



**Proceedings of GLOGIFT 08**  
June 14-16, 2008  
Stevens Institute of Technology  
Hoboken, NJ, pp. 758-765

## INFORMATION TECHNOLOGY LED INNOVATIVENESS - UNITED ARAB EMIRATES (UAE) PERSPECTIVE

Zafar Husain\*

### ABSTRACT

*This study focuses on measuring IT led innovativeness of the government and private firms in the UAE. A tool for measuring innovativeness has been adopted and modified to cover innovation strategy, organization, process, learning, linkages, cost reduction and flexibility as dimensions. This study was carried out using questionnaire (Innovation Audit Tool) and was conducted in 52 organizations. Five respondents representing different level in each organization were selected to represent five different levels namely entry level (1 to 2 years), front management level (2 to 5 years), middle management level (5-10 years), high middle management level (more than 10 years) and strategic management level. The key research questions addressed are:*

- 1. Is there a difference in the response of the people at different levels regarding the innovativeness of the firm?*
- 2. Does the IT strategy of the firm influence flexibility of innovation?*
- 3. Is there an impact of work experience on the innovative thinking of the executives?*
- 4. Do the linkages with the firms of the developed countries enhance learning and innovativeness?*

*Stratified sampling was used from the firms registered with chambers of commerce and industries of seven emirates along with several government organizations like police, municipal corporations, oil companies, hotels and other infrastructure companies. This study makes contribution at three different levels to the research in innovation management. First, it focuses on a use of technology in general and information technology in particular as a means of realizing innovation. Second, it adopts innovation audit approach involving people at five different levels, a method that has not been as widely used in management of technology and innovation research. Third, the study clearly demonstrates the potential benefits of innovative thinking of executives on flexibility in strategy formulation. The results show a boat shaped characteristics on innovativeness variables. The innovativeness among the entry level executives is quite high while it reduces among people in the front-level management executives. The innovativeness is rated as lowest in the people in the middle level management executives. The study shows that innovativeness is again rises when people reach to high middle and strategic management level positions. Strategic usage of IT positively influences flexibility in innovation. Linkages with the technology providers and foreign collaborators help enhancing learning and innovativeness.*

**Keywords:** *IT led innovativeness, Flexibility in innovation, Linkages, Learning and Innovativeness.*

---

### Introduction

Technology has been instrumental in transforming economies and societies of many countries in last few decades and the same has been done more rapidly in last few years. Technology has totally changed the way we do business now. To maintain this rapid pace of development,

---

\* Department of Business Administration College of Business and Economics United Arab Emirates University Al-Ain, P.O. Box 17555, UAE

technology itself is undergoing very frequent changes thereby reducing the span of technology life cycle. The firms which can manage technologies effectively have increased considerably their chances of survival and growth. On the other hand a complacent approach to emerging and disruptive technologies could be extremely negative. All the business firms irrespective of their location need to have a robust radar approach for the emerging and disruptive technologies. Information technology has transformed the world most rapidly so far and there is a possibility that it would continue to do so in short future. One of the important characteristics of information technology is that it can be evangelized extremely rapidly and provides immense avenues of innovation to developers and users. Within the business world there is increased uncertainty in terms of future growth predictions and the direction of economy. Till few years before, information technology investment proposals were given high priority and were seldom scrutinized. Now Information technology departments are increasingly called upon to justify every penny they spend and asked to do more with less. Information technology in general and software industry is undergoing its own transformation. The software-as-a-service(SaaS) and service-oriented architecture (SOA) where software is moved to the network for others to subscribe and use, is changing the business model for all the companies. It has also changed the way that information system solutions are planned, analyzed, designed, constructed, delivered and maintained. In view of the above facts and in order to remain competitive, people in the organizations should be in a position to innovatively adopt emerging and disruptive technologies and innovate on acquired and developed information technology. The basic ingredients required to be able to realize innovation are clear idea of how IT led innovation can help compete, what are innovation processes, organizational environment that can nurture innovation culture, top management sponsorship, cordial business relationship with information technology vendors and flexibility in organizational practices that help innovation.

### Conceptual Background

Innovation can be better defined and understood as a process in which the organization creates and defines problems and then actively develops new knowledge to solve them (Nonaka, 1994). The basic inputs required for realizing any innovation in any field are people and knowledge (Husain and Sushil, 1997). Changing business environment AH01- IT Led Innovativeness - UAE Perspective GLOGIFT 08 June 14-16 2008 provides opportunity for innovation. A critical portion of the knowledge and skills required for innovation resides with and is used by people working of the problem situations. The complexity of many modern innovations makes it mandatory to pool in and integrate multiple strands of knowledge in different areas particularly in business and technology. Innovation is intrinsically about identifying and using opportunities to create new products, services, or work practices (Van de Ven, 1986) to fill the business gap which emerges due to changes in environment. Lemon and Sahota (2004) presents culture of innovative organization as a multilayered knowledge repository each layer of which has behavioral qualities and process and store information. Blackler (1995) provides five different categories of organizational knowledge which are termed as embrained, embodied, en-cultured, embedded, and encoded. These categories of knowledge are crucial for making effective innovations in an organization.

Burgelman et al (2004) defines innovation capabilities as a comprehensive set of characteristics of the organization that helps identify, facilitates, promotes and supports its technological innovation strategy. Innovation capabilities are developed by an organization based on its (people's) knowledge of technology being used, products and services that are delivered, processes knowledge and understanding and the experience in the industry.

Technology resource component is becoming increasingly important for the firms operating

### *Information Technology Led Innovativeness-United Arab Emirates (UAE) Perspective*

in intensely competitive environment (Hanies and Sharif, 2006). People convert knowledge into innovation to explore a possible opportunity in the business environment or to overcome a potential threat. They need a conducive environment wherein the innovative ideas are given due consideration before they are acted upon or not. For people suggesting innovation, it is expected that they have a clear idea of how technology in general and information technology in particular can help their organization compete. Innovation strategy of the firm is clearly communicated and understood by people across the organization. People in the organization should also be aware of how their firm is placed in terms of information technology in comparison to competitors (Husain et al, 2005). The management values their opinion to combat IT led innovation challenge. The top management sponsorship and commitment to develop state-of-art IT solutions is clearly visible from its action from time to time. The top management has a shared vision for managing technology and technology led services. For this purpose, technology reviews are undertaken periodically to maintain or to attain technology leadership in the industry. Business strategy clearly encourages and allocates resources for innovation projects (Husain and Sushil, 1996).

#### **Methodology**

On the whole information technology led innovation capabilities are based on a numerous issues. This study is a part of an ongoing study and addresses IT led innovation AH01- IT Led Innovativeness - UAE Perspective GLOGIFT 08 June 14-16 2008 capabilities of the firms based on peoples' knowledge and understanding of technology, business processes, customer needs, competitions, emerging and disruptive technologies, flexibility in organizational practices, relationship with vendors, effectiveness of cross-functional teams, and timeliness of innovation activities. The study also focuses on organization structural constraints, IT capabilities of the firms in the same industry, learning from own success and failures, collaborative working with key firms across the countries, role of communication and diffusion in innovation, top management sponsorship, reward and recognition, review processes to critically analyzing the innovation, and ability to protect the same from getting copied. Presented study also takes a closer look at flexibility in organizational practice to promote innovation culture, flexibility in innovation strategy and flexibility in innovation mechanism and its effect on innovation capabilities. This study focuses on measuring IT led innovativeness of the government and private firms in UAE. A tool for measuring innovativeness has been adopted (Tidd et al, 2005) and modified to cover innovation strategy, organization, process, learning, linkages, cost reduction and flexibility as dimensions. The key research questions addressed are:

- Is there a difference in the response of the people at different levels regarding the innovativeness of the firm?
- Does the IT innovation strategy of the firm influence flexibility of innovation?
- Is there an impact of work experience on the innovative thinking of the executives?
- Do the linkages with the firms of the developed countries enhance leaning and innovativeness?

Stratified sampling was used from the firms registered with chambers of commerce and industries of seven emirates along with several government organizations like police, municipal corporations, oil companies, hospitals, hotels, electricity, water other infrastructure companies. This study was carried out using questionnaire (Innovation Audit Tool) and was conducted in 52 service organizations which are offering innovated products and services mainly through information technology medium. These organizations include leading IT solutions developers, banks, hotels, insurance companies, telecom companies, government departments, and some non-profit organizations. Five respondents representing different levels in each organization were

selected to represent five different levels namely entry level (1 to 2 years), front management level (2 to 5 years), middle management level (5-10 years), high middle management level (more than 10 years) and strategic management level. This study makes contribution at three different levels to the research in innovation management. First, it focuses on a use of technology in general and information technology in particular as a means of realizing innovation. Second, it adopts innovation audit approach involving people at five different levels, a method that has not been as widely used in management of technology and innovation research. Third, the study clearly demonstrates the potential benefits of innovative thinking of executives on flexibility in strategy formulation.

### Data Analysis

The innovation audit tool which was used for this survey consists of 48 items. Respondents were requested to rate their responses on a 1 to 7 rank 1 indicating not true and 7 indicating very true. After applying principal component factor analysis with Varimax rotation was taken to achieve simplified factor structure (Hair et al, 2006 Page:137) which converged in 13 iterations, six major factors having Eigen value of more than 1.0 were identified covering 74.97 % cumulative explained variance. Cronbach's Alpha for sample reliability was measured 0.912 which is much higher than acceptability limit of 0.70. Four items did not show loading on any of the selected factors and were eliminated from the further analysis. Based on the items found loaded on six factors they are names innovation strategy, innovation process, organizational helpfulness, linkage, learning and innovation flexibility.

The naming has been done considering the variables found loaded on a factor. For example items such as organization structure is helpful in innovation to happen, people work together to in cross functional teams for IT projects, people are involved in suggesting ideas to fill up gaps in information systems, innovation communication is effective across the organization, reward and recognition system support innovation process and supportive climate for realizing IT innovation were found loaded on a factor has been named as organizational helpfulness. For subsequent analysis summated scales were created by combining several individual variables loaded on the same factor in a single composite measure (Hair et al, 2006 Page: 135).

Table 1 presents average values of six factors. It also presents the averages of these factors by five categories of users at different level of management in their respective organizations. It was noted with interest that averages of all six factors were considerably high for entry level and strategic management level executives. While front level management, middle level management and high middle level management executives averages are low on organizational helpfulness and innovation flexibility.

The lowest average values have been shown by middle level management executives with experience of 5 to 10 years on all six factors except for learning. The average values for learning is quite consistent in comparison to other factors.

Table 1: Average Values of Responses on Selected Factors

S.No.	Variable Name	Overall Averages	Entry Level Executive	Front Management Executives	Middle Management Executives	High Middle Management Executives	Strategic Management Executives
01	Innovation Strategy	5.04	6.1	4.5	4.2	4.8	5.6
02	Innovation Process	5.32	5.9	5.1	4.5	4.9	6.2
03	Organizational Helpfulness	4.84	4.5	4.9	3.9	5.0	5.9
04	Linkage	5.42	5.5	4.8	5.0	5.5	6.3
05	Learning	5.60	6.2	5.01	5.6	5.6	5.6
06	Innovation Flexibility	5.91	6.05	5.81	5.5	5.7	6.1

Information Technology Led Innovativeness-United Arab Emirates (UAE) Perspective

Figure 1 shows the above results in graphical format to bring more insight. The boat shaped characteristics is shown in the all the factors except for innovation strategy. This boat shape curve indicates that the innovativeness of the people is reasonably high when they join the organization at the entry level position. It takes a dip when they rise to front level management positions. It is at minimum when they at middle level management positions.

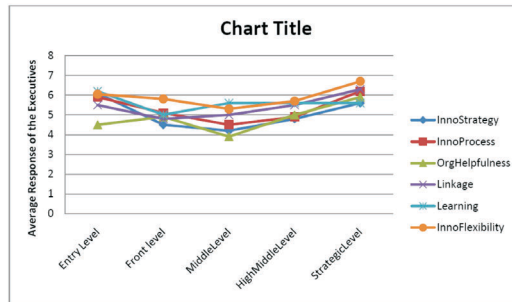


Figure 1: The Innovativeness Characteristics of Executives at Different Levels

If we consider if these six factors covers the innovativeness of the people working in the organizations, then one can note from the above diagram that it starts picking up again once people reaches high middle and strategic positions. Table 2 presents Pearson two-tailed correlation of the six factors. All six variables are showing strong correlation with each other at 0.01 significance level. It can therefore be considered that all six factors put together cover a significant part of IT led innovativeness of the people at different levels of management.

Table 2: Pearson Two-Tailed Correlation Matrix

	Innovation Strategy	Innovation Process	Organizational Helpfulness	Linkages	Learning	Innovation Flexibility
Innovation Strategy	1	.899(**)	.862(**)	.787(**)	.816(**)	.858(**)
Innovation Process	.899(**)	1	.846(**)	.810(**)	.797(**)	.839(**)
Organizational Helpfulness	.862(**)	.846(**)	1	.795(**)	.773(**)	.862(**)
Linkage	.787(**)	.810(**)	.795(**)	1	.828(**)	.771(**)
Learning	.816(**)	.797(**)	.773(**)	.828(**)	1	.773(**)
Innovation Flexibility	.858(**)	.839(**)	.862(**)	.771(**)	.773(**)	1

\*\* Correlation is significant at the 0.01 level (2-tailed).

After initial data analysis it was decided to take up interviews with selected respondents in each category to develop more insights in the results and interpretations. Twenty five such interviews from over fifteen organizations were conducted and five interviewees were chosen from each level. The respondents for interviews were chosen through researcher’s judgment based on availability and interest shown by the people in the study. Figure 2A presents the averages for innovativeness variables for people at the entry level in the organizations. In this case innovation flexibility and learning are having higher values indicating that innovation flexibility encourages learning. People at the entry level are now appropriately qualified for the job they are in. Since they are at the entry level positions, organizational helpfulness is seen as a major problem in realizing the innovation. They find innovation process quite suitable to match their educational background and nature of work and therefore rating it as quite high (5.9 while ideal

is 7.0). Many entry level executives expressed satisfaction with the innovation strategy of the organization and it is being reflected in the value of this variable (6.1 while ideal is 7).

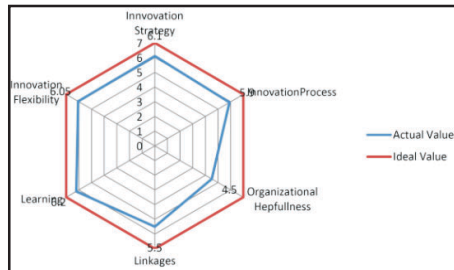


Figure 2A: Averages of Entry-Level Executives

Figure 2B exhibits the innovativeness perceptions of the front level management executives. Front level executives rate linkage and innovation strategy variables as quite low. They consider innovation flexibility as an important tool to promote innovativeness in the organization. Front level management executives have indicated organizational helpfulness higher than entry level executives, because of the experience of working with the same organization has helped them understand the organization structure better. Figure 2C deals with the averages on six innovativeness variables as indicated by middle management executives. All the six innovativeness variables indicate that innovativeness of the middle management executives has dipped significantly. Primary reasons expressed for this trend is increased work pressure, assuming responsible positions and avoiding risk to get promotion for next higher position. One of the important reasons mentioned by some very sporting executives is that they find entry level and front level people more appropriately trained and qualified on the IT related jobs. This is true to great extent as the local society is undergoing a tremendous change as far as the quality of education is concerned. This is getting reflected in the executives at different levels of management.

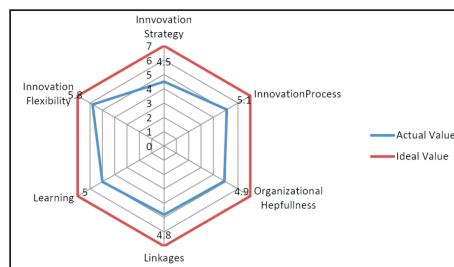


Figure 2B: Average Responses of Front Level Management Executives

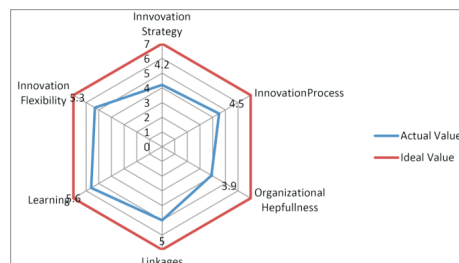


Figure 2C: Average Responses of Middle Level Management Executives

*Information Technology Led Innovativeness-United Arab Emirates (UAE) Perspective*

Interestingly enough the averages for six factors are increasing for high middle level management and strategic management executives. Figures 2D and 2E exhibit the increased inclination for IT led innovations in upper echelons of management. The high middle management executives perceive linkage or collaboration with technology providers or franchiser as a major source of aspiration for IT led innovations. They attach huge importance to linkage and innovation flexibility.

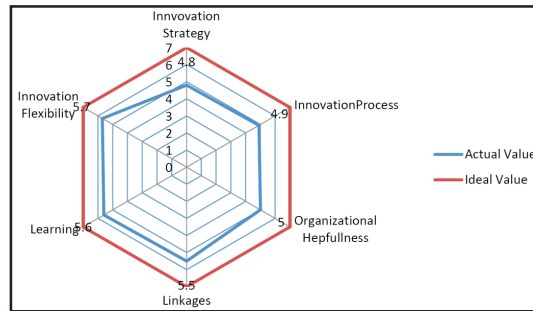


Figure 2D: Average Responses of Higher Middle Management Executive

As far as strategic management executives are concerned, they attach tremendously high importance to innovation flexibility, innovation strategy, linkage, learning and innovation process. People at this level exhibit high degree of innovativeness in order to acquire and maintain leadership position. Interviews in certain government and monopolistic organizations revealed that strategic management is highly motivated and strive for technological sophistication (Courtesy UAE local government policy). In certain cases they found to be even better then technology providers in the core areas of operations for example in oil and gas, and in hotel industry.

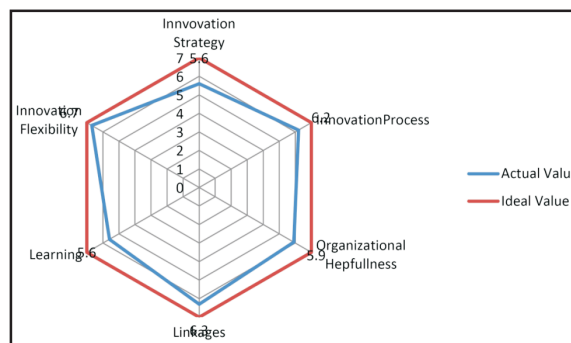


Figure 2E: Average Responses of Strategic Management Executives

**Study Limitations**

The work presented in this article is a part of a ongoing study and like all other research projects it also has its set of limitations. This study faces serious limitation of generalization as the sample size is only 52 organizations and 260 respondents from a universe of around two thousand odd companies where all five levels of management are involved in IT led innovations of business operations. A confirmatory factor analysis exercise with either split samples in the original data set or with an altogether different data set preferably in a different location could improve generalizability of results to the acceptable limits. More in-depth interviews could help find reasons for different innovativeness levels at different levels of management.

## Conclusion

Six factors identified after principal component factor analysis were assumed to be explaining the IT led innovativeness of the people in organizations. The sample was divided in the five distinct categories of executives representing different management levels. According to the results of the innovation audit entry level, high middle management and strategic management executives have showed higher innovativeness while front level and middle management level executives showed reduced innovativeness. A boat shaped characteristic was observed on all six factors. The interesting phenomenon which has been observed in this study is innovativeness is higher at the entry level which reduced while people in front and middle management level and it increases again in higher middle and strategic management people. So it can be concluded that work experience does affect the IT led innovativeness of the people. Strong correlation was observed between IT innovation strategy and innovation flexibility. Linkage and foreign collaborations are having a positive impact on learning and overall innovativeness of the people.

## References

- Blackler, F., (1995), Knowledge Worker and Organizations: an overview and interpretation, *Organizational Studies*, 16(6), pp 1021-1046.
- Burgelman, R., Maidique, M.A., Wheelright, S.C., (2004), *Strategic Management of Technology and Innovation*, McGraw-Hill New York, pp 8-20.
- Haines J.D. and Sharif N.M., (2006), A Framework of Managing Sophistication of the Components of Technology for Global Competition, *Competitiveness Review*, 16(2), pp 106-121.
- Hair J.F. Jr., Black W.C., Babin B.J. Anderson R.E., Tatham R.L., (2006), *Multivariate Data Analysis*, Sixth Edition, Pearson Education International.
- Husain Z., Sushil, (1997), Management of Technology: Learning Issues for Seven Indian Companies, *Technology Management: Strategies and Applications*, Volume 3, pp 109-135.
- Husain Z., and Sushil, (1997), Strategic Management of Technology – A Glimpse of Literature, *International Journal of Technology Management*, 14(5), pp 539-575.
- Husain Z., Pathak A.K., Vyas R.K., (2005), Management of Information Warfare: Emerging Paradigm, *International Journal of Information Technology and Management*, 4(1), pp 25-67.
- Lemon M., and Sahota P.S., (2004), Organizational Culture as a Knowledge Repository for Increased Innovative Capacity, *Technovation*, 24(2004), pp 483-498.
- Nonaka, I., (1994), A dynamic theory of organizational knowledge creation, *Organization Science* 5, 14–37.
- Tidd J., Bessant J., Pavitt K., (2005), *Managing Innovation – Integrating Technological, Market and Organizational Change*, Third Edition, John Wiley and Sons Ltd.
- Van de Ven, A. H., (1986), Central problems in the management of innovation, *Management Science*, 32, pp 590–607.