Investigation of the Requirement and Constraints Affecting Teleworking in Government Institutes; Case Study: Research Institutes of Ministry of Roads and Urban Development

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ABSTRACT

Although teleworking has many benefits in governmental, organizational and individual levels, it faced various variables in both planning and implementation phases that are caused because of low acceptance rate in organizations. By identifying and controlling these variables, managers and decision-makers can use teleworking programs in their organizations. This study aims to investigate the requirements and constraints of teleworking implementation in governmental organizations. Researchers reviewed the literature related to teleworking, identifying variables related to requirements and constraints that affect teleworking we designed the research model based on that. We selected 145 employees of research centers of the Ministry of Roads and Urban Development as case study. After gathering information through standardized questionnaires, the data have been analyzed through SPSS software and correlation coefficient and linear regression tests were arranged as descriptive and analytical table s. The results of linear regression model show the significant relationship and negative effects of constraint variables and positive effects of requirement variables on teleworking implementation.

1. INTRODUCTION

The tendency to establish and develop integrant computer systems, which was made possible by information technology advancements, is the major foundation for organizational structure changes during recent decades. Structural changes lead to changes in work organization methods around information processing and infrastructure of a phenomenon known as virtual organizations and teleworking in organizations.

In the 1990s, teleworking emerged as an opportunity to improve the efficiency and effectiveness that could be possible through advanced IT infrastructures [1]. The increase in availability of expertise in ICT has facilitated adoption

of teleworking. In other words, IT development stimulated teleworking.

Teleworking means individuals or groups of people do their job away from the employee, the client or contractor. It allows the employers to do their professional tasks without any need to be in the organization. This causes more flexibility and less traditional bureaucracy. Also, teleworking paved the way to develop international and multinational corporations with the same management and people no longer have to travel elsewhere to work. Work hours got more flexible and new organizing methods have been proposed to get rid of dysfunctional bureaucracy.

In spite of these advantages, teleworking confronts different variables in both planning and implementing phases that leads to low rate of adoption in organizations. As success or failure of this technology depends on adoption of managers and employees, it is necessary to identify and examine the effective factors on adopting this new job governmental organizations method. Siha and Monroe (2006) reported a large amount of disinclination of organizations to establish teleworking. They suggested that future studies must focus on reasons of low rate of teleworking growth and must find out why the obstacles differ from a country to another? [2].

Statesmen emphasize on computation, activities related to personal and public jobs and carrying out the tasks through teleworking in order to develop the e-government and increase the efficiency, flexibility, decrease in driving time and lateral effects of teleworking implementation [3].

Nevertheless, the rate of teleworking growth in governmental organizations is low and predicted expectations have not been reached. Considering the advantages and disadvantages of teleworking, it is important to figure out: 1) why using this method could not find its position among managers and employees? 2) Why most of the employees and managers tend to use traditional methods continually?

The aim of this study is to identify the factors on carrying out the tasks outside the work place using ICT. The study investigates this issue by identifying the constraints and requirements of teleworking implementation during decision-making process and finds the relationship between them to make it possible for managers to identify and control the inspected variables. Also, this study helps the literature related to organizational problems of teleworking.

2. LITERATURE REVIEW

Jack M. Nills was the first to start researching about teleworking. He introduced the concept of teleworking in the 1970s.

Tremblay investigated characteristics of teleworking in 2002 and found out that more than half of the employees were satisfied of teleworking method [4].

In a research about perception of middle managers during implementation of teleworking program, Watad and Will showed that changes in culture are the most important factor [1].

Amirreza Mamdouhi identified work on personal computer, reading and writing the reports, and corresponding as suitable elements for teleworking. He achieved it by considering the role of teleworking as one of the management strategies and modeling the rate of teleworking application for different jobs. He also suggested group working, participation in meetings and missions outside the office as other suitable elements of teleworking [5].

In 2005, Fynes-Clinton, in a study on managers in Australia and New Zealand, showed that managers tend not to trust to teleworkers. About a half of the managers believe that teleworkers underact [6].

Siha and Monero studied teleworking and its advantages. They concluded that applying teleworking among rivals is the main motivation in order to start using teleworking in organizations. They also mention that an advantage of teleworking is in employment and trying to keep the employees [2].

Meadows in 2007, presenting successful lessons of teleworking, indicated that strong information technology systems with strong information technology providers are necessary for a successful teleworking program. Although such a system may be expensive, it has greater advantages [7].

According to Congress report in 2009, a total of 33 agencies reported cost savings/benefits as a result of telework. The greatest benefits were in the areas of productivity (39 percent), human capital, such as recruitment and retention (37 percent), and realized savings in leave (34 percent) [8].

In 2010, Min Huu Pham showed that lack of support from top managers is the main constraint of teleworking implementation in New Zealand. He suggested that managers must pay more attention to support, human resource issue and culture changes to have a successful teleworking program [6].

The 2010 report of Fedscop Institute – one of the formal news authorities of Information Technology area in federal government of the United States – showed that the satisfaction level of teleworking in governmental sector was 91% and in private sector was 95%.

2.1. Definition of Teleworking

Rasmussen and Corbe described teleworking as "an approach that enables the employee to work far from the office (usually at home) with connection to the office through communication tools" [9]. Based on teleworking increase law, definition of teleworking includes flexible computer programmed job in which employees are authorized to do their tasks and other permissible activities through an ap-

proved work place excluding their official work place [10].

The management and human resource development office of vice-presidency defines teleworking as a selection on the way of doing job that allows employees to do a part or the whole part of their tasks out of the office using computer and communication tools; it means employees can do their job from somewhere like their home or a communication center or the other office around their home.

Summing up all the above mentioned definitions, we describe teleworking as below:

"Teleworking is a way to organize and do the jobs from somewhere except the geographical office place through information and communication technology that leads to place and time flexibility to do their tasks."

2.2. Critical Success Factors (Requirements) of Teleworking Implementation

Critical success factors are having vital roles are and the system should prepare them to keep on. In other words, every critical success factor is an outline and to achieve success, the related jobs must be done in the very best way [11]. Four factors of suitable regulations, perceived benefits, top management support, and trust (Kowalski & Swanson) are requirements or critical factors to implement teleworking in an organization [6,12].

Law & Regulations

Regulations play an important role in adjusting the relationships between employers and employees. This relationship is considered to be abolished because of digital revolution regarding the prevalence of teleworking system, regulations, relationships, employment and present systems and do not have ability to meet the requirements of this novel phenomenon. It is just considered to be the conformity with teleworking. Therefore, it would be important to predict necessary legitimate tools based on new job conditions [13].

Perceived Benefits of Teleworking

Teleworking benefits employees, managers, environment and society. Based on the report of Federal Government of Virginia in 2010, teleworking decreases the transportation needs and the increases the possibility of employment of professionals from all around the world. It reduces transportation expenses, problems for staffs and their families, and also makes it possible to employ the best talented employees [10].

Top Management Support

Teleworking changes the traditional framework of jobs. The success of teleworking projects depends on managing ability to establish this transformation. The role of managers must change from an executor to an educator or facilitator. It means that the manager should supervise the output instead of the manner. Maybe, it is necessary to develop the neglected management skills in traditional jobs because of their importance in teleworking environment. These skills include: paying additional attention to education, training personal relationships, developing connections among sparse workforce, and assessing the differences and faithful commitment to team structure [14].

Trust

From Tyler's point of view, trust is important because there is a strong perception of how to develop effective partnership inside the organization. Since trust plays a significant role in changing and unstable condition, it has greater importance in virtual organizations than in traditional ones. When regulations, policies, rules and traditional principles are insufficient, people tend to launch personal relationships and quality of these relationships is assigned by trust level [15,16].

2.3 Constraints

In constraint theory, everything that may confine system to obtain better function has been known as constraint [17]. Every system suffers more management constraints than physical ones. About teleworking, Minh Huu Pham recognized five important constraint factors including: economical constraints, workplace constraints, technology constraints, workforce constraints and risk.

Economical Constraints

Economical constraints are known as commercial boundaries during implementation of teleworking program. According to D›Arruda, employers face direct and indirect expenses related to teleworking.

Direct expenses include: preparing software, hardware, and telecommunication tools; educating the employees; transporting and installing equipment at home sites; increasing in supervising expenses including: changes in supervising systems, coordination and accordance; and getting ready to lay the foundation for information technology.

Indirect expenses are: confronting collective resistance, adjusting documents, increasing energy consumption because of transmission from central office to houses [6].

Work Place Constraints

The work pattern in the industrial age is a limiting factor in information age. The reason is that new organizations understand the concept of global changes and they tend to establish new relationships with their employees, stakeholders, societies and regions. These organizations intend to change the time and place of work and their employment relationship using teleworking program.

Some characteristics of suitable organization to use teleworking activities and information and communication technology are as follows: using a horizontal organizational structure, decentralizing the decision-making process, providing team work and collaborative activities, arranging

flexible work time and procedure, innovating the schemes of work pattern, paying attention to human capital, interacting open system with inside and outside environment, considering the intangible assets, planning long-term programs [18].

Technology Constraints

Technology is infrastructure and an essential factor for every teleworking program. Baker and colleagues analyzed the effect of IT support, suitable technology and other factors on satisfaction and willingness to use telework employees. The results show the critical role of technology on development of teleworking.

While technology is the backbone of teleworking program and is also part of organization's information system, due to competitive issues, organizations prefer not to share their technological characteristics openly.

Barron found that teleworkers must use at least one computer, high-speed wireless broadband, cell phone, and other equipments like fax, copiers, scanners and printers [6].

Risk

Risk is the fear of losing critical information, health and other rights of teleworkers. Unless employers guarantee all the rights of teleworkers and spend more on monitoring, employers may be forced to deal with crime and lawsuits.

Investment in teleworking strategies is not risk-free. However, there is a strategy for every risk that it can usually reduce the risk to a manageable level. Scott and Overmayer classified the known risks associated with investment in teleworking strategies into four categories: technology, operational, social, and organizational.

Workforce Constraints

Organizations should consider good location, good staff, and employee's attitude towards teleworking during teleworking implementation. Although technology can facilitate collaboration, but Trembly found that teleworking is more suitable for a personal, collaborative jobs. According to Meadows, teleworkers should be able to work independently. They should also be self-motivated and result-oriented and fully understand the functions and procedures.

3. HYPOTHESES

Hypothesis 1: The positive compliance of requirements of teleworking will affect its implementation significantly.

Hypothesis 1-1: Enactment of supportive and incentive laws will affect teleworking implementation significantly.

Enactment of distinct administrative, social and work law for issues related to teleworking is beyond an organization's domain and authority must prepare it [19].

Hypothesis 1-2: Support of top manager will affect teleworking implementation significantly.

Many studies approved manager support as one of the important factors in teleworking implementation along with comprehensive education and reliable technical solutions [2].

Hypothesis 1-3: Getting familiar with teleworking benefits affects teleworking implementation significantly.

According to Crandall and Gao, teleworking benefits are increasing the efficiency, decreasing the operation expenses and new employments, and the ability to adapt to the virtual organization [20].

Hypothesis 1-4: Development of mutual trust will affect teleworking implementation significantly.

Kowalski and Swanson identified trust as one of the most important factors in teleworking success. CISCO`s anagers can trust self-control and self-manage of their employees through empowering them.

Hypothesis 2: Constraints have negative impact on teleworking implementation.

Hypothesis 2-1: Economic constraints have negative impact on teleworking implementation.

Expenses of teleworking program can be completely cumbersome in some situations. Mellow suggested that managers should consider how much of the expenses could be borne by the employer or subsidized for successful teleworking [21].

Hypothesis 2-2: Workplace constraints have negative impact on teleworking implementation.

Watad and Will considered cultural changes as the most important obstacles towards teleworking implementation. Culture cannot be changed only by implementing an information technology project. It should regularly improve through education and awareness about the benefits of the project.

Hypothesis 2-3: Information technologies constraints have negative impact on teleworking implementation.

Joice found that information technology on its own is not a major obstacle to develop teleworking. But, many companies lack an appropriate approach to implement teleworking, and also miss strategies to support information technology [22].

Hypothesis 2-4: Risks constraints have negative impact on teleworking implementation.

For the purpose of this study, risk is defined as the lack of: IT strategy, activities documentation, and balance between work and lifestyle.

Many organizations are unable to protect sensitive data because they lack protective security policies or teleworkers are not fully aware of it. However, proper training and safety tips can reduce the risk of security of teleworking [22].

Hypothesis 2-5: Workforce constraints have negative impact on teleworking implementation.

Crandall and Gao found that teleworkers are afraid to lose good projects and good advertising chance. Mello also mentioned that loss of connection with colleagues and managers make employees feel insecure about their position in organization.

To find the answer to the main question of the study, we offered a research model to find the relationship between requirements, constraints and implementation of teleworking that is shown in Figure 1.
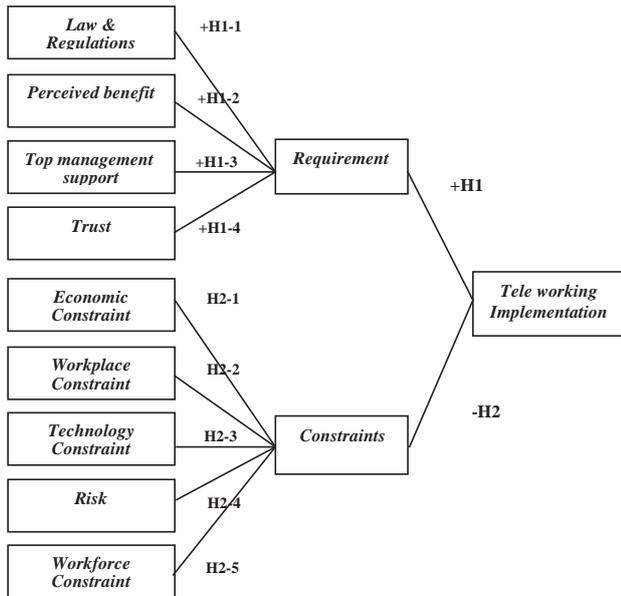

Figure 1. Research model of requirements and constraints of teleworking implementation.

4. METHODOLOGY

4.1. Research Method

This study is applicable because it has identified the guidelines and requirements of teleworking implementation. It is also descriptive since it introduces the effective relations and factors on adoption of teleworking as well as constraints in this area.

4.2. Statistical Population and Sample

In this study, we chose the statistical population among managers, faculty, research experts and other staffs of research centers of Ministry of Roads and Urban Development. We determined the samples by simple random sampling without replacement and using the following formula [23]:

$$n \geq \frac{z^2 N P_y (1 - P_y)}{(N-1)\varepsilon^2 P_y^2 + z^2 P_y (1 - P_y)}$$

Where Z is the standard distribution equal to 96.1 at the confidence level of 95 %. ε represents total characteristics that are determined by the researcher in order to reflect the demographics of the study and the determined level is 0.0667. Py is the ratio estimated from the initial sampling among 30 members of statistical population and the value

is 80%. N is the population size that is 440 individuals and the sample size was determined at least about 145 individuals.

$$\frac{(1.96)^2 \times 440 \times 0.8 \times (1 - 0.8)}{(440 - 1) \times (0.0667)^2 \times (0.8)^2 + (1.96)^2 \times 0.8 \times (1 - 0.8)}$$
$$\cong 145.13$$

4.3. Research Tools

Research method is a field data collection method and its tools are questionnaires that are composed of 48 questions in 3 parts: requirements (including 4 main variables), constraints (including 5 main variables) and solutions for teleworking implementation. Answers have 5 choices ranging from disagree to thoroughly agree.

In order to confirm the measuring factors and measuring capability of variables (validity), 30 questionnaires were given to the experts and users of teleworking and their reformative comments were used about certain questions and expressions. This study used Cronbach's Alpha coefficient to assess the reliability of SPSS software and the results are shown in Table 1. As the value is greater than 0.70, it is considered as acceptable measure of reliability [24].

Table 1. Cronbach's Alpha Coefficient

Part	Variable	Cronbach's α
Requirements of Teleworking implementation	regulations	0.884
	Support of managers	0.923
	trust	0.854
	Perceived benefits	0.995
Constraints of Teleworking implementation	Economical Constraints	0.882
	Work place Constraints	0.79
	Technology Constraints	0.919
	Risk	0.873
	Workforce Constraints	0.93
Solutions	Implementation of teleworking	0.789

5. DATA ANALYSIS

The descriptive findings of this study include statistical parameters such as average, standard deviation and number of participants based on Table 2 for all the variables and simple correlation between compliance of requirements and constraints of teleworking and its implementation are presented respectively in table s 3 and 5. The results of linear regression of requirements and constraints are presented respectively in Table s 4 and 6.

Table 2. The mean and standard deviation of the variables in the study

Statistical parameters / Variables	Mean	Standard deviation	Number
Implementation of teleworking	3.9803	0.5725	
Requirements	3.9514	0.67038	
Enactment of supportive and incentive laws	4.1195	0.85407	
Support of top managers	4.1931	0.74811	
Mutual trust	4.1000	0.73857	
Perceived benefits	3.7856	0.81069	
Constraints	2.3224	0.67577	145
Economical Constraints	2.3552	0.84813	
Work place Constraints	2.1793	0.76838	
Information technology Constraints	2.0713	0.92060	
Risk Constraints	2.3264	0.84114	
Workforce Constraints	2.5876	0.98889	

Table 4. Results of regression analysis on variables (Relation between requirements and teleworking implementation)

Criterion variable	Predictor variable	Coefficient of determination RS	Ratio and possibility F	Regression coefficient		
				Beta value (B)	t	Meaningful level
Teleworking implementation	Compliance of requirements	0.523	F=157 P<0.001	0.724	12.53	P<0.05
	Perceived benefits	0.317	F=66 P<0.001	0.563	8.15	P<0.05
	Support of top managers	0.523	F=157 P<0.001	0.724	12.55	P<0.05
	Mutual trust	0.381	F=88 P<0.001	0.618	9.39	P<0.05
	Enactment of supportive and incentive laws	0.447	F=116 P<0.001	0.669	10.76	P<0.05

Table 3. Simple correlation coefficient between compliance of requirements and its components

Variables	Statistical parameters / Predictor	Correlation coefficient (r)	Significant level (P)	Number
Teleworking implementation	Compliance of requirements	0.73	0.001	
	Enactment of supportive and incentive laws	0.67	0.001	
	Support of top managers	0.73	0.001	145
	Mutual trust	0.62	0.001	
	Perceived benefits	0.57	0.001	

Table 5. Simple correlation coefficient between constraint and its components

Variables	Statistical parameters / Predictor	Correlation coefficient (r)	Significant level (P)	Number
Teleworking implementation	constraints	–0.53	0.001	
	Economical constraints	–0.41	0.001	
	Work place constraints	–0.47	0.001	
	Information technology constraints	–0.50	0.001	145
	Risk constraints	–0.53	0.001	
	Workforce constraints	–0.25	0.001	

Based on findings in table s 2, 3 and 4, the first hypothesis and its four sub-hypothesis are not rejected; and there is a significant positive relationship between requirements and variables associated with teleworking implementation. As increasing the compliance of requirements and every other variable will lead to increase in teleworking implementation. Other findings indicate that 3.52% of changes of teleworking implementation are related to compliance of requirements, 7.44% to enactment of supportive and incentive laws, 3.52% to support of top managers, 7.31% to perceived benefits, and 1.38% to mutual trust respectively.

Also, based on findings in Table s 2, 5 and 6, the second hypothesis and its five sub-hypothesis are not rejected; and there is a significant negative relationship between constraint and its components and teleworking implementation. As decrease in every variable of constraints, leads to increase teleworking implementation. Other findings indicate that 9.27% of changes in teleworking implementation are related to constraints, 5.16% to economical constraints, 2.22% to workplace constraints, 25% to information technology constraint, 1.28% to risk constraint and 2.6% to

workforce constraint.

Table 6. Results of regression analysis on research variables (relation between constraints and teleworking implementation)

| Criterion variable	Predictor variable	Coefficient of determination RS	Ratio and possibility F	Regression coefficient		
				Beta value (B)	t	Meaningful level
Teleworking implementation	Constraints	0.279	F=55 P<0.001	-0.529	7.45	P<0.05
	Economical Constraints	0.165	F=28 P<0.001	-0.806	5.32	P<0.05
	Work place Constraints	0.222	F=41 P<0.001	-0.471	6.39	P<0.05
	Information technology Constraints	0.250	F=48 P<0.001	-0.5	6.9	P<0.05
	Risk Constraints	0.281	F=56 P<0.001	-0.530	7.48	P<0.05
	Workforce Constraints	0.062	F=10 P<0.001	-0.250	3.09	P<0.05

6. CONCLUSION

The obtained results of descriptive, correlation coefficient and linear regression findings demonstrate a direct and significant impact of compliance of constraints, requirements and their variables on teleworking implementation that is presented in Figure 2.

Assessments clearly show that top management support like: managerial emphasis on regulation of work output, development of communication and interaction with staff during the implementation of design, and emphasis on group activities (keep the team ethic) by the director has the most important role among the requirements. Findings suggest that the success of teleworking as a change in working process from traditional age to information age depends on the management ability to guide the transition. The manager's knowledge of capabilities of staff, abilities of information technology and support and understanding teleworking process play important roles in designing new successful procedures for teleworkers and organizations.

On the other hand, while technology constraint is of great importance, but risks such as lack of: IT strategy, activities documentation, and balance between work and lifestyle

plays the pivotal role. Therefore, in a successful teleworking program, managers must develop information technology strategies and teleworking policies. They should also try to minimize the risks by providing good education and empowering the employees and help them to keep the relative balance between work and home life.
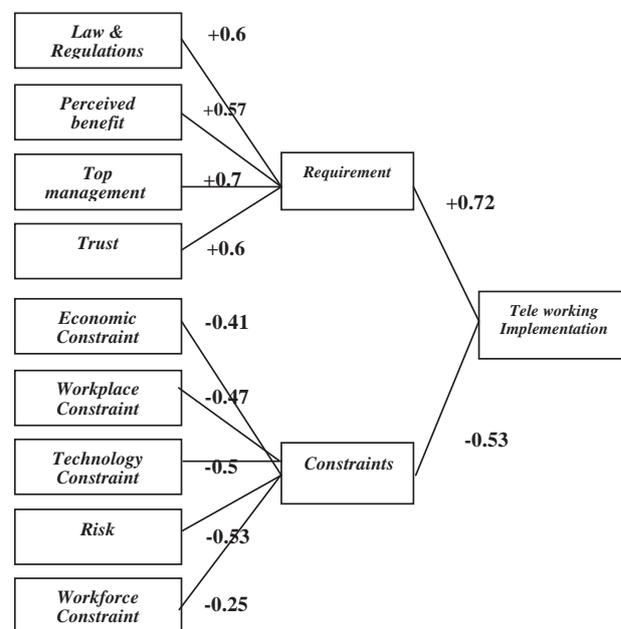
Figure 2. Final model of requirements and Constraints of teleworking implementation.

We suggest that managers pay more attention to top management support and risk, while not neglecting other factors in a teleworking project. Future research should validate some of the findings of this study. The author suggests that researchers use other data collection methods that can identify participants' demographics, seek the opinions of non-adopters, and revise the research model, especially in terms of risk and technology constraints.

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