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Strategic Management of Technological Innovation Challenges in Choosing Product

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Abstract: In recent years, companies are trying to create competitive advantage in designing and manufacturing. It's put strategy products long term profit. Hence, management strategies and organizational changes in most cases formed strategies for technological innovation stake (Boden, 1990). In this paper, the researchers are trying to identify the challenges to advancing innovative management companies to engage with selected strategic product design, effective management of technological innovation strategy of the company show. The study rose the question is, how can the product design, production can be choosing to create a competitive advantage will boost the market? What is strategic management of technological innovation challenges in this regard? Thread management challenges through fundamental technique multiple attribute decision making (MADM) choosing will be to show that companies currently in the process of how research and development (R*and*D) factors in choosing priority should the strategic product.

Key words: Technological Innovation, Choosing Product, Multiple Attribute Decision Making (MADM), Research and Development (R*and*D).

INTRODUCTION

Innovation is the most important determinant of business competitiveness, growth, and economic prosperity in a world of global markets and rapid technological change (Christensen *et al.,* 2004; Huston, 2003). By providing new and improved solutions in health care, personal security, and the quality of our environment, innovation also improves the quality of life of every country. Innovation is ultimately a business investment decision. Government policies aiming to encourage business investment in innovation should:

- Encourage investment in productive assets in R*and*D, machinery and equipment used in producing goods and services of greater value, and workplace training;
- Increase the cash that businesses have available to invest by leaving more money in the hands of those companies making the investments (Carlsson and Stankiewicz, 1991).
- Raise the rate of return on productive assets, thereby making investments in R*and*D, technology, and workforce skills more attractive for businesses than other ways of allocating cash (Brookfield, 2000).
- Assure businesses that policy measures will remain in place during the course of their investment cycle and provide greater certainty and consistency with respect to the application of rules and eligibility requirements (Leonard-Barton, 1995).

Literature Review:

In this section, we overview the literature of strategic management and technological innovation as the main framework of this paper reviews the challenges of product choosing. Beginning with a review of its strategic management and review of the three strategic perspectives we intend to approach business and show business.

Strategic Management:

The increasing importance of strategic management may be a result of several trends. Increasing competition in most industries has made it difficult for some companies to compete (Csikszentmihalyi, 1990; Hamel, 2003). Modern and cheaper transportation and communication have led to increasing global trade and awareness (Gatignon and Robbertson, 1985). Technological development has led to accelerated changes in the global economy. Regardless of the reasons, the past two decades have seen a surge in interest in strategic management. Many perspectives on strategic management and the strategic management process have emerged.

This paper's approach is based predominantly on three of these perspectives: (1) the traditional perspective, (2) the resource based view of the firm, and (3) the stakeholder approach, which are outlined in Table 1.

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Table 1: Three Perspectives on Strategic Management (Crawford, 1983).

	Traditional Perspective	Resource Based View	Stakeholder View
Origin	Economics, other business disciplines, and consulting firms	Economics, distinctive competencies, and general management capability	Business ethics and Social responsibility
Firm	An economic entity	A collection of resources, skills, and abilities	A network of relationships among the firm and its stakeholders
Strategy Formulation	Situation analysis of internal and external environments leading to formulation of mission and strategies	Analysis of organizational resources, skills, and abilities Acquisition of superior resources, skills, and abilities	Analysis of the economic power, political influence, rights, and demands of various stakeholders
Competitive Advantage	Best adapting the organization to its environment by taking advantage of strengths and opportunities and overcoming weaknesses and threats	Possession of resources, skills, and abilities that are valuable, rare, and difficult to imitate by competitors	Superior linkages with stakeholders leading to trust, goodwill, reduced uncertainty, improved business dealings, and ultimately higher firm performance

Technological Innovation:

The Technological Innovation System is a concept developed within the scientific field of innovation studies which serves to explain the nature and rate of technological change (Smits, 2002). A Technological Innovation System can be defined as 'a dynamic network of agents interacting in a specific economic/industrial area under a particular institutional infrastructure and involved in the generation, diffusion, and utilization of technology. The approach may be applied to at least three levels of analysis: to a technology in the sense of knowledge field, to a product or an artifact, or to a set of related products and artifacts aimed at satisfying a particular [societal] function'. With respect to the latter, the approach has especially proven itself in explaining why and how sustainable (energy) technologies have developed and diffused into a society, or have failed to do so. The concept of a Technological Innovation System was introduced as part of a wider theoretical school, called the innovation system approach. The central idea behind this approach is that determinants of technological change are not (only) to be found in individual firms or in research institutes, but (also) in a broad societal structure in which firms, as well as knowledge institutes, are embedded. Since the 1980s, innovation system studies have pointed out the influence of societal structures on technological change, and indirectly on long-term economic growth, within nations, sectors or technological fields (Mauzy and Harriman, 2003). The purpose of analyzing a Technological Innovation System is to analyze and evaluate the development of a particular technological field in terms of the structures and processes that support or hamper it. Besides its particular focus, there are two, more analytical, features that set the Technological Innovation System approach apart from other innovation system approaches (Greiner, 1972).

Firstly, the Technological Innovation System concept emphasizes that stimulating knowledge flows is not sufficient to induce technological change and economic performance (Hekkert *et al.*, 2007). There is a need to exploit this knowledge in order to create new business opportunities. This stresses the importance of individuals as sources of innovation, something which is sometimes overseen in the, more macro-oriented, nationally or sector ally oriented innovation system approaches. Secondly, the Technological Innovation System approach often focuses on system dynamics. The focus on entrepreneurial action has encouraged scholars to consider a Technological Innovation System as something to be built up over time. This was already put forward by Carlsson and Stankiewicz: Technological Innovation Systems are defined in terms of knowledge/competence flows rather than flows of ordinary goods and services. They consist of dynamic knowledge and competence networks. In the presence of an entrepreneur and sufficient critical mass, such networks can be transformed into development blocks, i.e. synergistic clusters of firms and technologies within an industry or a group of industries (Freeman, 1995). This means that a Technological Innovation System may be analyzed in terms of its system components and/or in terms of its dynamics. Both perspectives will be explained below.

Innovation Challenges:

Some innovations are technology based. Other innovations, such as new products or services in retailing financial services, are facilitated by new technology. The critical for success technological innovation are commercial rather than technical: A successful innovation is one that returns original investment in its development plus some additional returns (Humphrey, 1997). This requires that a sufficiently large market for the innovation can be developed. Innovations are the outcome of the innovation process, which can be defined as the combined activities leading to new, marketable products or new production and delivery systems. We showed figure 1 the relationships among key concepts in the technological innovation process. It highlights the activities constituting the process and the outcome produced. The process depicted in figure 1 can start with market development or technical activities. In reality, the technological innovation process will almost always be iterative and concurrent rather than unidirectional and sequential.

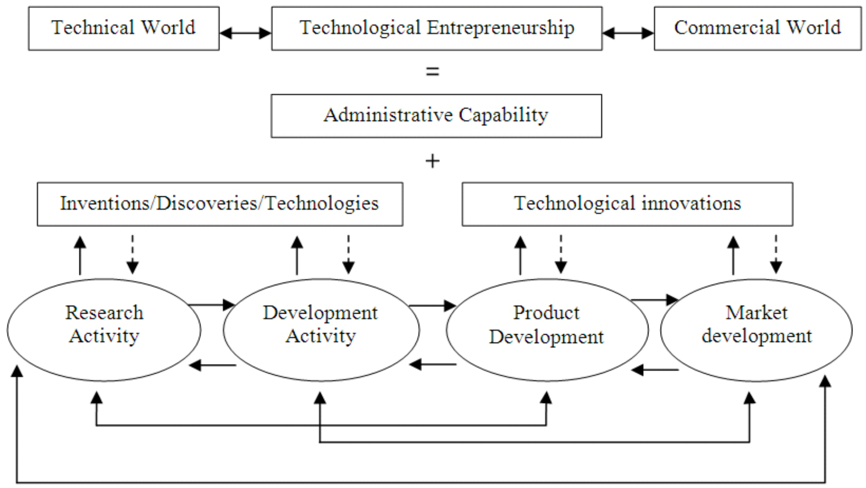

Fig. 1: The Relationship among Key Concept Concerning Technological Innovation (Boden, 1994).

Strategic Innovation:

Strategic innovations are wholly and radically new creative business ideas. They end up changing life as we know it, business as usual, or both. They create new markets (Leicester). They stimulate research in areas related to their improvement. They create demand for competencies uniquely suited to them. Bringing these ideas to the market necessarily involves a bold departure from the existing, proven and established business models. As a result, strategic innovations take longer, cost more and are ambiguous, as compared to continuous process improvements, process revolutions and product/service innovations (Grove, 1996).

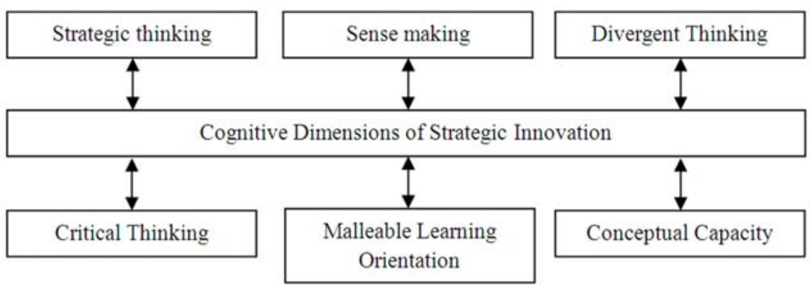

Fig. 2: Cognitive Dimensions of Strategic Innovation (Jacobsson and Johnson, 2000).

Now, we define of Cognitive Dimensions of Strategic Innovation. Strategic Thinking is pattern recognition, the ability to "connect the dots" at a strategic level to see underlying patterns, discontinuities, and future scenarios, and how they interact to create opportunities for new growth (Charan and Tichy, 1998). Sense making is to scan and interpret, rapidly reframe, and generate insight into the changing environment. The ability to mine periphery, to make deep intuitive meaning out of the maelstrom of trends and force that shape markets. Divergent Thinking is the capability to expand the boundaries of mental models and see things from many, often paradoxical, perspective. The ability is to break existing frames, and make new combinations among seemingly disparate elements. Critical Thinking is the ability to examine and transform strategic assumptions, orthodoxies, mental models, and other blind spots that impede divergent thinking and strategic innovation (Suurs, 2009). Malleable Learning Orientation is a malleable, non-liner learning orientation that is "at home" in a dynamic environment rife with ambiguous information, loosely structured problems, deep uncertainty, paradox, and complex tradeoffs. The ability is to learn through continuous experimentation as well as from and through experience. Conceptual Capacity is the ability conceives and conceptualizes; to think holistically and abstractly in terms of concepts, models and architectures (Dougherty, 1996).

RandD Plan in Strategic Management:

Generally R*and*D efforts for technological innovation can be seen as a spectrum starting at the conceptual end (the domain of university or knowledge) and ending at the commercial end (the domain of industry or market). These are commonly classified as basic and fundamental R*and*D; applied and empirical R*and*D; generic and platform R*and*D; and niche and differential R*and*D. People also consider these four types of R*and*D forming a bridge between "new ideas" (the supply push end) and "new needs" (the demand pull end) (Crawford, 1983). In fact, empirical studies give plenty of evidence that the push-pull forces conjunctively contribute to the success of R*and*D efforts. Technology is one of most important items on Choice of Production for Product R*and*D companies. We showed in figure 3 that technology and step of choice of product where the factory resources (Foster and Caplan, 2001).

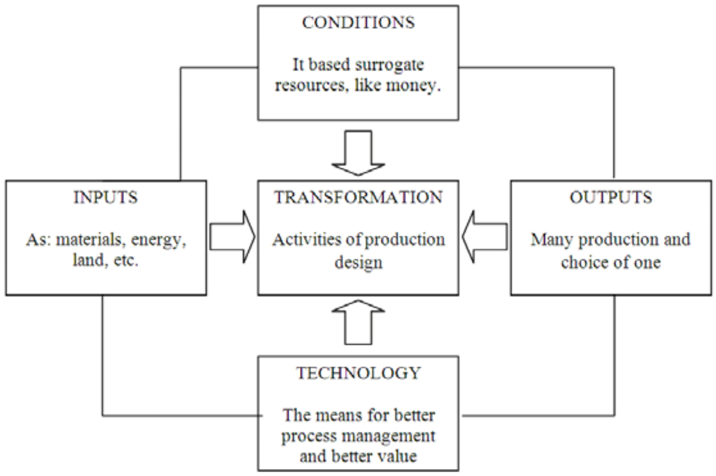

Fig. 3: Role of Technology and Factory Resources in Choice of Production for Product (Cooper, 1983).

Analysis of Pilot Case:

In this section, we selected index's Product Iranian automotive industry as pilot studies and we have automotive products company automotive-style three discussed Iran with regard to the indicators. The three companies are including *Iran Khodro Industrial Company, Industrial Pars Khodro and Saipa*. With index's derived products through MADM are investigated. Superior product selection according to the criteria of the review and analysis of elite opinion has been in this industry.

Indexes are including:

X_1: Energy consumption in production
X_2: Energy consumption in the final product
X_3: Space needed for production
X_4: Space required for final consumption products
X_5: Space required when handling the product
X_6: Safety considerations taking the final product
X_7: Environmental pollutants
X_8: Degree requirement to use product for consumers
X_9: Yield than the selling price
X_{10}: Yield than its cost
X_{11}: Competitive product, similar products in different markets
X_{12}: Amount of time required production
X_{13}: Degree of side products consumed in the final product
X_{14}: Level access to raw materials in production of abnormal
X_{15}: Level access to raw materials in production tech
X_{16}: Application rate of new or improved product application
X_{17}: Improve the product form and appearance that
X_{18}: Product life cycle
X_{19}: Spillover levels were used in production
X_{20}: Make up the amount of intellectual property right (IPR)
X_{21}: Amount of guarantee and warranty conditions for product

Indexes are "X_i" and products are "P_j". Choice of one of "P_j" by MADM method:

P: $(X_1, X_2 \ldots X_n)$
X_j: $\max_i \, Uj_n \, (r_{ij})$

Now we used on normal dimension formula:

$$n_{ij} = \frac{r_{ij}}{\sqrt{\sum_{i=1}^{m} r_{ij}^2}}$$

Table 2. R*and*D for Choice of Product in three Co. (wight in MADM).

Co.	Irankhodro Co.					Saipa Co.					Parskhodro Co.		
Products	A_1	A_2	A_3	A_4	A_5	A_6	A_7	A_8	A_9	A_{10}	A_{11}	A_{12}	A_{13}
Indexes													
X_1	.01	.81	.78	.31	.70	.48	.15	.50	.20	.35	.39	.38	.01
X_2	.02	.01	.10	.38	.09	.06	.01	.30	.01	.20	.39	.87	.42
X_3	.01	.15	.11	.66	.09	.54	.20	.30	.01	.69	.69	.49	.47
X_4	.03	.23	.01	.12	.09	.38	.01	.27	.56	.67	.15	.01	.30
X_5	.04	.24	.40	.13	.80	.10	.91	.30	.33	.23	.06	.01	.49
X_6	.02	.21	.32	.01	.67	.39	.20	.15	.88	.56	.56	.49	.59
X_7	.01	.23	.22	.19	.23	.09	.30	.59	.01	.49	.48	.15	.58
X_8	.04	.18	.01	.38	.12	.85	.55	.15	.01	.53	.59	.83	.59
X_9	.03	.19	.33	.43	.90	.77	.16	.59	.56	.76	.89	.53	.38
X_{10}	.23	.15	.16	.06	.78	.11	.21	.06	.42	.45	.11	.44	.10
X_{11}	.14	.18	.01	.27	.45	.01	.15	.45	.67	.52	.60	.16	.47
X_{12}	.06	.34	.71	.19	.39	.39	.15	.16	.45	.53	.45	.58	.69
X_{13}	.45	.37	.27	.30	.49	.53	.23	.66	.34	.34	.34	.01	.34
X_{14}	.14	.16	.53	.34	.58	.30	.89	.54	.01	.45	.36	.34	.90
X_{15}	.52	.19	.10	.16	.35	.29	.35	.46	.78	.56	.45	.64	.45
X_{16}	.02	.89	.10	.67	.01	.89	.01	.45	.01	.34	.06	.55	.44
X_{17}	.45	.20	.35	.20	.56	.39	.20	.20	.33	.56	.20	.06	.23
X_{18}	.77	.16	.52	.72	.48	.01	.56	.89	.46	.67	.78	.53	.44
X_{19}	.67	.11	.78	.38	.56	.68	.16	.13	.12	.34	.34	.34	.45
X_{20}	.33	.15	.88	.30	.89	.01	.58	.34	.34	.73	.49	.01	.45
X_{21}	.23	.19	.27	.89	.39	.56	.54	.30	.01	.01	.01	.45	.39

Source: Author Analysis.

Conclusion:

Joint definition of a complex product such as an aircraft requires a high degree of interaction among all the teams and firms involved. Prospective customers must also be included in the process, with all their requirements at varying levels of stringency. The specialties involved in the development of systems, equipment, and components are often similar. Most important challenges in choice of product (Technological Innovation approach) are in market culture and company abilities.

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