

AN EXPLORATION OF ENHANCING ADOPTION AND AGILITY IN TECHNOLOGICAL CHANGES

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Abstract *In the present paper, the optimal way of increasing employee's adoption and agility in technological changes and the proper designed strategies suggested by scholars to managers as policy makers to manipulate these technological changes and develop the foremost approach to control unexpected changes in companies are explored. After investigating related works and scrutinising numerous approaches surrounding managing technological changes; it is perceived a successful technological change management depends, to a great extent, on employees' capabilities to be more adopted and agile in implementing new technologies satisfactorily. Since employees play the main role in accomplishing technological tasks, they should possess skills related to those new technologies. As keeping regular employees has some obstacles mentioned in the following; the optimal option of having skilled staff with more adoption and agility in technological changes can be produced through contingent workforce system in the light of vintage human capital model in this study. Besides, technology diffusion theory is considered marginally in this paper to manifest the presence of employees' adoption and agility in technological changes.*

Keywords: *Technological Change, Adoption, Agility, Contingent Workforce, Technology Diffusion, Vintage Human Capital Model*

INTRODUCTION

In recent changing and challenging business world, organisations mainly IT sector which is an integral part of organisations are attempting to be at the forefront of competitive market through implementing new technologies producing the latest update services according to stochastic market demands specially customers' interests and preferences (Dellaert, Jeunet, & Mincsovic, 2008). Despite getting benefits on implementing new technologies, these rapid and continuous changes in technologies drive companies to spend a lot of time and effort to accept these new trends. Since they have to cope with these new changes (Marković, 2008); they face a huge number of limitations in switching to and implementing these new technologies with reference to employees who are the main role in performing technologies. Thus, adoption and agility in employment might be considered as the first and main concern surrounding technological changes studies.

From introducing and developing the technology by companies till getting it accepted by employees, it sometimes takes too much time because of deficiency in adoption and agility that produces less efficiency and productivity.

Thereby managers should conduct approaches reducing the gap between developing a new technology in companies and the maximum of its usage, which leads employees to implement new technologies successfully. Then there is an issue that up to what time employees can adopt and implement these new technologies within a minimum given time (adoption and agility in technological change). Scholars identify a term namely diffusion as a process of crossing the chasm between developing the new technology and the peak of its usage (Chari & Hopenhayn, 1987; Börjesson, Martinsson, & Timmerås, 2006). In other words, the quickness of adoption in new technology explains the diffusion of that technology (Rogers, 1995). It seems that technology diffusion can indicate the adoption and agility of that technology. Scholars indicate these terms including in technology diffusion in different words and accordingly each can affect another or be affected through other external factors i.e. Bass (1969) develops his model named Bass Model or Bass Diffusion Model consisting differential equation to describe the timing and speed of adopting a product from its initial usage till its peak usage. In his work, he emphasizes that the speed of adoption of new technology depends on adopters' innovativeness. Besides, Comin and Hobijn (2010) illustrate in their model that the size of

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adoption can affect the length of time between the invention of technology and eventual adoption of that technology that they call it as adoption lag. Comin, Dmitriev, and Rossi-Hansberg (2012) measure technology diffusion across time and space named longitude and latitude demonstrating duration and distance of technology diffusion. Their findings indicate that determining technology diffusion over space is essential to determine the speed of technology diffusion. Meanwhile they believe that adoption of a technology requires attaining related knowledge of that technology. Therefore, technological skill and knowledge can be assumed as a determinant of enhancing adoption and speed in diffusing a technology that would be discussed later.

Studies show that IT companies control their agility to observe how they become adopted in technological changes. Lyytinen and Rose (2004) discuss that time and speed is a main factor during technological changes; going through theories regarding agility in technological transformation and model of IT innovation developed by March (1991) and Swanson (1994). They found that agility is influenced by the different stages of technology diffusion during maturation of IT innovations. So through previous studies regarding organisational changes it gets clear that employees' adoption and agility as the most effective determinants in implementing new technologies are manipulated during diffusion process. It is worth considering likewise technology diffusion as an indicator variable to ascertain the presence of adoption and agility in technological changes in this paper.

It should be essentially figured out how employees can adopt new technologies to implement them with more agility. So, the first issue concerned by managers is that how companies can enable their employees to be more adopted and agile in technological changes in order to have satisfactory ones. It is suggested that to increase these two qualities in employees; (employees' adoption and agility in technological changes) they should have related skills regarding new technologies (Kaunt, 2002; Yaghoubi & Rahat Dahmardeh, 2011). Besides, it is found that skilled staff diffuse new technology with more adoption and agility. Rosenberg (1972) in his study finds that skill level of employees is a determinant to diffuse a new technology with more adoption. In their work, Bartel and Lichtenberg (1987) evidence that highly-educated workers who have related skills of new technology accelerate the rate of diffusion in technological changes. Similarly, Attewell (1992) develops knowledge barrier approach to technology diffusion which implies that through lowering knowledge barriers; adoption of technology would be enhanced in time and technology diffusion speeds up. Qin and Nembhard (2010) partially avert that timely workforce knowledge can be a main component in workforce agility to adopt stochastically changes and diffuse technology.

So, this is managers who control changes through appointing employees with proper skills to implement new technologies.

It is obvious that changing from old technologies to new ones and implementing them requires new skills relating to those new technologies but it would take time, energy and money/ budget to train old employees to acquire new skills regarding new technologies due to the fact that they are attached to their job routine. Then, it would be an obstacle for companies to train old employees how to work with and implement new technologies (Polivka & Nardone, 1989).

Furthermore, it might be a threat for old employees since they think their old skills would be devalued and they face tedious jobs (Heffron, 1968) and for employers who think trained employees might go for better jobs or be grabbed by competitors (Christie, Northcott, & Walling, 1990). There is a case study being conducted by Policy Studies Institute (PSI) during 1981-87 to show how new technology can affect industrial employment. It is reported that the direct effect on employment was that there was a decrease in employment related to unskilled shop-floor jobs. The results indicate that due to technological changes, some 'traditional' skills might be removed or declined which are replaced by developing new skills regarding new responsibilities. Meanwhile, in some cases respondents asserted that their jobs got more monotonous rather than before. Besides, some older staff who had manual skills emerged anxiety and opposition toward computerised systems. The case studies averted that there was a lack of proper particular types of skilled staff and moreover it was reported that there was a difficulty to recruit such a type of staff. The increase in requirement and shortage of skilled staff induced companies to invest in systematic training policy in order to have skillful employees related to new technologies. Furthermore, in spite of established outcomes of technological change policies, unfortunately companies faced various barriers to conduct training system in order to have skillful staff related to new technologies to be able to implement them. Those barriers were reported such as shortage of time, workload pressure, cost of staff's off-site training, scare of losing trained staff through joining to better companies or absorbed by them (Christie *et al.*, 1990).

Forasmuch as getting skillful employees through training old ones to have adopted and agile employees has some inconveniences for companies as asserted above, it is attempted to find other policies which can be conducted by managers to overcome those inconveniences caused by getting skilled staff. To increase adoption and agility in constant changes; employees should be also changeable, flexible and updated that is summarised in contingent workforce. Different works related to contingent workforce call it as freelancers, independent contractors, temporary employees, part-time workers (Bureau of Labor Statistics, 2005). Companies can apply contingent workforce system to be agile (Wilson, 2010) because contingent employees are more flexible to quickly develop new skills in comparison

to permanent employees (Gartside, Silverstone, Farley, & Cantrell, 2013) since agility itself is an ability to promptly make solutions and swiftly adopt to environmental changes (Baskerville, Mathiassen, & Pries-Heje, 2005). Through contingent workforce system, skilled employees would be more adopted in continuous changing global marketplace (Daly, 1997). Svedaite and Tamosiunas (2013) in their case study investigate the advantages of contingent employment and conclude that contingent employees have speed in adopting technological development as the majority of the sample was under 25 years old and they were skilled employees. It can be said that age and knowledge might have effects on speed (agility) and adoption of technological change as well. In addition, Hipple and Stewart (1996) stress that contingent workforce includes younger workers in compare with non-contingent workforce.

To complement contingent workforce system; it is demonstrated that companies can follow vintage human capital model that is a skilled employee-oriented model in which it is said that younger employees who are skilled in relatively new technology can adopt technologies within a shorter time than old employees who have expertise in old technology (Weinberg, 2004). In vintage human capital model it is indicated that if employees are skilled in relatively new technology, diffusing of that technology would be higher (Chari & Hopenhayn, 1991; Kredler, 2008). So vintage human capital model can be a base for contingent workforce system, since in vintage model it is emphasized on getting young staff with new skills related to new technology and in contingent workforce strategy it is recommended that contingent fresh employees who have related skills can bring adoption and agility in technological changes more promptly than traditional employees. It can be assumed that fresh skilled employees are those who attain their skills through education or training while old employees acquire their expertise or experience through working with a technology (Helpman and Rangel, 1998).

By and large, up to now it can be realised that skilled contingent employee can quickly (with agility) adopt to changing environmental demand (Gartside et al., 2013) that can be called as highly diffusing in technology or crossing the chasm.

Going through the literature review, it is found that every component of the model of this study is related to each other: for managing technological transformation and changes, employees' adoption and agility are required which are summarised in technology diffusion depending on employees' skill and knowledge that can be observed mainly in fresh younger employees who are contractual ones and diffuse technology more promptly according to vintage human capital model.

Then to answer the question that how companies can enable their employees to be more adopted and agile in technological changes in order to have satisfactory ones; the studies related to technological change management claim that the respond might be skilled contingent employees who can be more adopted and agile in technological changes. This answer is diagrammed in the below model to show the hypothesized relationship of items discussed and their assumed effects on each other:

THEORETICAL MODEL OF THIS STUDY

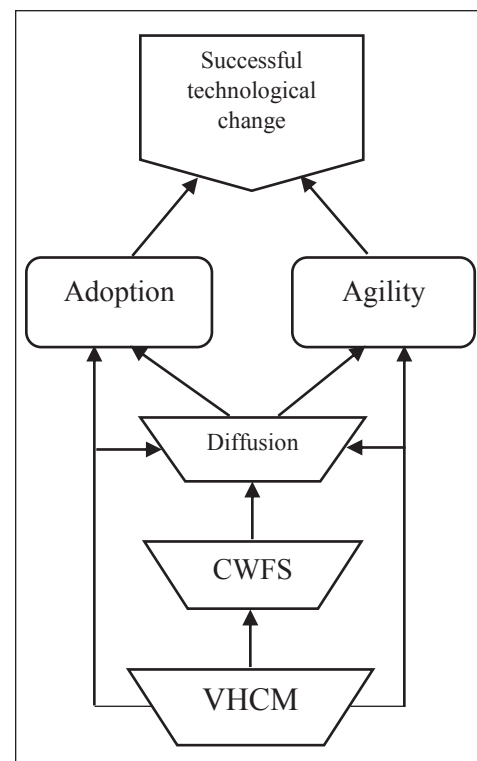


Fig. 1: Theoretical Model of This Study

In short, as it is illustrated in the above diagram which is on the base of studied works and approaches; the model of this paper is inspired by vintage human capital model. From up of the model it is demonstrated that in order to have a satisfactory technological change (hypothesized as a criterion variable), there are two determinants namely, employee's adoption and agility. But to define them in technological change as they are abstract, a process is required to manifest them; that is technology diffusion. Hence in order to find out whether adoption and agility are present in implementing new technologies, those technologies should be diffused (this set is recognised as intervening variables). For that, skillful staff is required which can be gained through designing contingent workforce system on the light of vintage human capital model (contingent skillful staff is determined as a predictor variable).

DISCUSSION

In this paper it is questioned how companies facing constant technological changes can enable their employees to be adopted and agile during implementing new technologies. Through investigating studies related to this issue, it is found that employees' adoption and agility are the most effective determinants in satisfactory technological changes. In order to get these two qualities, scholars suggest different approaches that each has different pros and cons, while exposing all to argue is beyond the scope of this paper. So, after scrutinising approaches, it is realised that contingent workforce system can be the optimal approach for companies in order to have skillful staff with more adoption and agility in technological changes.

It is implicated that change is change with its exclusive qualities; it is continually unstable, unsecure, uncertain, and unfamiliar. So, it causes employees to become stressful and tense in work environment (Ledez, 2008). Especially permanent employees who have expertise in their job role would not adjust to or accept any change in their regular job routine or attain any new skills since they may think they are losing their job role or their old skills would be useless. They are adapted to their traditional workplace then it must be complicated to get them to be adopted and agile in constant technological changes. Therefore, most of works regarding technological changes, suggests and deals with contingent workforce strategy in which it is indicated that contingent employee is apt to change. They are unstable, transient, changeable, and flexible as they are updated, knowledgeable and skilled related to new technology; no need of training them or introducing them to new technology. They are already adopted and agile in implementing new technologies.

However, following up this strategy has some benefits for companies such as increasing adoption and agility in technological changes. It results in some disadvantages for contingent employees themselves. They state that instability, no financial guarantee, termination of contract without any reason, lack of social guarantee and so on are outcomes of their contingent job role (Svedaite & Tamosiunas, 2013). Since this paper is employer-oriented and tries to introduce some strategies to managers as policy makers to develop the optimal policy in order to increase adoption and agility during implementation of new technologies, it is not concerned with those limitations that contingent employees may face. So, in further studies contingent workforce system can be investigated from employees' perspective. Moreover, in this study the ways to enhance the adoption and agility of technological changes are not assessed empirically, therefore the findings cannot be expanded even to similar situations. Besides, the relationships between variables and the impact of each one on the other variables are not examined. It is assumed that in future studies these limitations would be eliminated.

CONCLUSION

In global competitive market, organisations are facing continual technological changes during recent decades. They have to develop these changes and introduce them to employees to get new skills related to new technologies. Employees have to cope with these inevitable technological changes and implement these new technologies. Implementing new technologies requires some employees' qualities such as adoption and agility. It is not assured whether this long procedure gives results in accordance with companies' goals, since regular employees are attached to their regular job environment and there are other obstacles of keeping regular employees to get them trained and skilled to be adopted and agile in recent technologies. Consequently, it can be reached to the point that for attaining adoption and agility in technological changes in organisations, fresh contingent skilled employees are required who can be gratuitously recruited and retired according to internal and external organisation's demands.

To achieve this, vintage human capital model declares that young employees who have related skills are more adoptable and agile in implementing new technology than old employees who are experienced in old technology. This theory is widely discussed in contingent workforce system in which contingent employees are more agile and adopted to technological changes.

Hence, in order to have agile and adopted employees, organisations can recruit contingent ones. Afterwards, to manifest that contingent workforce is agile and adopted in technological changes, there is a theory being called as technology diffusion in which the quickness of adopting new technology is issued that some scholars entitle it as crossing the chasm. Actually through investigating studies regarding diffusion, it is realised that diffusion is a process to show how much a new technology has been adopted with how much agility. Through diffusion theory it is possible to measure the adoption and agility of implementing a new technology.

In addition, vintage human capital model is a proper supplement to affirm that contingent workforce strategy can be a compelling approach for managers to deal with throughout constant environmental changes and challenges.

With regard to above scrutiny surrounding previous theories and models; it can be reached to a conclusion that organisations face inevitably internal and external changes that in this mobilising life it has more effects on technological side as an integral part of organisations which persuades them to change technologically. As far as these technological changes are happening momentarily, there should be more adoption and agility in employees to perform these changes so managers should deftly manipulate

some approaches to develop more adoption and agility in employees who implement these new technologies. With respect to employment which is the first and main issue in implementing technologies, in this paper items participating in employee's adoption and agility are dealt with. Vintage human capital model is considered as a base of this study which supports contingent workforce system and it itself causes employees to diffuse new technologies with more adoption and agility. Afterwards diffusion theory is considered as a scale to perceive the amount of adoption and agility are run during technological changes. Moreover previous studies signify that technology diffusion has a direct relationship with technology adoption and agility. As much as diffusion in technology rises, adoption and agility in implementing that technology increase as well which implies that technology diffusion has a direct relationship with adoption and agility in implementing of technology. Accordingly, the theoretical model for further studies is depicted to hypothesize the relations of the variables that can be investigated in later papers.

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