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THE INTERRELATIONSHIPS BETWEEN QUALITY MANAGEMENT PRACTICES AND THEIR EFFECTS ON INNOVATION PERFORMANCE

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ABSTRACT
Quality improvement initiatives have positive results in cost reduction, increased productivity and provide competitive advantages in the marketplace. However, the question is whether the concept of quality and innovation are complementary or competing strategies. Are there specific approaches in the implementation of quality systems that provide satisfactory results on both sites? Performances of analyzed companies suggest that quality is necessary but insufficient in business today. The primary purpose of this study is to explore the relationship and mutual influence between quality management practices and innovation performances. The findings suggest that there are areas with positive relationships between these two strategies that managers can focus to improve innovation performance.

Keywords: Quality management, continuous improvement, soft and hard tools, incremental innovation, radical innovation

1. INTRODUCTION
Quality and innovation have traditionally been seen as competing rather than complementary goals. *'Quality is doing things better; innovation is doing things differently'*. Some argued that quality management focuses on incremental improvement and satisfying existing customers whereas innovation management emphasizes breakthrough improvements in products and processes and focusing on acquiring new customers, [1].

Philosophy of total quality management (TQM) is associated with two major components known as 'soft and hard' tools. "S*oft tools*" are focused on satisfying customers' requirements, providing training to employees, teamwork, cooperation among employees, commitment of top management, involvement of employees etc. "*Hard tools*" include the continuous improvement, process control, as well as all aspects of measurement, standardization, testing, quality management, and certification for conformity assessment.

Innovation is a multidimensional process which does not exclusively result from R&D. It can be classified as radical or incremental. Radical innovations usually comes from R&D activities and after translation into new products and/or processes, open new markets and new investment opportunities. Incremental innovation, even if it may take place within R&D departments, typically builds on existing technologies, products, services, or routines and modifies them to some degree.

Exploration of links between TQM and innovation as two business strategies is recently started. Thus, the purpose of this paper is to examine and summarize recent studies, show mutual influences / relationships between particular variables, and to identify gaps for further research.

1.1. Relationship between TQM and Innovation

Relationship between TQM and innovation is complex and depends of many different factors. TQM philosophy includes everybody in the system of continuous improvement. It is possible to achieve this when employees have certain autonomy (space and responsibility) to innovate and make decisions, where continuous improvement comes from learning from mistakes. Thus, organizations adopt innovations in two main ways: by imitating or by developing their own.

Human Resource Management, process management, strategic management open type organizations have a positive impact on innovation, [2]. Data collected from ISO 9001 certified manufacturing and service organizations also indicate that there is a positive correlation between TQM and innovation including: radical (product and process), incremental (product and process) as well as innovation in the administration area. Results also show that the models of quality management directly or indirectly are related to innovation, [3], [4]. Process management directly and positively affects all types of innovation. Its contribution to radical innovation of products is notably lower than to other types of innovation such as incremental product and incremental process, radical processes innovations and innovation in the administration, [3].

There is a positive relationship between (ISO 9000) and innovation for certain types of innovation. Thus, there is also a notable relationship between the level of quality that the organization achieves and different types of innovation. In particular, it can be noticed between firms that maintain a high level of quality that is reflected in the most innovative organizations, but only on certain types of innovation. Organizations with low and medium quality levels have less impact on innovation, and they are mainly related to the field of new and improved products, and implemented innovation projects. Organizations that want to achieve a higher level of innovation must have the ability to meet certain standards of quality. In other words, TQM is a prerequisite for it, [5].

2. RESULTS AND DISCUSSION

Recent results strongly confirm the link between innovation and the so-called hard components of TQM. Investing in hard components of TQM, such as standardization and quality control, increases the innovation performance probability, but results depend on the size and profile of the organization, etc. Figure 1, [6], [7]. One of numerous studies on this issue deals with analysis of the results of quality and innovation for a number of leading U.S. Companies Table 1, [8].

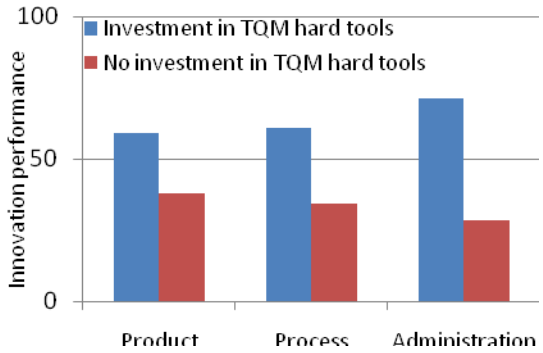

Figure 1: Effects of investment in hard on innovation performance (qualitative diagram) **[6]**

Table 1: Company's perspective of innovation **[8]**

	Balanced companies	**Quality-Oriented companies**
TQM	• More proactive & amenable to taking risk, • emphasized both *Hard tools & Soft tools*	• More reactive & risk-averse • emphasized *Hard tools* only
	Focused on development of: • new customers & markets, • facilities, services and products, • Strategic partnerships	Focused on: • meet the requirements of existing customers rather than seeking for new ones • cutting costs everywhere, • meeting present needs,
Innovation	Devoted to new product development	Devoted to improving quality of existing products
	Perceive innovation as a means to improve quality	Perceive innovation as ultimate goal

Balanced companies emphasized use of both soft and hard tools while quality oriented companies emphasized use of hard tools. These two groups of organizations see innovation differently: balanced companies are more devoted to new product development and quality oriented companies are more devoted to improving quality of existing products, [8] Thus, balanced companies see the new product development as a means to improve quality while quality oriented companies see innovation as the ultimate goal, [8].

Linking TQM and innovation in this paper, special focus is paid to the soft and hard TQM variable separately, modeled by Structural Equation Modeling (SEM). Soft tool variable (strategic planning, management commitment, customer focus, employee involvement, training, teamwork), and hard tool variable (standardization, quality control, continuous improvement), are explored and their effect on innovation areas (such as product, process, administration). The results are summarized in the literature review synthesis matrix, Table 2. Several of these interrelationships are well defined in the literature. Still, there are many of the relationships that are not well defined or explored at all.

Table 2: Relationship between TQM and innovation: findings by using Structural equation modeling

TQM \ Innovation Area		Product	Process	Administrative
Soft tools	Strategic planning	No direct and positive relationship, [9] Positive and significant relationship, [10]	• No direct and positive relationship, [9]	• No direct and positive relationship, [9] • Positive and direct relationship between, [9]
	Management commitment	No direct and positive relationship, [9] Positive and significant relationship, [2], [10]	• No direct and positive relationship, [9] • Positive and significant relationship, [2]	• No direct and positive relationship, [9] • Positive relationship (Reflected in managerial thinking), [9], [11], [12]*.
	Customer focus	No significant relationship, [1], [9] ,[13]* No firm link between, [14] Positive and significant relationship, [2] ,[10]	• No firm link between, [14], [13]*	• Positive and significant relationship, [12]*
	Employee Involvement	Positive and significant relationship, [2], [13]*		• Positive and significant relationship, [12]*
	Training	Positive and significant relationship, [2]		• Positive and significant relationship, [12]*
	Teamwork	Positive and significant relationship, [2], [13]*		• Positive and significant relationship, [12]*
Hard tools	Standardization	Positive correlation (with investment in standardization radical innovation increases), [6], [2], [3]. No significant and negative relationships, [13]*, [15]**.	• Positive correlation (with investment in standardisation radical innovation increases), [6], [2], [3] [16]. • No significant and negative relationships between, [13]*, [15]**.	
	Quality control Measurement	• Positive correlation (with investment in standardisation radical innovation increases) [6] [2] [3].		
	Continuous improvement tools	• Positive and significant relationship, [17]	• Positive and significant relationship, [17]	

* Multiple regression analysis; ** Correlation analysis;

In accordance with the Table 2, relationships between TQM variables and innovation variables are indicated in filled cells with corresponding literature citation. Accordingly, the following conclusions can be drawn:

- Well defined relationship between TQM and innovation variables are represented in cells with several citations.
- Not well defined relationships between the variables are shown in the cells with one citation.
- Unresearched relationships are represented in empty cells - no published studies found.
- Variation between different study results from no significant to significant relationship represents unclear relationship. Thus, these areas are good candidates for further research as well.
- Lack of published work in this area for particular variables, e.g. one or none, which provides an opportunity for further research in this area.

3. CONCLUSION AND FURTHER RESEARCH

The recently published papers show that there are positive effects of hard TQM tools to innovate in the field of standardization and quality control, where the increase in investment in these tools caused innovation growth. Organizations with higher levels of quality have a higher impact on innovation while organizations with middle and low levels have lower impact on innovation. All these aspects have a limited impact on the specific type of innovations.

In accordance with Table 2, future research in this area can be carried out in two main directions: (1) start with research of relationships between particular variables associated in empty cells in the table; (2) continue with the research for particular variable associated with cells of small number of publications, and with cells of large variation in the results.

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