

ASSESSMENT OF THE INNOVATION CAPABILITIES OF SOFTWARE COMPANIES IN EGYPT

Mohamed El-Nawawy¹, Bassem A. Abdullah², M. M. Awany³

¹Technology Innovation and Entrepreneurship Center

²Ain Shams University/Technology Innovation and Entrepreneurship Center

³Nile University, Director of Technology Management Program

Abstract

In this paper a study of innovation management for software SMEs in Egypt is presented. IMP³rove online innovation assessment tool has been used to evaluate innovation management of a sample software company in Egypt, which could be generalized to a wide range of software SMEs in Egypt. The dimensions that guide the assessment are measured. These include perception of innovation in a firm; evaluation of the complete product lifecycle from idea generation through product development and launching in the market until it is off the market, drivers for innovation, and the outcome of implementing innovation processes. Different innovation capabilities assessment tools suggested by researchers have been compared to check their comprehensiveness for including the various factors seem necessary. IMP³rove assessment tool has been chosen. It provides rating of innovation capabilities of a firm by answering its online questionnaire and automatically comparing the firm's scores to the average score of companies in its benchmarking class in addition to the score obtained by best practice companies in this class and incorporates all these results in a report which starts with aggregated results for all dimensions of innovation down to detailed results for each question.

The results of this study highlight the main strengths, weaknesses, and barriers to innovation in the sector and provide recommendations including the importance of adopting Knowledge Management system. It also gives insights for further developments.

Keywords

Innovation Management; Small and Medium Enterprises (SMEs); Innovation Assessment; Information and Communication Technology (ICT);

Introduction

In the past, business success has often come serendipitously, with good ideas being translated into product and production process technology by energetic, committed people.

However, nowadays, the technical complexity of products, services, and processes, the resource requirements, and length of time necessary to achieve success; are factors that reduce the viability of approach relying heavily only on good luck, unstructured efforts and good ideas from bright people. Innovation continues to be crucial for any enterprise to succeed in business.

For sustainable profitable growth in competitive markets, a firm should adopt innovative ideas that lead to products, processes, and/or services; which satisfy customers' changing needs and expectations (Subin et al., 2013), (Sára et al., 2013). In any field; an innovation is something original, new, useful, and valued by target customers which will then break in and obtain a foothold in an economic market or society (Frankelius, 2009). Innovation management addresses the capability to manage organizational changes that involve improvement and development leading to an increase in the competitiveness of a company (Fejes, 2013). The focus of innovation management is to allow an organization's response to external and internal potentials, and make use of its creative efforts to develop new ideas, processes or products (Kelly, 1978).

A systematic way of analysis and planning becomes essential activity required to help ensure that all important aspects are in place to enable the origination for innovation.

Measuring innovation capability of an organization is, therefore, crucial to the sustainable success and giving insight look into how this organization is running its business.

This paper attempts to assess the innovation capabilities of the Egyptian SMEs' software industry. A representative sample of a small to medium enterprises was selected for the assessment process. The IMP³rove assessment tool has been chosen to be used in for assessment. The tool allows, as well, the evaluation of the company's performance in innovation management compared to other companies in the same industry sector, country, size and age.

Collected data has been manipulated on-line, and analyzed in order to derive the conclusions and the recommendations.

The importance of Egyptian SME in ICT

SMEs are increasingly important component of the industrial structure in particular in Egypt where there are high population, a good percentage of graduates, and a relatively low income society. Since, SMEs are considered- worldwide, the key drivers behind innovations and creative entrepreneurship and with the rapid pace of

technological change and fierce competition; the ability of SMEs to innovate is becoming more significant in order to lend competitive advantage edge to firms, industries and ultimately economies

In the last couple of decades, the ICT sector in Egypt has emerged strongly and highly contributing to its economy. Perhaps this is due to the considerable number of Egyptian graduates in the field and the relatively modest investment required for the start-up enterprises in the field.

According to the Information Technology Industry Development Agency (ITIDA) online database, statistics showed that the SMEs in software sector count for about 50% of SMEs in the whole ICT sector which reached 603 enterprises in year 2010 (www.itida.gov.eg).

This research paper can be considered as a step to set the stage for driving the innovation in the sector. Due to the importance of the field many research activities should be done focusing on SMEs in software, and investigate whether or not they acquire the necessary factors to be able to innovate. The analysis of the sector is a crucial step to provide the practitioners, academia and policy makers with the necessary information about the sector's performance, innovation capability, the barriers and strengths and weaknesses. More importantly, the research will help in fostering the innovation in the sector's SMEs thus enhance their performance and elevate the national economy.

The objective of this research work

The objective of this research work, therefore, is to assess the innovative capabilities of the software development SMEs in the Information and Communication Technology (ICT) sector in Egypt through the measurement of the critical success factors in the organizations.

There are two ways that innovation can be used to boost a company's competitive edge:

- Process innovation can lead to more cost-effective ways of working so that a company can provide a product or service at a lower cost, and/or higher quality than its competitors.
- Product and/or service innovation can lead to a company's offerings differentiated products/services from those of its competition.

If a business can achieve both a high level of distinctiveness in its products/ services to attract customers, and provide those products/ services at a relatively low cost and high quality, then that business is able to compete from a very strong strategic position.

Innovation is a key driver for business success but many managers struggle to decide which action to take to improve their organization's innovation performance. This is the core objective of this research work.

The study results will highlight the main strengths, weaknesses and barriers to innovation in the sector and provide recommendations and insights for further developments.

The setting

One selected enterprise that represents the majority of the similar SMEs enterprises in software in Egypt has been chosen.

The company is an Egyptian software company, which is medium to small sized with 15-20 employees, 2 years age and 1.8 million Euros as income from sales in the last year. Public research grants account for 10% of this income while exports contribute to 80% of it and 10% for sales within Egypt. The company expenditures on innovation for the last year are 60 thousand Euros while the operation margin from innovation for the last year is estimated as 50% of total operational profit. This operational profit from innovation is distributed among different types of innovation as 40% for product innovations, 20% for service innovations, e.g. sms service for credit card payment, 20% for process innovations, 10% for organizational innovations, e.g. enhancing the role of HR in motivating employees for innovation, and 10% for business model innovations, e.g. online services. The company's internal growth, i.e. growth from income from sales of own products, accounts for 50% of its profit growth, whereas, merging with other companies constitutes 50% of its profit growth, which makes it a common case for Egyptian software companies which rely on merging with international companies to achieve growth.

The assessment tool

A tool for assessing the innovation capabilities of an enterprise is needed in order:

- To identify the processes that drive innovation which combine the core and the enabling processes;
- To develop performance measures for each of the processes of innovation such that the overall impact of innovation on competitiveness can be assessed;
- To allow companies to audit their innovative capacity by measuring the overall innovation performance; and
- To enable companies to improve the processes and achieve better performance.

Many researchers and authors have suggested assessment or auditing tools with various key parameters, or different dimensions. Yet they all circle around almost similar concepts perhaps with different naming, different combinations, and/or depth of details.

Table 1 (Chiesa et al., 1996), (Jong, 1999), (Neely et al., 1999), (www.novaknowledge.ns.ca), (www.shef.ac.uk) shows a comparison of some of the

tools suggested by different authors as including the key factors affecting the innovative capability:

Table 1 Comparison of Innovation Assessment Tools

	Dimensions (Factors)	Neely & Hii	Chiesa & Others	Jong & Brouwer	Sheffield	Nova Scorecard	ICI	IMP³rove
1	Culture	●	●	●	●		●	●
2	Product Innovation		●		●	●		●
3	Product development		●		●	●	●	●
4	Production process innovation		●		●	●		●
5	Technology acquisition		●			●		
6	Market Focus		●		●			
7	Leadership		●			●	●	
8	Resource Provision	●	●			●		
9	System and Tools	●	●	●		●		●
10	Increased competitiveness	●	●		●	●	●	●
11	Strategy		●	●				●
12	Structure			●	●		●	●

Other tools in literature include the BSC as introduced by Kaplan and Norton (Kaplan et al., 2001). The BSC evaluates the overall performance of an organization by integrating financial measures with other key performance indicators such as customer views, internal business processes, organizational growth, learning and innovation (Banker et al., 2004). However, for the BSC performance, while

considering several relevant dimensions of organizational performance, does not clearly define how to weight their relative importance within a comprehensive framework (De Felice et al., 2013). There are a lot of decision-making tools such as MACBETH (Measuring Attractiveness by a Categorical-Based Evaluation Technique) (Multicriteria, 1992), ELECTRE (ELimination and Choice Expressing Reality) (Roy, 1968) and PROMETHEE (Preference Ranking Organization Method for Enrichment Evaluations) (Brans, 1997). However, they are not popular for multi-criteria decision-making (Saaty, 2005).

IMP³rove assessment tool

The IMP³rove tool has been chosen due to its comprehensiveness, well establishment, online data manipulation, and providing comparison with other companies in benchmarking class (www.improve-innovation.eu).

The tool measures the company's innovation management in five dimensions, namely, innovation strategy, innovation lifecycle processes, innovation organization and culture, enabling factors, and innovation results.

Innovation strategy, mainly, indicates the perception of innovation in a firm and how it is planned and documented.

Innovation lifecycle processes include the evaluation of the complete product lifecycle from idea generation through product development and launching in the market until it is off the market.

Innovation organization and culture focus on both external and internal factors affecting innovation performance. A partnership is an example of external issues, while employees' tendency for innovation is an example of internal.

Enabling factors address drivers for innovation in a firm, such as number of patents generated which are the results of new ideas. This directly affects development of new products, services or processes.

Innovation results measure the outcome of implementing innovation in a company in terms of income, revenue, and company's growth. That is company's performance.

The process

Data has been collected from the authorized personnel of the company on-line through questionnaires. The company has been contacted while being available on site in order to answer any query in during answering the questions, and to assist them in entering data to the online assessment tool and to validate these data.

The results

Table 2 shows the key results for the assessment:

Table 2 Key Results for Assessment

Question	Result	Average (mean of the scores of all companies in relevant company's benchmarking class*)	Growth Champions (Top 10% of companies with the highest rates of sales, employment and operational margin value growth in company's benchmarking class*)
Ratio of income from sales of product innovation to total income (Innovation Results)	0.05	0.23	0.53
Assessment of innovation projects systematically (Innovation Strategy)	3	4.8	4.8
Number of radical ideas generated and recorded (Innovation Lifecycle Processes)	5	26	13
Average ratio of expenditures on innovation to total income (Innovation Results)	0.04	0.43	0.25
Time for an idea to be selected and to get to development phase (Innovation Lifecycle Processes)	30 days	55 days	30 days

Inclusion of design specialists in decisions at key milestones (Enabling Factors)	6	4	4
Average cost reduction from innovation in percentage of total cost (Innovation Results)	10%	6%	2%
How do your customers view your firm's capacity for innovation (Innovation Organization and Culture)	4	5.4	5.5

*The benchmarking class chosen by company for comparison with its own results includes companies from own industry sector and all countries.

Analysis of the results

In the following the result of each innovation dimension is discussed.

For Innovation Results dimension: It is clear that the company has low expenditures on innovation, which consequently results in low income from sales of innovative products.

However, applying innovation measures in the company has reduced costs.

For Innovation Strategy: the company has low score in assessing innovation projects

For Innovation Lifecycle Processes: the company has a low number of radical ideas generated and recorded. On the other hand the time for an idea to be selected, and to get to the development phase indicates the company is performing well in this parameter.

For Enabling Factors: the company has a high score concerning inclusion of design specialists in decisions.

For Organization and Culture: The company's level of the perceived capacity for innovation by customers is relatively low.

Conclusions

Considering this company as a sample of the SME software industry in Egypt, and according to the discussions above; one may conclude the followings main issues:

(a) Companies are lacking clear vision for an innovation strategy which results in poor planning for innovation projects. This is clear from the score of the question for assessment of innovation projects systematically.

(b) Companies are lacking clear procedures for idea management. This is clear from the low number of radical ideas generated. This negatively affects the product lifecycle.

(c) Companies need to develop a marketing plan to gain customers trust

For the management of new idea, it is suggested to establish criteria for selecting ideas based on costs for production, production feasibility, and sustainability. Accordingly, the company should allocate a reasonable budget for the most promising ideas through developing and launching phases, which will consequently increase income from innovation as new ideas develop to new products, which satisfy the demand by market. Moreover, for better project planning, it is suggested that companies could consider the adoption of document management system (Knowledge Management) by creating reports on design methodologies, best practices, obstacles, success and failure,.etc. These reports and documents are to be turned into digital format and disseminated to the relevant employees of the company.

Finally, companies need to make efforts in communicating with present and potential customer and to demonstrate clearly their profile to them and performing demonstrations of its previous successful projects.

Acknowledgement

The authors would like to thank Technology Innovation and Entrepreneurship Center, TIEC, for allowing them to use data constituting basis of this paper.

References

- [1] Banker RD, Chang H, Janakiraman SN, Konstans C (2004) "A balanced scorecard analysis of performance metrics," *European Journal of Operational Research* 154: 423–436.
- [2] Brans JP, Macharis C, Mareschal B (1997) *The GDSS Promethee*. Vrije Universiteit Brussel, STOOTW/277.
- [3] Chiesa, Vittoria. Coughlan, Paul. & Voss, Chris A. (1996) "Development of a Technical Innovation Audit", *Journal of Product Innovation Management* 1996; 13:105 - 136.2.

- [4] Fabio De Felice and Antonella Petrillo (2013) “Key Success Factors for Organizational Innovation in the Fashion Industry,” *International Journal of Engineering Business Management*.
- [5] Fejes, J. (2013) “Innovációvezérelt vállalatirányítás: stratégiai megközelítés,” Working paper, Budapest University of Corvinus, Budapest.
- [6] Frankelius, P. (2009) “Questioning two myths in innovation literature”, *Journal of High Technology Management Research*, Vol. 20, No. 1, pp. 40–51.
- [7] www.improve-innovation.eu
- [8] www.itida.gov.eg
- [9] Jong, de J.P.J., Brouwer E. (1999) ”Determinants of the innovative ability of SMEs”, EIM Small Business Research and Consultancy.
- [10] Kaplan R, Norton D (2001) “The strategy-focused organization: how balanced scorecard companies thrive in the new business environment,” Harvard Business School Press, Boston. Massachusetts, ISBN1-57851-250-6.
- [11] Kelly, P. and Kranzburg M. (1978) “Technological Innovation: A Critical Review of Current Knowledge,” San Francisco: San Francisco Press.
- [12] Neely, Andy & Hii ,Jasper (1999) “The Innovative Capacity of Firms”, The Judge Institute of Management Studies, University of Cambridge. Report commissioned by the Government Office for the East of England.
- [13] NovaKnowledge Innovation Scorecard, Idea House Group Development Inc (2003), www.novaknowledge.ns.ca, 2001.
- [14] Saaty (2005) *TL Theory and Applications of the Analytic Network Process: Decision Making with Benefits, Opportunities, Costs, and Risks*. RWS Publications, Pittsburgh.
- [15] Sheffield, www.shef.ac.uk/~iwp
- [16] Subin Im, Mitzi M. Montoya, John P. Workman Jr. (2013) “Antecedents and Consequences of Creativity in Product Innovation Teams,” *Journal of Product Innovation Management*, Volume 30, Issue 1, pages 170–185, January 2013.
- [17] Roy B (1968) Classement et choix en présence de points de vue multiple (la méthode ELECTRE). *La Revue d'Informatique et de Recherche Opérationnelle (RIRO)*; 2: 57–75.
- [18] Vincke PH (1992) *Multicriteria decision-aid*. John Wiley & Sons, New York.
- [19] Zoltán Sára, Dr. Zoltán Csedő, József Fejes, Tamás Tóth, Dr. Gábor Pörzse (2013) “Innovation Management in Central and Eastern Europe: Technology Perspectives and EU Policy Implications,” *Journal of Economics and Sustainable Development* ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online) Vol.4, No.4.