. These institutions and foundations can also join the managing company with their companies and/or foundations.

Turkish Chamber and Stock Markets that are connected with Union of Chambers and Stock Exchanges of Turkey, banks and finance institutions, local and foreign legal entities, R&D and foundations and associations related to development of technology, state institutions, union of exports can join the managing company as founders or later as shareholders.

Foreign private legal entities can join the manager company under the framework of legislative acts within Act No.6224- The Law of Encouragement of Foreign Capital.

In the foundation stage of the region the manager company is responsible for the following: planning and application of the project, carrying out all the infra-structure and construction services necessary for the region, management of the region by abiding by the regulations of this law, the prevention of entrepreneurs' and third persons' acts against this law and taking necessary precautions related to this.

Managing company is a private Legal entity which makes expropriation in the name of public interest. The decision of public interest is given by the application of managing company. The ministry cautions the managing company which does not abide by the objective indicated in this Act and gives a certain period of time and requires the region to function in accordance with the objectives indicated in the act. At the end of this period when it is understood that the manager company is not successful in the achievement of the objective. The Ministry sues for the court in charge and requests the stoppage or annulment of the functioning of the managing company. In case of annulment of managing company, the Ministry on the condition that the rights and responsibilities of the company and managers are kept confidential expropriates the land within the possession of managing company and the real estate and may give the management of the region to another managing company.

Control
Article 6 - The activities and practices of managing company and entrepreneurs within the region are controlled by the Ministry.

Personnel
Article 7 - In the managing company and the activities in the region personnel is assigned according to the work regulations in force. In these regions foreign and qualified R&D personnel can be assigned in conformity with the related acts of the regulations.

In the activities of the region in case there is a need for research personnel than in that situation personnel from state institutions and Universities can be asked to work part-time or full-time by the permission of their institutions. The income that the instructors, research assistants will take from these services will be kept outside the scope of revolving fund of University. The personnel that will be employed full-time will be given an un-paid leave by their institutions. The personel that will be employed full time will be given an un-paid leave and their permanent contract will continue. The retirement rights of the people who are subject to the law of Turkish Republic Retirement fund No. 5434 are preserved on the condition that provisions of article 31 are abided by. The provisions that conflict with the arrangements in law of Higher Education. No. 2547 Article 36 are not applied.

The Academic Staff who are working on a temporary contract basis – abroad and in the country-of act number 39 make their studies in the institutions of that region with the permission of Council of Higher Education. The income of the academic staff who are permitted to work in that region with a monthly payment is kept outside the scope of revolving fund of the University. Apart from this, Academic Staff can found a company with the permission of Council of Higher Education to make the findings of their research commercial, can be the shareholder of an established company and/or may take jobs in the management of these companies.

Support and exemptions

Article 8 - The provision of land which is necessary for the establishment of the regions, infra-structure and construction of Management building and the amounts of expenses that are not covered by managing companies can be covered by the subsidy of the ministry in a limited way.

The managing company is exempt from all kinds of tax, picture and expenses in the transactions related to the enforcement of this law. From the regions that run Waste Water Distillation Plant the municipals do not take cost for waste water. The income that the tax payers of the region have obtained from the production activities based on software and R&D is exempt from all kinds of income and institution tax for five years after their functioning. The Council of Ministry can extend time up to ten years for certain technological areas that are chosen and targeted at.

The payment of R&D personnel, researchers, software engineers is exempt from all kinds of tax for ten years starting from the foundation date of the region.

The sum of donations and aid given to people and institutions by the taxpayers of Income and Institutions as sponsorship in return for a receipt is subject to reduction by abiding by the principles and proportion as indicated in Article 89, 2. sub-paragraph of Law of Income and Tax. No 1193 and Article 14, 6. sub-paragraph of Law of Institutions No. 5422.

Regulations

Article 9 - The studies of Council of Evaluation, the location of regions, the preparation criteria of feasibility reports, foundation, running, using of land, the principles related to activities and conditions related to this, how to spend the money

allocated to the budget of Ministry and enactment of this law and other issues are arranged by the regulations to be prepared in six months.

Excluded Provisions
Article 10 - In the activities of the region within the scope of this law provisions of Public Account Act. No.1050, Court of Account No. 832 and State Tenders Act. No. 2886 are not applied.

Temporary Provisions
Temporary Article 1 - The foundation of technoparks that have been approved by the Ministry before the date that this law came into force are accepted as Region on the condition that such technoparks abide by the provisions of this law and benefit from all exemptions and benefits provided by this law.

Taking effect
Article 11 - This law comes into force on the date it is published.

Enforcement
Article 12 - Council of Ministers is responsible for the execution of the provisions of this law.

Appendix 2

R&D Incentives

Definition of R&D Projects:
R&D projects are the activities which aim at producing a new product, improving the quality or standards of the product, applying new methods for increasing the standards and decreasing the costs, developing new production technologies, adopting a new technology to domestic conditions and also the transformation of the results of these activities to useful tools, materials, products, management, system and production techniques and improving the quality of existing technology. In addition, the aim, scope, period of time, budget, special conditions, the quantity of incentives given by the institutions or real/legal persons and the rules of the sharing of the rights of the invention that can be provided, are determined in advance.

Aim:

- meeting a definite proportion of R&D projects of industrial companies that can be evaluated
- providing financial support for the research of new systems, production techniques to create a new product or to improve the competitive power of existing products.

Users:
All industrial companies and the firms that produce software, can get that support. In order to support the R&D activities, the expenditures should be measured and invoiced.

The Support in R&D Projects:

- personnel expenditures
- expenditures on tools and software used in the R&D activity
- expenditures on consultancy for R&D activity and other services which have equal value
- The R&D services taken from domestic R&D institutions
- The expenditures on official registrations of patents, useful models and industrial design certificates
- The expenditures on materials for R&D activities

The Amount of the Support:
The basic proportion: 50%
The max. proportion: 60%

The Period of Support:
The support is provided for R&D activities at the project level for 3 years. There are 2 ways to receive capital support for projects:

- two years with the capital support for the projects concerning developing products (max. $1 million)

- two years with the capital support for the projects on strategic subjects (max. $100.000)

Implementing Institutions:

- The support of R&D activities at the project level: The Turkish Scientific and Technical Research Council (TÜBİTAK) and Technology Monitoring and Evaluation Board (TİDEB)
- For capital support: The Turkish Technology Development Foundation (TTGV)

The ways that these institutions can be used are given below:

a) TÜBİTAK- TİDEB:

The support from TÜBİTAK for R&D activities such as developing a notion, experimental production or services...etc, also include expenditures on personnel, tools and materials, software, consultancy, application for patents...etc. In that respect, the activities that are considered R&D are:

- developing a notion
- the study of economic and technological feasibility
- the lab. activities during the period from the development of the notion to the design
- the work on design
- the production of the prototype
- the establishment of pilot centers
- the experimental production
- the work on patent and licence
- the services used to solve the problems after the sale

The firms that want to get the support should fill in the "Proje Öneri Formu" and give it to TİDEB. A booklet for more information can also be obtained by fax or information can be found on the web site.

b) THE TURKISH TECHNOLOGY DEVELOPMENT FOUNDATION:

TTGV is an another institution providing support for R&D activities. Its support includes the expenditures for a project in terms of personnel, equipment, travel and services. The maximum support is 50% of the budget of the project. The repayment (in USD) has to be made at regular intervals within 4 years but without interest. The amount is about $1-2 million. (depending on its source).

The industrial companies which have the ability to get INDUSTRIAL REGISTRATION CERTIFICATE and all software companies can make applications for "the support for the project of Technology Development".

For more information about the period of evaluation, requirements and methods of application:

Appendix 3

LABORATORIES

Department of Aeronautical Engineering

- Aerodynamics Laboratory
- Propulsion Laboratory
- Control and Avionics Laboratory
- Structures Laboratory

Department of Chemical Engineering

- Basic Measurements Laboratory
- Unit Operations Laboratory
- Process Control Laboratory
- Computer Laboratory
- Central Instrumental Analysis Laboratory
- Polymer Laboratory
- Biotechnology Laboratory
- Nuclear Application Laboratory
- Chemical reaction Engineering Laboratory

Department of Civil Engineering

- Coastal and Harbour Engineering Laboratory
- Structural Mechanics Laboratory
- Geodesy and Engineering Seismology Laboratory
- Soil Mechanics Laboratory
- Hydraulics Laboratory
- Materials of Construction Laboratory
- Construction Engineering Laboratory
- Transportation Laboratory
- Water Resources Laboratory

Department of Computer Engineering

- Hardware and Electronics Laboratory
- The Microcomputer Laboratory
- Department Local Area Network
- CENG 200-210-220 Laboratory
- Image-Procesing and Pattern Recognition Laboratory
- Parallel Computing Laboratory
- Symbolic Computation Laboratory
- Laboratory for Computational Studies of Language

Department of Electrical and Electronic Engineering

- Basic Electrical Engineering Laboratory
- Basic Electronics Laboratory
- Electrical Machinery and Drives Laboratory
- Logic Design Laboratory
- Microcomputer Laboratory
- Student Computer Service Room
- Fluidized Bed Laboratory
- Process Control Laboratory
- Electronic and Telecommunication Laboratory
- Antenna and Propagation Laboratory
- Microwave Laboratory
- Power System Laboratory
- Robotics Laboratory
- High Voltage Laboratory
- Static Power Conversion Laboratory
- Biomedical Engineering Laboratory
- Physiological Measurement Laboratory
- Biomedical Education Laboratory
- Medical Ultrasonics Laboratory
- Medical Imaging Laboratory
- Machine Shop

Department of Environmental Engineering

- Unit Operations Laboratory
- Chemistry Laboratory
- Microbiology Laboratory
- Air Pollution Control Laboratory
- Instrumental Analysis Laboratory
- Machine Shop
- Water and Sewage Treatment Plants

Department of Food Engineering

- Food Chemistry and Biochemistry Laboratory
- Food Microbiology Laboratory
- Food Engineering Laboratory
- Biotechnology Laboratory
- Quality Control Laboratory

Department of Geological Engineering

- Seismological Observatory
- Engineering Geology Laboratory
- Petrography Laboratory
- Clay Mineralogy Laboratory

- Mineralogy Laboratory
- Paleontology Laboratory
- Sedimentology Laboratory
- Chemistry Laboratory
- Emission Spectroscopy Laboratory
- X-Ray Laboratory
- Ore Microscopy Laboratory
- Photogeology Laboratory
- Computational Laboratory
- Petroleum Geology Laboratory
- Remote Sensing and GIS Laboratory
- Marine Micropaleontology Unit
- Tectonic Research Unit

Department of Mechanical Engineering

- Undergraduate Heat Transfer Laboratory
- Heat Transfer Research Laboratory
- Thermal Environmental Engineering Laboratory
- Thermal Conductivity Laboratory
- Thermal Power Laboratory
- Electrical Analogy Laboratory
- Optical Laboratory for Heat and Mass Transfer Research
- Thermodynamics Laboratory
- Fluid Mechanics and Fluid Machinery Laboratory
- Nuclear Engineering and Radioisotope Applications Laboratory
- Undergraduate Laboratory for Measurement Techniques
- Dimensional Metrology Laboratory
- Machine Shop
- Specimen Preparation Shop
- Machine Tool and Production Laboratory
- Stress Analysis Laboratory
- Photoelasticity Laboratory
- Materials Testing Laboratory
- Plasticity and Metal Forming Laboratory
- Fatique Laboratory
- Electrical Discharge Machining (EDM) Laboratory
- Dynamic Systems Laboratory
- Internal Combustion Engines and Gas Turbines Laboratory
- Automotive Laboratory
- Computer Integrated Manufacturing (CIM) Laboratory
- Mechatronic Design Laboratory
- Machine Design Laboratory
- Biomechanics-Gait Analysis Laboratory
- Photography Work Shop
- Machine Tool Automation Laboratory

Department of Metallurgical and Materials Engineering

- X-Ray Diffraction Laboratory
- Scanning Electron Microscopy
- Transmisson Electron Microscopy
- Instrumental Wet Chemical Analysis
- Foundry
- Ceramic Engineering Laboratory
- Thermal Analysis Laboratory
- Metallography and Image Analysis
- Mechanical Test Laboratory
- Heat Treatment Laboratory
- Welding Technology Laboratory
- Non-Destructive Laboratory
- Extractive Metallurgy Laboratory
- Machine Shop
- Composite Materials Laboratory
- Compuetr Simulation Laboratory
- Corrosion and Energy Storage Devices Laboratory
- Novel Alloys Laboratory
- Polymer and Composite Materials Laboratory
- Powder Metallurgy Laboratory
- Shape Memory Alloys Laboratory
- Surface Sciences Research Laboratory
- Thermodynamic Studies Laboratory

Department of Mining Engineering

- Rock Mechanics Laboratory
- Mine Ventilation Laboratory
- Mine Surveying Laboratory
- Mine Mechanization Laboratory
- Mineral Processing Laboratory
- Bacterial Leaching Laboratory

Department of Petroleum and Natural Gas Engineering

- Core Analysis and Sample Preparation
- Petroleum,Natural Gas and Product Analysis Laboratory
- Formation Water Analysis Laboratory
- Drilling Fluid Testing Laboratory
- Cement Testing Laboratory
- Enhanced Oil Recovery Laboratory
- Geothermal Energy Research Laboratory
- Thermal Analysis Laboratory
- Computerized Tomgraphy Laboratory

Department of Engineering Sciences

- Experimental Mechanics Laboratory

Department of Industrial Engineering

- Human Factors Laboratory
- Production Modelling Laboratory
- Work Analysis Laboratory

Department of Chemistry

- General Chemistry Laboratory
- Analytical Chemistry Laboratory
- Physical Chemistry Laboratory
- Organic Chemistry Laboratory
- Inorganic Chemistry Laboratory
- Radioisotope Laboratory
- Polymer Research Laboratory
- Organic and Inorganic Industrial Laboratory
- Solid-State Chemistry Laboratory
- Instrumental Analysis Laboratory
- Surface and Colloid Chemistry Laboratory
- Micro Analysis Laboratory

Department of Physics

- Solid State Physics Laboratory
- Laser and Atomic Beam Laboratory
- Archaeometry Laboratory
- Renewable Energy Sources Laboratory
- High Energy Physics Laboratory
- Plasma Physics Laboratory
- Astrophysics Laboratory
- Computer Simulation Laboratory

Department of Biology

- Biochemistry Laboratory
- Biomaterials Laboratory
- Ecological Genetics Laboratory
- Microbiology Laboratory
- Molecular Biology Laboratory
- Molecular Genetics Laboratory
- Neurophysiology Laboratory
- Plant Sciences Laboratory
- Molecular Biophysics Laboratory

Appendix 4

Survey Questionnaire

Anket No:.....

Bu anket çalışması "Yeni Ekonomi Koşullarında Çalışmanın Kişisel Sonuçları: ODTÜ-Teknokent Örneği" başlıklı yüksek lisans tezinin saha araştırması bölümünü teşkil etmektedir.

Ankete verdiğiniz yanıtlar kesinlikle bireysel bazda ele alınmayacak, istatistiksel tekniklerden yararlanılarak toplu olarak değerlendirilecektir, bu yüzden ankete ad, soyad yazmanız gerekmemektedir.

ODTÜ-Teknokent çalışanlarının bir profilini çıkarma amacını taşıyan bu yüksek lisans tezinin 2006 yılı sonu itibariyle bitirilmiş olması planlanmaktadır. Çalışmanın sonuçlarından haberdar olmak isterseniz, anket formuna iletişim bilgilerinizi eklemeniz ya da cemetink@yahoo.com adresine bir e-posta göndermeniz yeterli olacaktır.

Size iletilen anket formuna yanıt vererek bu araştırmaya katkıda bulunduğunuz için teşekkür ederim.

Saygılarımla

BÖLÜM 1 DEMOGRAFİK BİLGİLER

1.1 Yaşınız .....

1.2 Cinsiyetiniz
a. Kadın **b.** Erkek

1.3 Doğum Yeriniz: .....Köyü **.....**İlçesi **.....**İli

1.4 Medeni durumunuz

a. Evli

b. Bekar (Lütfen Soru 1.6'ya geçiniz)

1.5 Eş ve Çocuklarınız

Yakınlığı	**Yaş**	**Cinsiyeti**	**Öğrenci ise**		**Mesleği**
			Okulu	**Sınıfı**	
Eşi					

1.6 Anne ve babanız

	Eğitim Durumu	Mesleği	İkamet ettiği yer
Baba			
Anne			

1.7 Eğitim Durumunuz

	Okulun adı/türü	Okulun bulunduğu kent	Bölüm/ branş	Bitirme Yılı
Lise				
Lisans				
Yüksek Lisans				
Doktora				

BÖLÜM 2 EKONOMİK DURUM

2.1 Gelirinizden memnun musunuz?
a. Çok memnunum
b. Memnunum
c. Memnun değilim.
d. Hiç memnun değilim.

2.2 Birikimlerinizi nasıl değerlendiriyorsunuz?
a. Banka fonu vb.
b. Hisse senedi
c. Gayrimenkul
d. Borsa
e. Diğer (belirtiniz) .....
f. Birikimim yok

2.3 Aşağıda belirtilenlerden hangilerine sahipsiniz?
a. Masaüstü Bilgisayar
b. Dizüstü bilgisayar
c. Internet bağlantısı
d. Uydu yayını
e. Ev sineması sistemi
f. Projeksiyon cihazı
g. Video kamera
h. Dijital fotoğraf makinesi
i. Plazma televizyon
j. Diğer (belirtiniz)

2.4 Arabanız var mı? Varsa arabanızın şu anki ederi ve markası nedir?

2.5 Aşağıda verilen seçeneklerde en fazla harcama yaptığınız ilk üç tanesini sırasıyla işaretleyiniz. Harcama miktarını belirtiniz.

	Önem Sırası	Harcama
Kira	( )	
Ulaşım	( )	
Sağlık	( )	
Eğitim	( )	
Giyim	( )	
Gıda	( )	
Hobi/Eğlence	( )	
Diğer	( )	
Birikim	( )	

BÖLÜM 3 MESLEĞE VE ÇALIŞMA KOŞULLARINA İLİŞKİN SORULAR

3.1 Kaç yıldır çalışıyorsunuz?

3.2 Kaç yıldır ODTÜ Teknokent'te çalışıyorsunuz?

3.3 Sizce Teknokent'de çalışıyor olmak nasıl bir avantaj sağlıyor?
a. Prestij
b. Genç ve dinamik çalışma ortamı
c. Üniversitenin sağladığı imkanlar
d. Ücret dolgunluğu
e. Bir avantaj sağlamıyor

3.4 Çalıştığınız işyerinin temel faaliyet alanı nedir?
a. Yazılım
b. Biyoteknoloji
c. Donanım, mikroelektronik
d. Otomasyon
e. Biyomedikal
f. Mekanik
g. Finans ve iş hizmetleri
h. Sistem geliştirme
i. Tasarım
j. Diğer...

3.5 İşyerinizde ücretli olarak kaç kişi çalışıyor?
a. 1-5
b. 6-10
c. 11-20
d. 21-50
e. 51-100
f. 100'den fazla

3.6 İşyerinizdeki pozisyonunuz nedir?
a. Mühendis
b. Proje yöneticisi
c. Üst düzey yönetici
d. Sekreter
e. Teknik lider
f. Pazarlama, satış
g. Muhasebe, idari işler
h. Diğer...

3.7 Bu kaçıncı işiniz?(İlk işiniz değilse Soru 3.10'a geçiniz**)**

3.8 İş sahibi olduktan sonra <u>ekonomik durumunuzda</u> nasıl bir değişiklik oldu?
a. İyiye gitti
b. Kötüye gitti
c. Aşağı yukarı aynı kaldı

3.9 İş sahibi olduktan sonra <u>sosyal hayatınızda</u> nasıl bir değişiklik oldu?
a. İyiye gitti
b. Kötüye gitti
c. Aşağı yukarı aynı kaldı
d. Sosyal hayatım kalmadı

3.10 Şu anki işinizde kaç sene daha çalışacağınızı düşünüyorsunuz?
a. 1 seneden az
b. 2 - 3 sene
c. 4 - 5 sene
d. 5 seneden fazla

3.11 Yeniden üniversite okumak ya da iş seçme sansınız olsa neyi tercih ederdiniz?
a. Aynı bölümü ve işi tercih ederim.
b. Farklı alana yönelirim. (Belirtiniz)

3.12 İşiniz ile ilgili <u>geleceğe dair</u> hangi kaygıları hissediyorsunuz?
a. Proje alamama
b. İşten çıkarılma
c. Düzenli ücret alamama
d. İş yerinin kapanması
e. Bir kaygım yok, memnunum.
e. Diğer (Belirtiniz) ....

3.13 İşinizi değiştirmeyi düşünüyor musunuz?
a. Evet **b.** Hayır (3.15'e geçiniz.)

3.14 Ne sıklıkla düşünüyorsunuz?
a. Her gün
b. Haftada bir iki kez
c. Ayda bir iki kez
d. Yılda bir iki kez
e. Hiç

3.15 Beş sene sonra ne yapıyor olacağınızı düşünüyorsunuz?
a. Aynı işyerinde çalışıyor olacağım.
b. Büyük olasılıkla farklı bir işyerinde çalışıyor olacağım.
c. Belirsiz

3.16 Şimdiki ekonomik durumunuzla en fazla ne kadar sürelik ödemelere rahatça girebilirsiniz?
a. 6 ay
b. 1 sene
c. 2 - 3 sene
d. 4 - 6 sene
e. 6 seneden fazla

3.17 Son bir sene içinde birbirinden farklı kaç projede görev aldınız?
a. 1
b. 2-3
c. 4-5
d. 6-10
e. 10'dan fazla

3.18 Son bir sene içinde <u>aynı anda</u> ortalama kaç farklı projede görev aldınız?
a. 1
b. 2-3
c. 4-5
d. 6'dan fazla

3.19 Sizden işinizle ilgili bir çok farklı konuda bilgi sahibi olmanız bekleniyor mu?
a. Evet **b.** Hayır

3.20 İşinizin karmaşık ve zor geldiği oluyor mu?
a. Genellikle **b.** Bazen **c.** Nadiren

3.21 Size göre iş tatmini açısından en önemli üç unsur nedir? (Lütfen en önemli gördüğünüz üç seçeneği sırasıyla numaralayınız)

	Önem Sırası
Statü, kariyer	( )
Ücret	( )
İşyerinin statüsü	( )
İnisiyatif kullanabilme	( )
Mesleğinde sevdiği işi yapmak	( )
Mesleğini uygulayabilme olanağı	( )
İşyerinin fiziki koşulları, ortamı	( )
İşyerindeki insan ilişkileri	( )
İşin topluma sağladığı yarar	( )
Mesleki açıdan gelişme olanağı	( )
Diğer-Belirtiniz .....……	( )

3.22 İşinizi bir yakınınıza tavsiye eder miydiniz?
a. Evet
b. Hayır
c. Belki

3.23 Haftada ortalama kaç saat çalışıyorsunuz?

3.24 Bu sürenin haftada ortalama kaç saatinde <u>bilgisayar başında</u> çalışıyorsunuz?

3.25 Lütfen çalıştığınız işyerindeki durumu göz önünde bulundurarak aşağıda verilen ifadelere ilişkin görüşlerinizi belirtiniz.

İşin durumuna göre…	**Kesinlikle**	**Bazen**	**Asla**
Çalışma saatleri artabilir			
Çalışma saatleri azalabilir.			
Haftasonları da çalışılabilir.			

3.26 İşyerinizde çalışma saatleri ölçülür mü?
a. Evet **b.** Hayır (Soru 3.28'e geçiniz)

3.27 Çalışma saatleri nasıl ölçülüyor?
a. Akıllı (Proximity) Kart ile
b. İmza ile
c. Kamera ile
d. Diğer

3.28 İşlerinizin yoğun olduğu dönemlerde ne sıklıkla fazla mesaiye kalıyorsunuz?
a. Haftada bir
b. Haftada birden fazla
c. Haftanın her günü

3.29 Fazla mesai için ek ücret alıyor musunuz?
a. Evet **b.** Hayır

3.30 Bir sendika ya da odaya üye misiniz?
a. Evet **b.** Hayır

3.31 Daha önce şirket içi eğitimlere katıldınız mı?
a. Evet (Belirtiniz) **b.** Hayır

Şimdi size günlük hayatta karşılaşabileceğiniz bazı durumlar okuyacağım. Lütfen her bir durum karşısındaki muhtemel davranış ve tutumunuzun ne olduğunu belirtiniz.

3.32 BİRİNCİ DURUM*:*

Diyelim ki, patronunuz ani bir kararla, çalışan sayısında azaltmaya gidiyor ve işten çıkarılacaklar arasında siz de varsınız. İşten çıkarılmanıza nasıl tepki verirsiniz.

a. İşlerin kötüye gitmesinden kendimi sorumlu tutarım.
b.Haksızlığa uğradığımı düşünürüm.
c. Doğal karşılarım.

3.33 İKİNCİ DURUM
Diyelim ki, patronunuz şirket için yüksek kar getirebilecek yeni bir yatırım yapmak istiyor, fakat sirketin şu anki durumunda bu yatırımı finanse etmek için risk almak gerekiyor. Patronunuz bu konuyu sizinle paylaştığında ona ne yapmasını söylersiniz?

a. Şirket yüksek kar getirebilecek bu işe girişmelidir. Risk alınmadan başarı elde edilemez.
b. Şirketin şu anki durumunda yeni bir risk işlerin daha kötüye gitmesine yol açabilir.Risk almamak gerekir.

3.34 ÜÇÜNCÜ DURUM
Diyelim ki, patronunuz şirketi büyütme kararı alıyor. Ancak çalışanların gerek zamanlarından gerekse de maaşlarından henüz ne kadar süreceği belli olmayan bir döneme kadar fedakarlık yapmasını talep ediyor.
Bu durum karşısında davranışınız nasıl olur?

a. Şirketin bir çalışanı olarak fedakarlıkta bulunurum. (3.33.b'ye geçiniz)
b. Kendime başka bir iş bulmaya çalışırım.

3.34.b Fedakarlıkta bulunacağınız süre en fazla ne kadardır?

BÖLÜM 4 KİŞİLİK VE DAVRANIŞLAR ÜZERİNE SORULAR

Aşağıda verilen tabloyu anket uygulanan kişinin kendisinin doldurması istenecektir. Anketi uygulayan ise bu sırada hazır bulunacaktır.

4.1 Günlük yaşantınızda aşağıda verilen durumlarla ne kadar sık karşılaşıyorsunuz?

	Çok sık	Genellikle	Bazen	Nadiren	Asla
Dikkatin kolay dağılması					
Aynı yerde uzun süre oturmaktan sıkılma					
İşleri yarım bırakma					
Okurken atlamalar yapma, sıra ile okuyamama					
Eşya kaybetme					
Düşünmek için hareket etme, yürüme veya dolaşma isteği					
Başkalarının sözünü kesme					
Bir yerde oturmak zorunda kalındığında el ve ayak sallama					
Yapılacak bazı işleri sürekli erteleme					
Geleceğe dair kaygılanma					
Stres					
Sabırsızlık					
Uykusuzluk					
Sebepsiz huzursuzluk					
Unutkanlık					
Çabuk sinirlenme					
Ruh halinde ani iniş çıkışlar					
Sürekli meşgul hissetme, koşuşturma hali					
Çabuk ve kolay sıkılma					
Başarısızlık hissi					
Sürekli yorgunluk hissi					

Appendix 5

Brief Notes about Respondents

1. 28 years old, electric and electronic engineer, working as a software engineer for four years at METU-Technopolis, his first job, married.
2. 28 years old, electric and electronic engineer, working as a software engineer, continuing his doctorate, his first job, single.
3. 27 years old, computer engineer, software engineer, his second job at METU-Technopolis, single.
4. 28 years old, student at department of electric and electronical engineering, software engineer, working for 4,5 years (3 at METU-Technopolis), single
5. 35 years old, web-designer and manager, working for 7 years (3 at METU-Technopolis), single
6. 33 years old, web-designer, working for 8 years, married
7. 35 years old, lawyer and manager, working for 8 years, single
8. 27 years old, biologist, working for three years at METU-Technopolis, single
9. 23 years old, industrial engineer, working for 8 months, continuing his master's degree on Science and Technology Policy Studies, his first job, single
10. 23 years old, industrial engineer, working for 8 months, his first job, single
11. 27 years old, electric and electronic engineer, working as software engineer for 4 years, his second job, single
12. 24 years old, electric and electronic engineer, working as software engineer, working for 9 months, his first job, single.
13. 24 years old, electric and electronic engineer, working as software engineer, working for 4,5 months, his first job, single
14. 22 years old, English lecturer, working in project group for 2 months, her first job, single
15. 26 years old, electric and electronic engineer, working for two years (8 months at METU-Technopolis), single
16. 26 years old, working part-time, continuing his master's degree at department of mechanical engineering, single.
17. 27 years old, civil engineer, working for 4 years at METU-Technopolis, single
18. 25 years old, mechanical engineer, working for 1 year, single
19. 35 years old, electric and electronic engineer, owner and manager of a company, married
20. 42 years old, electric and electronic engineer, working as a software engineer, working for 18 years old (3 at METU-Technopolis), married
21. 37 years old, food and software engineer, worked 9 years in Germany, working for 1 month at METU-Technopolis, married.
22. Mustafa İhsan Kızıltaş, Business Development Coordinator at Teknopark Co.
23. Prof. Dr. Canan Çilingir, Vice President of METU and the Chairwoman of Teknopark Co.