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THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES BY WOMEN AND THEIR POLICY IMPLICATIONS: WHAT ARE THE CHALLENGES FOR GREECE?

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Abstract. The use of modern technology has assisted in the development and adaptation of new habits by individuals in their daily activities. Concepts like tele-working, tele-education, tele-shopping, etc. may lead to a reduction of mobility needs allowing people to organize and reprogram their activities the best way possible. The aim of this paper is to examine the level of usage of Information and Communication Technologies (ICTs) by women and identify their effect on the programming of their daily activities (such as education, leisure, transactions, entertainment) along with their career development. Emphasis is given on the comparison between women that live in rural and less favoured areas in order to examine the differences in perceptions and attitudes towards new technologies.

A personalized questionnaire was designed to capture women's decision making behaviour. The data collection methodology involves the collection of 200 questionnaires collected from a number of different and diversified Greek provinces via personal interviews and internet surveys. Analysis of the data collected shows that women use modern technologies in their daily activities in a relatively low rate, when compared with other EU countries and USA. In both rural and less favored areas they prefer to use the traditional means of transport for their usual activities (work, children care, shopping, etc.). In suburban areas and islands this phenomenon is more evident due to the small familiarity with the use of computers. A significant result was the positive correlation between the level of salary, education and the use of modern technologies for activities such as e-banking and e-shopping. Another result is that companies seem to prefer the physical presence of women at the working environment since promotion of tele-working is still limited.

Key words: Womens' activity program, tele-education, tele-shopping, internet survey, behavioral analysis

1. INTRODUCTION

Developments in the e-economy have the potential to affect the way many activities --such as working, shopping, education--are being performed by individuals (via tele-working, e-shopping, tele-education), as such offering flexibility on their daily program and possible reduction of transport travel times (Shamir και Salomon, 1985; Christersen, 1988). The reduction of traffic congestion in urban areas (Mokhtarian, 1997; Moss και Townsend, 2000), and the improvement in the accessibility of less developed geographical areas (Dijst, 2001) are some of the extra benefits offered by these types of activities. The most researched applications of the impact of Information and Communication Technologies (ICTs) on travel are related to the influence of travel information on passenger behavior, teleworking and e-shopping activities (Golob and Regan, 2001).

Women can benefit by the use of new technologies, when they have easy access to activities that involve information usage. International state-of-the-art supports the critical role of new technologies and Internet on the provision of equal carrier opportunities to women in comparison with men, as well as the easier access to life-long learning and education (Vikas, 2001; Mokhtarian, et αl., 1998).

Especially for women who live in suburban areas or islands, the use of Information and Communication Technologies (ICTs) seams to contribute to the development of these areas, and present new opportunities to a series of activities such as work (via tele-working) and education (via e-learning) (Polydoropoulou και Kitrinou, 2004).

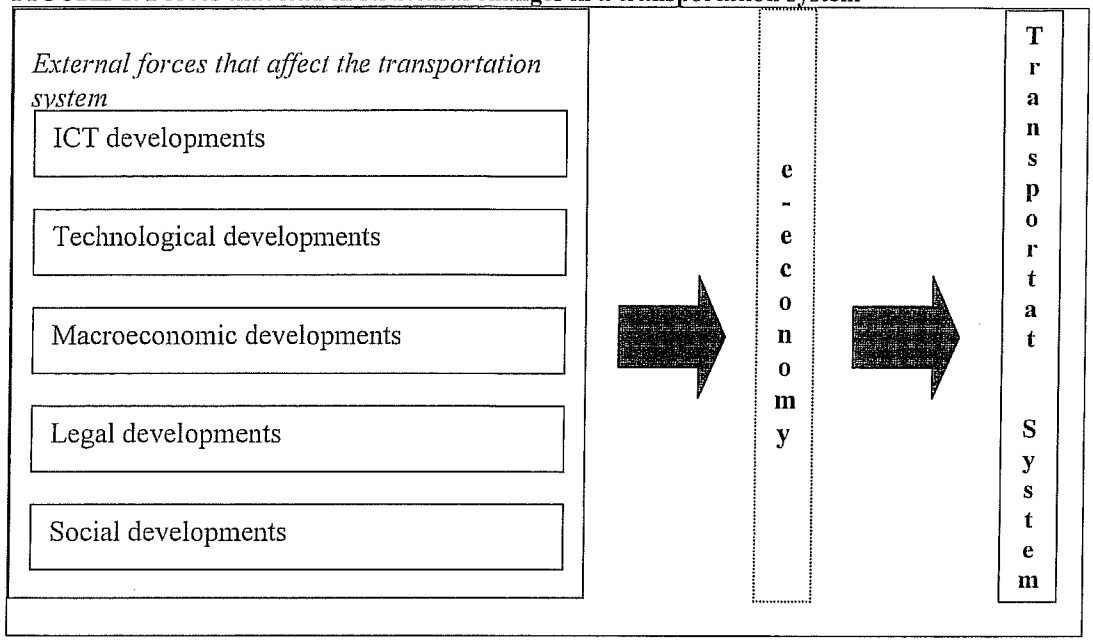
Although the e-economy has been the subject of considerable attention, still not much is known about its impacts on women's activities or about the path along which the e-economy will develop. The goal of this research is to estimate the potential impacts of the e-economy on women's activity patterns and to understand the opportunities presented by the digital revolution for improving the womens' quality of life.

Specifically, the aim of this research is to understand the impacts of the ICTs developments on the women's activity pattern and daily travel pattern. A review of the State-of-the-Art is presented in Section 2. Section 3 describes a theoretical framework for the analysis of women profiles based on their characteristics and their decisions related to issues such as tele-working, tele-shopping, tele-education and their travel habits. Section 4 presents the data collection methodology and the results of a case study conducted in Greece. Finally, section 5 concludes the paper.

2. STATE-OF-THE-ART

In Figure 1 the relationships between the factors the lead to structural changes in a transportation system are illustrated. The forces that affect the transportation system and are not part of it are called external. E-economy is the system via which this effect takes place.

FIGURE 1. Forces that lead in structural changes in a transportation system



Information and Communications Technologies (ICTs) continuously change the way people perform different economic and social activities, such as work, education, entertainment, shopping, banking, etc. Historically, these activities have been related to a continuity of travel conducted during certain times and specific locations. This fact is changing the past decades through the use of ICTs. The two fields of ICTs and travel, are sometimes substitutes and other times complements (Polydoropoulou & Kitrinou, 2004). While in the past, people scheduled their daily travel taking into account the restrictions that had due to time and place, together with their knowledge of the traffic conditions in a specific area, today they have the opportunity to perform electronic shopping, to work from home, to be educated from a distance thus having the opportunity to alter the number of daily trips performed.

Research on telework mainly focuses on the direct effects on travel demand by forecasting the number of telecommuters, the quantity of telecommuting occasions, the substitution of commuting and the potential travel savings (Arnfalk, 1999; Golob and Regan, 2001; Mokhtarian and Salomon, 1997; Niles, 1994; Mokhtarian et al., 1995; Salomon, 1998). Forecasting the range of telecommuting is based on studies of attitudes toward telecommuting (DeSanctis, 1984; Duxbury et al., 1987; Mokhtarian and Salomon, 1996a; Handy and Yantis, 1997), preference for telecommuting (Mokhtarian and Salomon, 1997; Stanek and Mokhtarian, 1998), choice of telecommuting (Bernardino et al., 1993; Bernardino and Ben-Akiva, 1996; Mahmassani et al., 1993; Mokhtarian and Salomon, 1996b; Yen et al. 1998), and characteristics of telecommuters (Yap and Tng, 1990; Hartman et al., 1991). A growing body of literature recognizes some indirect impacts of telecommuting on the timing of trips, modes of travel, and activity programs, including the possibility of increasing travel for non-work related trips as a consequence of reduced opportunities to travel (Handy and Mokhtarian, 1996; Shen, 2000; Giuliano, 1998). Furthermore, several studies investigate the actual relationship between transportation, communication, and spatial structure (Shen, 1999; Shen, 2000; Nazem et al. 1996; Black, 2001); telecommuting and residential choices (Ellen and Hempsted, 2002; Mokhtarian et al., 2004). However, as Mokhtarian et al. (2004) mentions, very little is known about the long-term effects of telecommuting on activities such

as residential location, although a later analysis of the same data makes a much stronger statement on causality i.e. the residential relocation causes the telecommuting (Ory and Moktharian, 2006).

E-shopping allows internet users to purchase goods and services via the Internet without physically reaching any shop. So far, analysis of e-shopping behavior relies mainly on Revealed Preferences (RP) data (see for example Chang et al., 2005 for a review of such empirical studies). These studies focus on understanding consumer e-shopping adoption as a function of several factors such as attitudes and perceptions of individuals (Farag et al. 2005b, Ferrell, 2005); socioeconomic characteristics (Farag et al. 2005a); web-based attributes and consumer product characteristics (Chang et al. 2005). A growing body of research also focuses on the impacts of e-shopping on traditional shopping trips (Handy and Yantis, 1997; Casas et al., 2001; Ferrell, 2005). The expected benefit of e-shopping on transportation demand is the reduction of shopping trips (substitution effect) and the possible re-usage of the saved travel time for other purposes/activities and trips (complementarily effect) (Ferrell, 2005). However, the substitution and/or complementarily effect of e-shopping varies among case studies and the impact of e-shopping activities on transport network conditions is still unclear (Handy and Yantis, 1997).

In order to extend the current knowledge of the impacts of ICTs, this research focuses on women's longer and shorted terms decision-making with respect to their social and financial activities, as well as their impact on the working conditions and environment.

3. USE OF NEW TECHNOLOGIES BY WOMEN IN GREECE

According to first quarter published data by NSSG for 2008, the active work force in Greece reached the 53.3% of the total population. The labor force is composed by men at 62% and by women at 38%. Data on salaries from all sectors of the Greek economy show that on average women are paid less compared to men by 16.5%. The average male salary is 1695 Euros whereas the female does not exceed the 1400 Euro barrier by much (Table 1).

TABLE 1. Gender Salary Comparisons in Greece

	Male	Female	Δ%
Primary Sector	€1100	€1005	8.5
Secondary Sector	€1585	€1385	12.5
Service Sector	€1778	€1422	20.0
Average	€1695	€1415	16.5

Source: NSSG

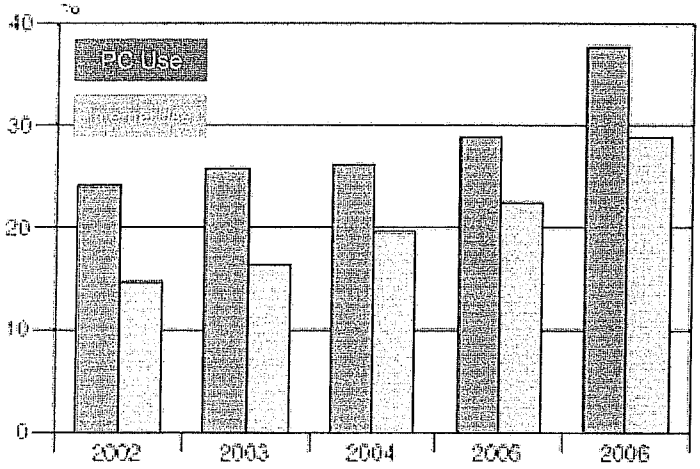
A research study conducted in the North Aegean area of Greece (ORFEAS, 2004) examined the female status in the labor market for cases of part-time and full employment and the reasons for the limited participation of women in production. The results of the study showed that:

1. Women that are employed full time are mostly married with children, have secondary education, and have had the aid of their family in the early stages of their employment.
2. Women that are part time employers have had secondary education and work mainly in seasonal jobs which have obtain with the assistance of the Greek Manpower Employment Organization.

3. The rate of unemployment reaches the level of 12.2%, of which more than 60% corresponds to the unemployment of women. The main reasons that have been reported for the high levels of unemployment are the family environment (35.4%), the limited number of vacancies (24.1%) and the lack of available vacancies based on the qualifications (13.9%)

The lack of professional qualifications is recognized by the majority of women as the decisive factor for their actual labor situation. Thus they are willing to follow courses which are related to foreign languages, and new technologies which will assist in the improvement of their qualifications. The limited knowledge in new technologies can also be seen in Figure 2. Despite the increasing trend still there is significant ground to cover in this field compared to other European countries.

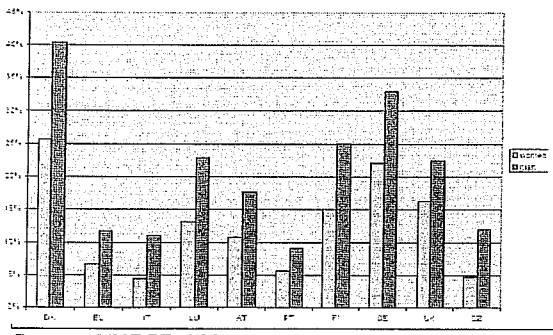
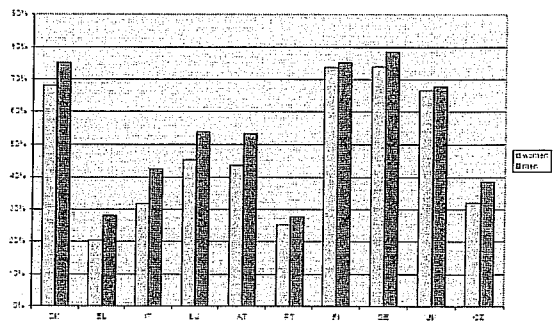
FIGURE 2. PC and Internet Awareness in Greece



Source: NSSG (2008)

As presented in Figure 3 On average 6.1% less women use a computer every three months then men, with high gender differences in Italy, Austria and Luxembourg where the percentages of women are 11%, 10% and 9% less of men respectively (UNECE, 2004). In addition Greece obtains the lowest levels of PC and internet usage by both genders and especially by women.

FIGURE 3. Comparison of Greece with other EU states in ICT awareness

Percentage of women and men who used a computer daily at home the last 3 months	Percentage of women and men who used computer the last 3 months
	

Source: UNECE, 2004

4. METHODOLOGICAL FRAMEWORK

Households and individuals take a number of decisions which lead to the configuration of their traveling needs in specific periods of time. During the years, the process of decision-making of households and individuals changes, influencing the demand for passenger transport. For this reason a number of characteristics have been used in this study in order identify the factors that affect households and individuals during the decision-making process for issues that concern them daily. Such decisions are related to:

- Place of residence
- Car choice
- Location of work
- Consumption of goods and services
- Education
- Planning of activities in terms of time and place
- Choice of use of electronic means
- Route choice

In this study the effect that different stakeholders and ICTs have on the decision making process of individuals is examined based on their different social, economic and other characteristics. Stakeholders are categorized in two main groups:

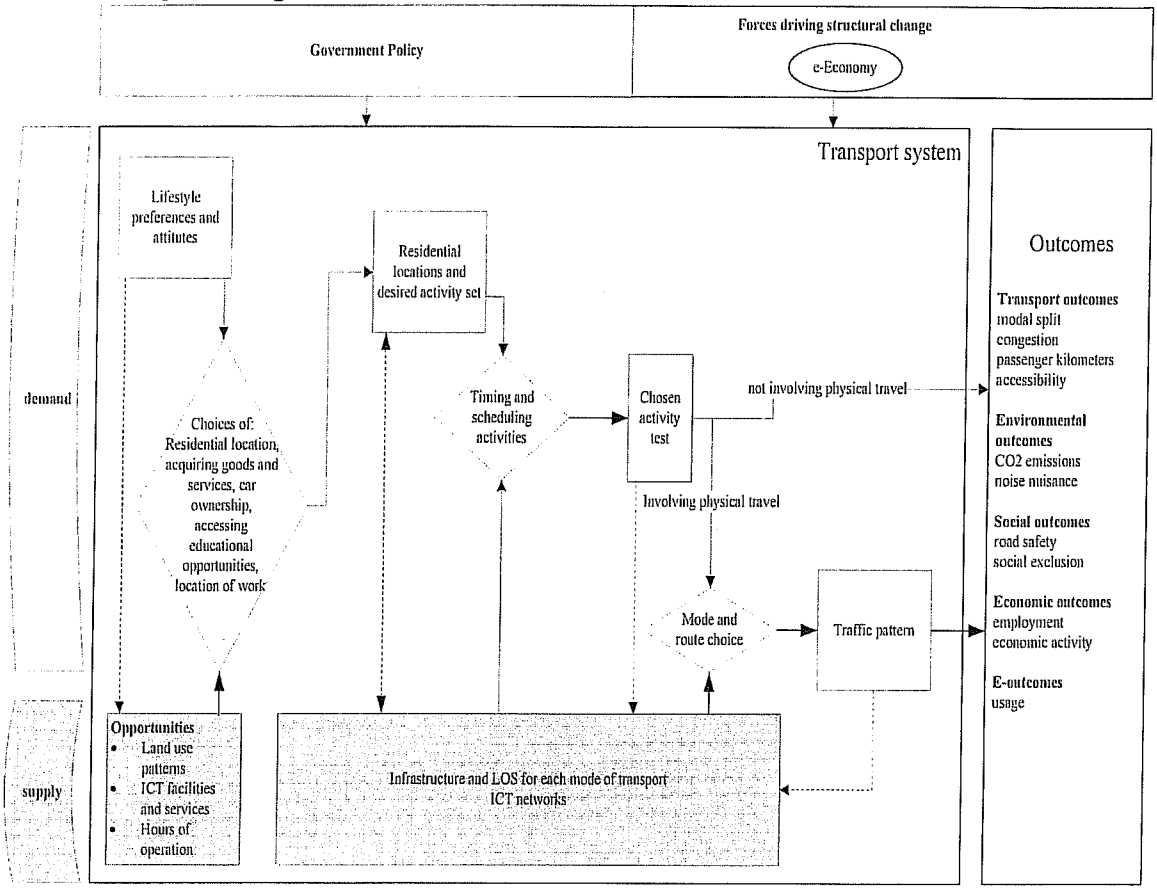
1. Individuals which represent the demand side of transport needs
2. Organizations which are the supply side and include:
    - Employers (schools, public sector etc)
    - Land suppliers (owners, state organizations etc)
    - Suppliers of goods and services (banks, construction companies etc)
    - Supplier of transportation services
    - Policy makers (state organizations at national, regional and local level)

The various categories of institutions can express heterogeneous behavior. For example, in the category "households and individuals", the decisions of old persons are likely to differ significantly from those of individuals under the age of 30 years. Each choice includes apart from the factors and characteristics that relate to that choice, information of the institutions that influence that specific choice. For example, the choice of residence is influenced by factors like the structure of household, income, the time of commuting from and to work, the possibilities of teleworking etc. These factors are influenced not only by the perception of households or individuals, but also by the employers and the governmental organizations.

A systems approach is used as a starting point for understanding the impacts of the e-economy on the womens' behavior. Specifically, the methodological framework of this research includes the development of a comprehensive and detailed ***system diagram*** that integrate physical elements of the transport structure with behavioral aspects of transport-related choices made by various actors (firms and businesses, households and individuals, and governments). The passenger transport system (see Figure 4) can be seen as a series of markets in which the desires of households and individuals (i.e. the demand side) are constrained by the opportunities offered to them (i.e. the supply side). The traffic pattern of households and individuals result from the exercise of all these choices and, in aggregate,

result in a set of traffic patterns with associated transport, environmental, economic and social outcomes.

FIGURE 4. System Diagram



Source: POET (2003)

According to Figure 4, individuals' way of living – and in our case of women- is impacted by the government policy as well as transport services and infrastructure. The political and social environment in combination with the economic conditions which are influenced by ICTs, determine the habits and preferences of women. The evolution of ICTs plays an important role on the development of attitudes and preferences of women and on their activities which can be performed via electronic means with immediate impacts on transportation, society and environment.

Of great importance is the definition of Forces Driving Structural Changes (FDSCs) which can not be controlled by individuals, but can lead to changes of the overall system performance. The prediction of such forces, as well as their impacts on the system is complicated. For this reason, in this research a set of scenarios has been developed, referring to future situations with respect the evolution of the e-economy and ICTs (i.e. opportunities of tele-working, tele-education, etc.) but also of the transport sector (i.e. use of intelligent transport systems, etc). Then respondents select the scenario that matches their preferences. Information on the women's activities in urban and suburban areas is then collected and analysed. This paper develops a case study in Greece using the above mentioned framework.

5. CASE STUDY: THE CASE OF GREECE

5.1 Data Collection Methodology

A personalized questionnaire was designed to capture women's decision making behaviour. This questionnaire is composed of five parts. In the first part respondents are asked questions relevant to their working conditions, tele-working activities, and factors influencing their career development. The second part includes questions relevant to their residential location characteristics and perceptions regarding the choice of residential location. In the third part women are asked to define the activities they do in a typical day (in a form of a time-use survey). In the fourth part their level of education along with their knowledge in computers and ICTS, and e-learning activities are identified. Stated preferences data is then collected using a number of scenarios describing future situations in order respondents to indicate the way they would conduct their activities. These future scenarios are described by four categories of characteristics. Under each future scenario respondents are asked how they would change their daily activities, working status and location of residence. Finally, in the last part personal details of the respondents are encapsulated.

The data collection methodology involves the collection of 200 questionnaires collected via personal interviews and internet surveys. The sample has been selected from a number of different and diversified Greek provinces in order to assure representativeness of the population as possible (16% from Islands, 75% from Attica region and 9% from the rest mainland).

5.2 Analysis and Findings

Figure 5 and 6 present some general characteristics of the sample. As it appears, the majority of the women that participated in the survey are currently working (97%) and almost 12% of them, either have their own, or are co-owners of a business.

Additionally, the level of educational is quite high (70% has at least a bachelor degree) and they have several years of work experience.

FIGURE 5. Occupation Status

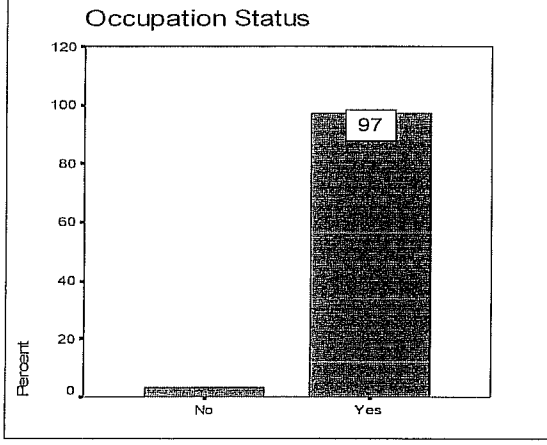
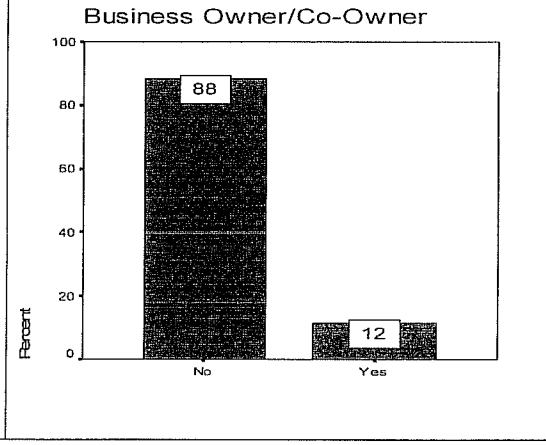


FIGURE 6. Business Owner/Co-Owner



The following figures (7, 8, 9, 10) present the relation of women with new technologies. As it can be seen, the majority of the respondents consider themselves good PC users, with good internet knowledge. A significant amount of women stated that they have attended at least one internet course (41.5%) and have internet access, both from work (92.5%) and home (62.5%).

FIGURE 7. PC Knowledge

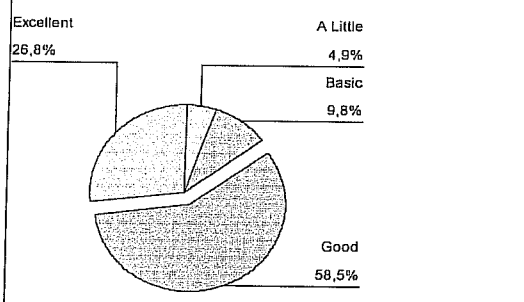


FIGURE 8. Internet Knowledge

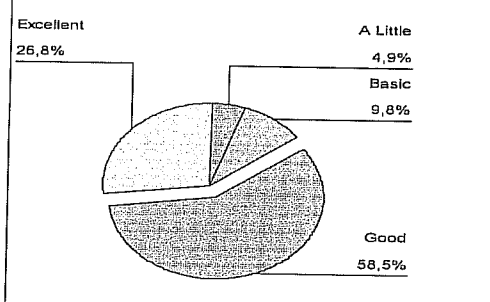


FIGURE 9. PC at Work

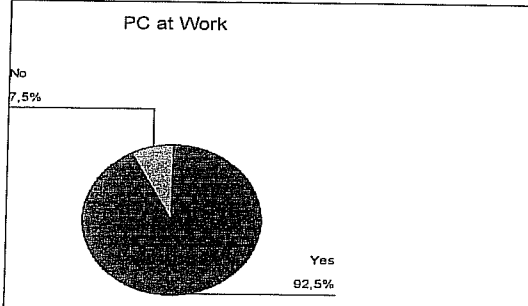
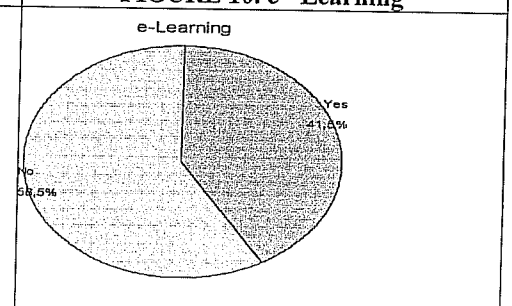


FIGURE 10. e - Learning



From the working women, approximately 60% are occupied in the private sector and 19% in the public sector (Figure 11). The work contract in the majority of the cases is full time (79%) and only (21%) part time (Figure 12).

FIGURE 11. Business Sector

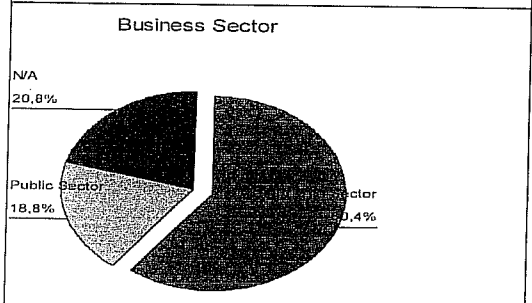


FIGURE 12. Employment Status

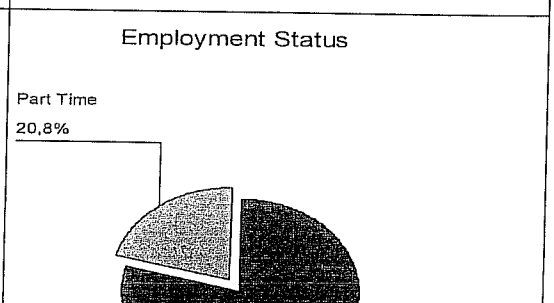
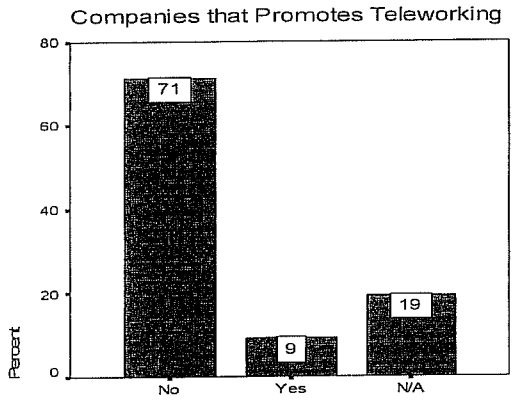


Figure 13, presents the rate of companies that encourage their employees to telework. As it can be seen, only 9% of the companies that the respondents work at encourage their employees to tele-work. This figure shows that teleworking is not widely known and still not understandable from the business world.

FIGURE 13. Companies that Promotes Teleworking



Based on the above results, it is not surprising the finding that only 3% of the sample teleworks, out of which, the two thirds teleworks 5 days per week (Figure 14). In addition, almost 10% of the sample's working women work from home, usually after work, 30 minutes to 1 hour per day (Figure 15). Furthermore, the average duration of work is 8.3 hours/day while only 11% stated that works over hours.

FIGURE 14. Telework

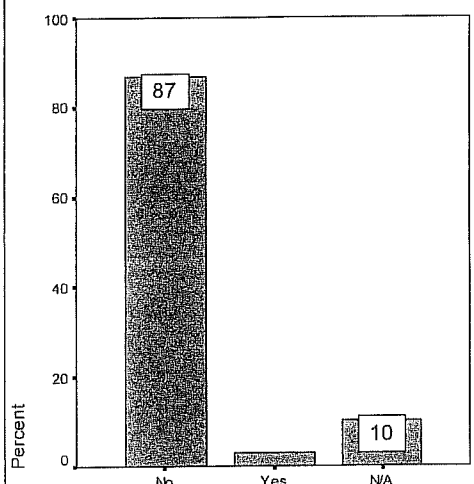


FIGURE 15. Work at Home

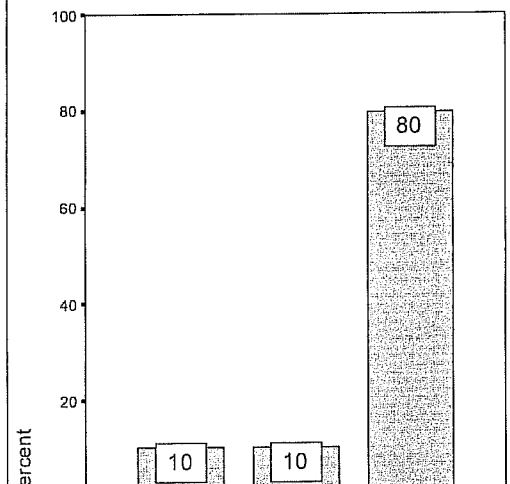


Figure 16 presents the level of women's satisfaction regarding their salaries. In a scale from 1 to 7, where 1 is not satisfied at all and 7 completely satisfied, the respondents were asked to state their degree of satisfaction. As it can be seen, almost 40% of the sample is not that satisfied with its salary and only 9% is extremely satisfied with it (the average satisfaction rate is 3.7 with standard deviation 1.8).

In the same way the respondents were asked to state their degree of agreement with the statement that "Women are equally paid with men", in a scale from 1 to 7, where 1 is totally disagree and 7 totally agree (Figure 17). The results weren't conclusive since approximately 34% stated that they tend to disagree with this statement and 38% tend to agree with it (the average rate of agreement is 4.1 with standard deviation 2.2).

FIGURE 16. Satisfaction with the Salary

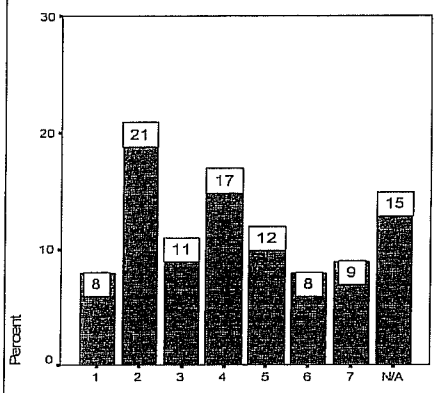
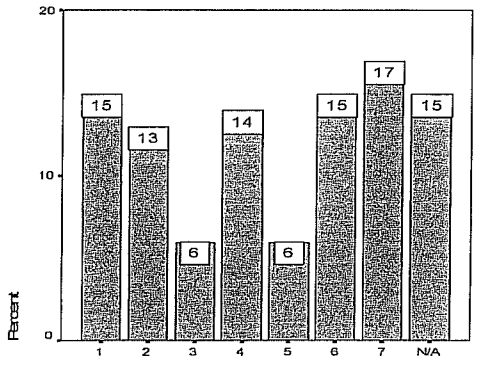


FIGURE 17. Level of Agreement "Women are equally paid with men"



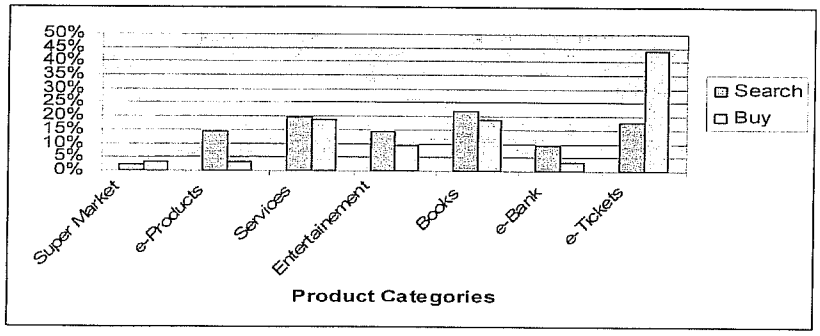
The respondents also replied to seven questions that can be used to infer how the influence of their closed ones had an effect on their career related decisions. Table 2 presents the statements that reflect this effect. A seven-point scaling ranking from Strongly Disagree to Strongly Agree was used to indicate the level of agreement of these statements. The majority of women stated that they took all the decisions regarding their career (5, 22), however it seems to be a tendency to consult others before taking important decisions regarding their career.

TABLE 2. Career related decisions

	Average	Std. Deviation
My mother's opinion influenced the decision for my career	2,63	1,846
My father's opinion influenced the decision for my career	3,11	2,036
My brother's opinion influenced the decision for my career	2,37	1,930
The opinion of my relative influenced the decision for my career	1,77	1,391
The opinion of my friends influenced the decision for my career	1,99	1,339
I took all the decisions for my career	5,22	1,760
I consult others before I take a decision regarding my career	3,94	1,720

Figure 18 presents the product categories that women tend to search information or/and buy through internet. The majority of women tend to search more for books and services but they mostly purchase e-tickets.

FIGURE 18. Products and Internet



Another important part of the questionnaire captures the means/modes (transport modes and electronic means, as email, fax, etc.) that women use in their activities. As it is shown in Tables 3 and 4, the use of transport modes (such as, tram, metro, car, bus, etc.) is significantly greater than the use of electronic means (such as, internet, phone, e-mail). It appears that activities that are related to shopping occur only with physical movement of women, with the use of a traditional transport mode. The only activities that women appear to use electronic means for their attainment is hanging out with friends (through chat rooms), as well as the reading of the press.

TABLE 3. Distribution of Women Activities per Mode/Mean and per Location

A/A	Activity	Electronic Mean		Transport Mode	
		Home	Other	Home	Other
	Main Work	-	29%	-	71%
	Grocery	-	-	-	100%
	Clothes	-	-	-	100%
	Cosmetics	-	-	-	100%
	Hang out with friends	8%	-26%	-	66%
	Hang out with relatives	33%	-	-	67%
	Newspapers	25%	-	-	75%

TABLE 4. Distribution of Women Activities per Location

A/A	Activity	Location	
		Home	Other
	Main Work	19,2%	80,8%
	Business Dates	32,7%	67,3%
	Second Work	42,4%	57,6%
	College/University Attendance	44,2%	55,8%
	Spare time	76,9%	23,1%
	Tickets for theatre, etc.	46,2%	53,8%
	Travel Tickets	48%	52%
	Financial Services	46,1%	53,9%
	Grocery	38,5%	61,5%
	Clothes	34,6%	65,4%
	Cosmetics	34,6%	65,4%
	Hang out with friends	53,8%	46,2%
	Hang out with relatives	65,4%	34,6%
	Newspapers	61,5%	38,5%

6. CONCLUSIONS AND GUIDELINES FOR POLICY MAKING

The data analysis showed that tele-working is very limited in Greece. Women are not extremely happy with their salaries compared to the cost of living. They are highly influenced by their family and friends for decisions related to their work arrangements. In our sample the knowledge of computers and usage of internet is high. This can be explained because almost half of the sample comes from the internet survey. However, tele-shopping activities are limited. Furthermore, the level of knowledge of ICTs is not used to substitute any working or shopping trips.

The results presented in this paper make it clear that developments in the e-Economy will not replace all, or even the bulk of, the physical transport of women. However, the e-Economy does offer policy makers some new opportunities for addressing the increase in passenger transport and the accompanying problems. There are clearly circumstances where women may benefit from being able to carry out tasks and activities without having to engage in physical travel. In some cases the activity may bring more utility if carried out via ICT than by physical travel. For some women, "virtual mobility" offers attractive advantages in the context of much of their administrative personal business (administrative chores, financial transactions, comparison shopping etc), some of their retail trips and perhaps their daily commute. Policymakers should focus their attention on identifying the circumstances in which virtual mobility is attractive and promote it.

In closing, it must be emphasized that our understanding of the effects of the e-Economy on the demand and supply of transport is still limited; we still do not really understand the *mechanisms* by which new developments change women's behavior and produce structurally different patterns of demand. More work is needed to produce the improved understanding that will help policy makers to make better policy and provide incentives and benefits to women to improve their standards of living, working conditions, and overall well-being.

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