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Assessment of Compatibility of critical success factors in new product development and it's relationship with structural variables in sports manufacturing industries

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ABSTRACT

This study aims at assessing the compatibility of critical success factors in new products developments with structural variables of various sports manufacturing industries in Tehran. Use of a descriptive correlational study, 80 employees and managers of various sports manufacturing companies in Tehran were totally examined, 70 of which delivered the completely filled-in questionnaires. After the approval of validity and reliability of researcher-made questionnaire, data were collected. The results revealed that indices of NPD's critical factors are able to predict structural variables, and critical success factors of new products have positive and significant relationships with structural variables. Finally, it can be said that the research model consists of optimal independent variables (critical factors in new product development) and dependent variables (structural variables), and the set of independent variables are able to explain changes in structural variables. The sport industry was ranked twenty-third with an income equivalent to 50.2 billion dollars in 1987, and after ten years in 1997 it attained the rank of eleventh with an income equivalent to 152 billion dollars. In 1999, it reached 213 billion dollars and the sports.

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Introduction

In today's world of fast-growing products and competitive markets, typically the need for products and services has grown dramatically. In order to efficiently respond to environmental changes, companies stop producing and distributing some products, or they make some modifications to them. Also, with regard to identifying costumers' needs and demands in different markets and in order to meeting these needs, and sustaining the long-term business and commercial boom in company, new products will be developed (Barkley et al. 2006). On the other hand, dynamic and complexity of the concept of new product development as well as its interdisciplinary nature, and also ever-increasing competitiveness of organizations along with the advent of new manufacturing sciences and equipment, have led manufacturers of new products to face with new challenges; and this enforced researchers to apply different approaches in their studies and arrive at effective findings. Most of researchers believe that new product development is a key factor in economical wealth of a country (Seyyed-Hosseini & Iranian, 2004). The development of new product depends on the ability to introduce the product to the market at an optimal time. Based on the researches, innovations in manufacturing new products lasts 3 years on average for companies, and it costs approximately 27.5 percent of company's sale, which includes the onset of manufacturing the first product to the end of its sale (Cooper, 2003).

In a study under the title of "understanding the complexities of knowledge integration in collaborative groups of NPD", which was conducted in Netherlands, they found that in relation to the quality of knowledge integration, there is a deep understanding of the role of common perception in the projects of collaborative groups of NPD. The generally selected approach draws knowledge integration in projects of collaborative groups of NPD. In this study, there found to be some factors which affect the process of establishing a common perception. These factors emerged in 3 organizational levels (agent, company, project), and this meant that the quality of knowledge integration not only depends on face to face communication, but also on project management and organization (Clansman et al, 2010). In another study as "the application of focus index in development of new product, and with the aim to propose a methodology to assess NPD implementation level and identify potential improvement areas within NPD of R&D based companies in Malaysia", they found that the assessment of focus level through comparing theoretical ranking is effective and valuable. Because, the systematic evaluation of original abilities of a company can be improved by this comparison, and some areas that need more development can be identified. The approach and concept of focus index pays much attention to NPD opportunities with the ultimate goal of enhancing NPD performance (Coang & Resley, 2012). With respect to definitions and categorizations of new product, some factors such as package improvement, manufacturing method, novelty of the product for the country, and changes in distribution networks, are considered as the product development approach, and the new product is not manufactured necessarily at these times (Crawford, 9, 2002).

Most studies have focused on critical success factors, which can make or break the development of new product (Cooper et al., 2005). Based on studies conducted in relation to success factors and critical factors of NPD, through evaluating critical factors of NPD from industrial managers' view in 74 industrial

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companies in China, Mu et al (2007) found that technological, marketing, managerial and commercialization factors in making decisions on new product development in all industries are important in successful process of decision-making for manufacturing new product.

Reviewing research's literature can suggest that the studies related to evaluating the critical success factors in NPD have achieved various results. Assessment of these factors from industrialists' view in China showed that indices related to a) technological, b) marketing, c) managerial, d) commercialization, affect the development of new product (Mu et al, 2007, p.8).

Increased activities in the field of physical training and sports have increased demands for various goods and services. This set of activities leads to the emergence of the sports industry. Sports industry is a market in which it offers to its costumers some products such as exercise, health, entertainment, leisure, goods, services, equipment, people, places and ideas. According to statistics, the sport industry was ranked twenty-third with an income equivalent to 50.2 billion dollars in 1987, and after ten years in 1997 it attained the rank of eleventh with an income equivalent to 152 billion dollars. In 1999, it reached 213 billion dollars and the sports industry promoted to the rank of sixth in the world. Some manufacturing companies of various industries in Tehran are active in the field of sports, some of which are involved in manufacturing sports equipment such as bodybuilding machines, sport apparels, sport equipment for various fields such as table tennis, and table football etc. In this study, regarding critical success factors in the process of NPD, we seek to identify whether critical success factors can predict structural variables of manufacturers of various sports industries in Tehran.

Methodology

This is a descriptive/correlational research which is conducted in the field mode. The statistical population of this study includes all managers and employees of manufacturing companies of various sports industries in Tehran (N=80). With regard to the limited number of employees, the total statistical population (totally) was considered as the statistical sample; of which, 10 questionnaires were deleted due to flaw, but 70 persons completely filled-in research's questionnaires.

The research's measuring tool consists of two researcher-made questionnaires. The first one was a questionnaire of critical success factors which consisted of a list of general concepts in critical success factors, and deals with 4-fold dimensions of technology, marketing, commercialization and product development team, it also consisted of 20 items altogether. In case of the second questionnaire, a questionnaire with 12 questions in two parts were used for evaluation of structural variables, and the internal reliability coefficient for structural variables were (α= 0.874).

From specialists' view, face validity was used for validity, and confirmatory factor analysis was used for validity confirmation of research questionnaires. In this study, Cronbach's alpha was used for measuring internal reliability of the research questionnaires. The internal reliability coefficient for critical success factors and structural variables was (α=0.921) and (α=0.874), respectively.

In order to gather data and distribute the questionnaires, the researcher went to population workplace. After notifying the importance of the topic of the study, the researcher asked them to fill in the questionnaires anonymously. Emphasis on not mentioning their names was because of ensuring that they fill the questionnaires honestly.

Data was analyzed by SPSS-19 software, and given the level of measurement of variables in descriptive statistics, tables, relative frequency, mean and standard deviation were used; and statistical Pearson correlation was used in inferential statistics to determine the relationships, and also multivariate regression and structural equations were used to predict and fitness of the model.

Research findings

Sample distribution, in terms of age, shows that 31.4% were under 30. In total, 60% of employees were 31-50, which equals to 42 of total 70 respondents to the questionnaire. Also, 8.5% were over 50. The mean age of employees was 32.62, and all had responded to this item. Based on educations, the frequency distribution of sample shows that 28.6% (n=20) had diploma, 17.1%(n=12) associate degree, 51.4%(n=36) BA, and 2.9% (n=2) master degree.

Frequency distribution of the sample, according to the field of study indicated that physical education and sports sciences with the frequency of 6, only made up 8.6% of the sample. Sample distribution by employment status showed that 56 (80.0%) had agreements, 10 (14.3%) contract, 2 (2.9%) semi-official and 2 (2.9%) had official confirmation. In total, 66 (94.3%) had unofficial employment status. The distribution of organizational charts showed that 28 (40.0%) were managers, 14 (20.0%) experts and 28 (40.0%) had other posts. Sample distribution according to work experience indicated that 24 (34.3%) were under 5 years, 30 (42.9%) 5 to 10, 12 (17.1%) 11 to 16 and 4 (5.7%) 16 to 20 years.

Descriptive statistics of critical success factors in NPD shows that, technology (3.51), product development (4.00), marketing (3.74), commercialization (4.00), and the critical success factor itself in NPD (3.84) is the independent variable of the study. The results show that the component of technology had the least mean value.

Descriptive statistics related to structural variables and its components (dependent variables) show that, software (4.06), hardware (3.68) and structural variables (3.87) are as dependent variables of the study.

Prior to statistical tests, and due to presumptions of whether using parametric tests, Kolmogorov-Smirnov test was used. Accordingly, the components examined in this study had normal distribution.

Pearson correlation was used to answer the research's hypotheses. Below, table (10-4) illustrates data analysis results. These results are provided in order to evaluate the relationship between technology factor with structural variables that influence the success of new product in manufacturing companies of various sports industries in Tehran.

Table 1: Results of Pearson correlation between critical factors in NPD with structural variables

variable		r	Sig	N
Structural variables	Product development	0.588	0.001	70
	technology	0.578	0.001	70
	marketing	0.532	0.001	70
	commercialization	0.594	0.001	70

Table 1 displays Pearson correlation results for evaluating the relationship between critical factors in NPD with structural variables. According to these results, there were significant and positive relationships between components of NPD and structural variables (P<0.001, r=0.588), component of technology and structural variables (P<0.001,r=0.578), component of marketing and structural variables (P<0.001,r=0.532), and component of marketing and structural variables (P<0.001,r=0.94). The component of

commercialization had the highest value and the component of marketing had the lowest value.

Table 2: Results of correlation between critical factors in NPD and structural variables

model	R	R^2	Adjusted R square	Std. Error of the Estimate	Sig	Durbin Watson
Regression (simultaneous)	0.740	0.548	0.518	0.284	0.001	1.73

The results of table 2 show the summary of the model. The correlation coefficient (R) between variables is 0.740, which indicates that there is a significant and direct correlation between the set of independent and dependent variables (P<0.001,R=0.740). Also, the value of adjusted coefficient of determination (R^2), which is the representation of determined change percentage of dependent variable changes (criterion) through independent variables (predictor), shows that 0.548% of variance of total changes of structural variables affecting the success of new product in manufacturing companies of various sports industries in Tehran, are related to critical success factors, and also 0.472% are related to factors outside the model.

With respect to significance of F-test value (P<0.001,F=18.200), it can be concluded that the regression model of the study, which is comprised of independent (critical factors of NPD) and dependent variables (structural variables), is a proper model, and the collection of independent variables can explain structural variables. Table 3 shows the results of simultaneous regression analysis, the independent variables (marketing).

The results of linear regression in table 3 show that components of critical factors of NPD are able to predict structural variables.

Therefore, regression equation of structural variables affecting new product success in manufacturing companies of various sports industries in Tehran (regarding the predictor variable of critical factors of NPD), based on the data in table 3, are as follows:

$Y = a + bX + cY + dZ + eP$

$Y= 0.940+0.213 (X)+0.286 (Y)+0.084 (Z)+0.180(P)$

X= component of technology, Y= component of product development, Z=component of marketing, P=component of commercialization

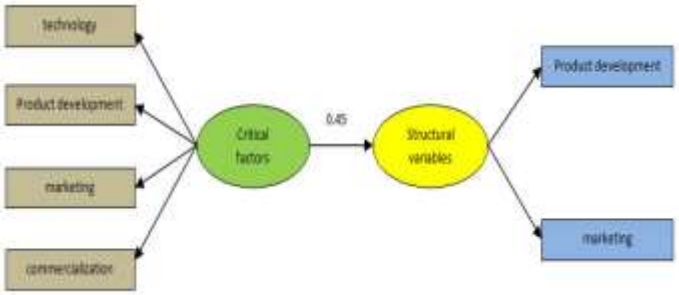

Figure 1: Lizrel software output in significance mode of causal relationship test between components of criterion variable and predictor variable

Structural equation modeling is a very general and powerful multivariate analysis technique in multivariate regression family, and more accurately, it is the extended overall linear model. It allows the researcher to test simultaneously a set of regression models. Structural equation modeling is a comprehensive statistical approach for testing hypotheses concerning the relationship between observed and latent variables, which is sometimes called covariance structure analysis, causal modeling and also Lizrel. In this section, conceptual model of the study is empirically tested by Lizrel software. The standardized coefficients of Lizrel output are displayed in figure 1.

X2/df value less than 3 (1.56) in Lizrel output indicates goodness of fit. Also the Root mean squared error average in this model is 0.065, which should somehow be less than 0.08. RMA value also should be less than 0.05, which is 0.029 in the model of the study. the value of CFI, NFI, AGFI and GFI also should be more than 0.9, which are 0.95, 0.95, 0.93 and 0.96 in the model of the study, respectively. According to indices and Lizrel software outputs, it can be said that data are fairly consistent with the model, and the indices indicate that the model is generally appropriate, and also empirical data are consistent with it so well.

Discussion

The aim of this study was to evaluate the compatibility of critical success factors in NPD in sports equipment industry. The results indicate that there is a significance relationship between all critical factors (technology, marketing, commercialization and product development). According to the results, there is a significance relationship between critical factors of NPD and structural variables affecting the success of new product. These results are perfectly compatible and parallel with the findings of Cooper (1997) and Mu's (2008) researches; therefore, the studies' results of strategies and executive models in the process of NPD, suggest that, depending on the type of industry and market, technology is one the key factors in the success of sports products. Technology should be the main criterion and in terms of administration it should have sufficient credit to be able to expand or penetrate new markets with an emphasis on NPD for companies.

According to the results it became clear that there is a significant and positive relationship between marketing and structural variables affecting the success. These results are paralleled with the studies of Cooper (1997) and Mu et al (2008) and Hilary (2005). In terms of sports sponsors, Hilary (2005) concluded that private participation in a specific sport as well as considering its importance, makes people be more familiar with sponsors, and this is the very profitability of a company or sponsoring company. Corenwell, Vesey-Irvin, Magnun have arrived at similar conclusions in separate studies.

According to the results it has been observed that there is a significant and positive relationship between commercialization and structural variables affecting the success. These results were compatible with the findings of Cooper (1997), Mu et al (2008). For a product to be marketed, it must have the ability to be competitive and also minimize and manage internal and external risks; so, following a systematic approach, and due to environmental changes and hope for the survival of the company, we are led to consider the following conditions as effective with this respect: accountability, competence, speed and flexibility, which have the costs and qualities within themselves. In general, internal and external risks can be eliminated by the process of commercialization.

The results revealed that there is a significant and positive relationship between product development team and structural variables affecting success. They were compatible with the findings of Dehnavi (2011), Sa'eedi and Mamaghani (2009), Ardakani et al (2010), and Lee and Wang (2012). In the process of NPD, product development team is the most effective factor in finding proper ideas and product distribution. However, many factors are involved in managers' decision-making in the process of NPD, they are divided into two categories: internal and external.

Table 3: Results of regression analysis between predictor variable of critical factor of NPD and structural variable

Simultaneous regression	Non-standardized coefficients		Standardized coefficients	T value	Sig
	B	Std. Error	Beta		
intercept	0.940	0.349		2.697	0.009
Component of technology	0.213	0.093	0.273	2.294	0.025
Component of product development	0.286	0.085	0.344	3.379	0.001
Component of marketing	0.084	0.089	0.113	0.945	0.348
Component of commercialization	0.180	0.096	0.216	1.874	0.066

Table 4: Fit indices of the model

Index value	fit indices of Conceptual model
56.436	Chi-square
36	Degree of freedom (df)
0.029	Root mean squared error average (RMSEA)
0.93	(AGFI)
0.96	(GFI)
0.95	(CFI)
0.95	(NFI)

Among which are some indices as: team formation, motivating the members of team, screening ideas, considering the policymaking of competitors, which are of managers' programs in this process. Knowledge and risks of decision making are key factors for management of the product team in managing the product. However, the accurate management of this team leads to the success of executive approaches of distinctive programs of NPD process, which can play an important role in coordinating other parameters of team building.

The results indicated that there is a significant mutual relationship between critical success factors of new product. According to the results, the null hypothesis is rejected and consequently, there is a significant relationship between critical success factors of new product. Cooper (2005) maintains that in terms of market, critical success factors of NPD process can be defined as proper orientation, importance and pivotal role of product and costumer in the market; and in terms of product, it can be defined as concentration on providing a global-level product, international orientation in designing, developing and marketing processes. These are compatible with findings of Cooper (2005), Farsijani et al (2011), Ardakani et al (2013) and Mu et al (2008).

Lizrel output also shows goodness of fit for the model; according to the indices and outputs of Lizrel software, it can be said that data are fairly consistent with the model, and indices show that the provided model is appropriate in general, and mutual data are colloquially consistent with it; and this result is perfectly compatible with Cooper's (2005) findings.

Conclusion

Despite the importance and value of sports marketing in Iran, no scientific and special consideration is given to it due to several reasons. But it doesn't mean that there is no economical activity in this respect. It means that sports in Iran is not fully professional. So, there is no competition for higher income, and it is not accounted for economically (Hashemi-Siavashani, 2003). Today, more than ever, most of companies have realized that the sole reliance on traditional competitive levers such as improvement of quality as well as costs reduction, and also differentiation of products and services, are no more sufficient and the concepts of speed and flexibility are more significant in competition. Also, tendency toward new products and services reflects the changing attitudes of companies. According to studies on 700 American companies that had taken place in 1998, it became clear that about one-third of organizations' profit was earned due to distribution of new products. While, the same study in 1970 revealed only 20% (one fifth). NPD management requires changes of approach and also adopting a new approaches and strategies in development of the product.

Resources

1. Ardakani S, Tale'ee-far R, Hatami-nasab H, Muhammadi F. 2011, evaluation and ranking of factors affecting NPD process (SMEs managers' perspective of foods and drink industries located in Fars Province), Novin research journal of marketing, Vol 1, No. 1, pp.101-126.

2. Ardakani S et al. 2010, analysis of factors affecting NPD in small and medium enterprises, research-scientific journal of product and operation management, first year, No. 1, fall and winter of 2010, pp. 53-70.

3. Barkley, Juan, Zoon Dan, Holroyd Philip. 2006, new product development, translated by: Ibrahimi A, Mahdieh O. Hommay Danesh Pub.

4. Seyyed-Hoseini, Iranian. 2004:4, the assessment of NPD and its role in economy of the country.

5. Talebi K, Salimi Torkamani M, Zare' H, 2010, identifying and prioritizing success key factors in NPD in small and medium businesses located in science and technology parks in Tehran, journal of new economy and business, No.19&20, pp.83-100.

6. Ja'farzadeh F, 2013, assessment of compatibility of critical success factors of new product development with structural variables of Down-Loop sports manufacturing company, master's thesis, Kurdistan Islamic Azad University, science and research.

7. Booz., Allen., Hamilton., (1982)., "New Product Management for 1980s"., Booz Allen &Hamilton Inc, New York, 1982.

8. Cooper, R. G and Edjett,S.T,(2005), "lean, rapid and profitable", new product development institute . Available at (www.stage-gate.com).

9. Cooper, A , Schendel.D, (2003)," Strategic response to technological threats. Business Horizons, vol.19, No.1,PP61_69.

10. Cooper, R.G, (1997), " The dimensions of industrial new product success and failure" , Journal of marketing, Vol. 43 No. 3,PP. 93-103&60-74.

11. Crawford, C.M, (2002), "New product management" , IRWIN, fifth edition, p 9.

12. Mu.j, peng .G, Tan. Y,(2007),''new product development in Chinese enterprise key successes factors managerial prospective'', international Journal of emerging marketing, vol.2, no.2, PP123-143.

13. Mu.j, peng .G, Maclachlan.D. L, (2008),''Effect of risk management strategy on NPD performance'', Technovation, vol.10no.16,PP 1-10.
14. Henard, D. H .,& Szymanski, D . M . (2001). Why some new products are moer successful than others. Journal of Marketing Research , 38(3), 362-75.
15. Poolton, J., & Barcly, I. (1998). New product development from past research to future applications. Industrial Marketing Management , 27(3), 197-212.
16. Suwannaporn, P., & Speece, M.W. (2010). Assessing new product development success factors in the Thai food industry . British Food Journal, 112(4), 364-386.