

Complex modeling of factors influencing market success of new product and service developments

Identification of drivers of new product success and analysis of their relations are very critical for companies to be successful in their core markets. It is agreed in the literature that firm strategy (marketing synergy, technology synergy), process characteristics and product characteristics all influence market success. Our main objective was to develop an innovation model integrating the structural and process elements influencing market success of innovations. We empirically tested our model by structural equation modeling and found that market success of innovations was highly determined by product characteristics, but it was also significantly, but to a lesser extent, influenced by process characteristics and the firm strategy. We also found that market success of innovations intensified the reactions of competitors.

Keywords: innovation, market success, new product development

Track: Innovation and New Product and Service Developments

1. Purpose of the Research

Innovation is one of the most important factors in market success. In the literature there is an abundance of proofs of the above statement. Cooper and Edgett (2009) stated that CEOs continue to rate innovation capability as a critical driver for their future business success as they focus on increasing profitability and growth and only one product concept out of seven becomes a new product winner; on average 44 percent of businesses' product development projects fail to achieve their profit targets and half of all new product launches are late to market.

According to Stankovic and Djukic (2004) business managers must continually review their companies' strategy to meet the three conditions for effective innovation: closeness to customers, multifunctional teamwork and cross-functional communications.

Evanschitzky, Eisend, Calantone and Jiang (2012) found that assessing factors predicting new-product success holds critical importance for companies, as research shows that despite considerable new-product investment, success rates are generally below 25 percent.

The positive relationship between marketing and innovation is underlined by Drucker (2008) who wrote that because the purpose of business is to create a customer, the business enterprise has two - and only two - basic functions: marketing and innovation. Marketing and innovation produce results; all the rest are costs. Marketing is the distinguishing, unique function of the business.

Henard and Szymanski (2001) collected 24 drivers of successful new product launches by meta-analysis of the literature of innovation success. However, they did not integrate their findings into a model.

As far as market success of the innovation concerned, a PwC study (2011) revealed that while improved productivity and reduced costs are among the broad business objectives that private companies expect innovation to help them achieve (cited by 58 percent and 52 percent of respondents respectively), growth-related goals top the list. Those goals include improved earnings/profit margins (81 percent), increased revenues (78 percent), and a widened customer base in current markets (78 percent). The percentages in these growth-related categories are even higher among companies that say they're prioritizing innovation to a great extent: 91 percent, 80 percent, and 87 percent respectively.

Our most important research objectives were to develop the empirical model of factors influencing corporate innovation based on Henard and Szymanski (2001) drivers; to identify the relationships among the elements of the model and to empirically test our hypothetical model. Obviously the above objectives can only be achieved after our identifying the variables that are considered to be the success factors of innovation and the logical relationship among them. In addition, we wished to explore those factors, dimensions that influence the market success of innovation to the largest extent.

2. Research Method

2.1. Conceptualization and operationalization

Henard and Szymanski (2001) identified four dimensions of the drivers of new product success after conducting a meta-analysis of the new product performance literature. They found that of the 24 predictors of new product performance investigated, product advantage, market potential, meeting customer needs, predevelopment task proficiencies, and dedicated resources, on average, have the most significant impact on new product performance. They grouped the driver variables into 4 dimensions entitled product characteristics, firm strategy characteristics, firm process characteristics and marketplace characteristics. Product characteristics is made up of 5 variables: product advantages, product meets customer needs, product price, product

technological sophistication and product innovativeness, whereas firm strategy characteristics include marketing synergy, technological synergy, order of entry, dedicated human resources and dedicated research and development resources. Firm process characteristics can be described as a function of structured approach, predevelopment task proficiency, marketing task proficiency, technological proficiency, launch proficiency, reduced cycle time, market orientation, customer input, cross-functional integration, cross-functional communication and senior management support. Last but not at least, likelihood of competitive response, competitive response intensity and market potential are considered as variables of marketplace characteristics.

We used the above drivers as variables when developing the hypothetical model of factors influencing market success of corporate innovation (Figure 1).

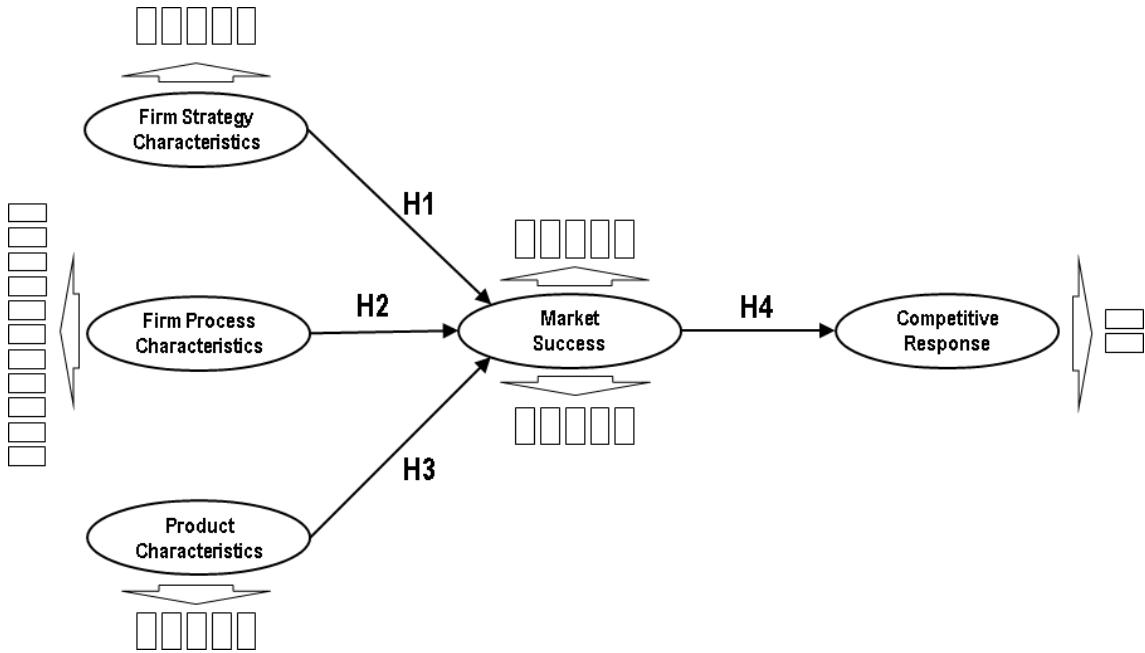


Figure 1 Hypothetical model of factors influencing market success of new product development

Strategic firm characteristics in our model is made up of the following variables: marketing synergy, technological synergy, order of entry, dedicated human resources and dedicated research and development resources. Firm process characteristic dimension includes 11 measurement variables such as structured approach, predevelopment task proficiency, marketing task proficiency, technological proficiency, launch proficiency, reduced cycle time, market orientation, customer input, cross-functional integration, cross-functional communication, senior management support. We assumed that strategic characteristics (hypothesis 1, H1), process characteristics (H2) and product characteristics (H3) have direct impact on the market success of innovation. Product characteristic dimension is made up of product advantage, meeting consumer needs, product price, technological sophistication, product innovativeness variables. In our model market success of innovation is measured by 10 variables: market share growth, total profit growth, profit margin increase, growing revenue, increasing customer awareness, increasing brand value, growing customer loyalty, growing customer satisfaction, increasing royalty and license fees. Furthermore, we also assumed that market success of innovation can also evoke competitors’ intensive reactions, i.e. the more successful a new product is, the stronger the competitors react after launching it (H4).

Competitive response factor was measured by the number of competitors' reaction and their intensity.

During the operationalization process we transferred the variables into scales to be used in the questionnaire. Table 1 shows the 5 main dimensions used in our model, the 33 variables and their scales.

Table 1 Operationalization of model variables

	Variable	Operationalization
Firm Strategy Characteristics	Marketing synergy	Does your firm have those marketing abilities that are essential for the market success of a new product, performance? 1=Not at all, ... 5=We have all the marketing abilities needed
	Technological synergy	Does your firm have those technological, manufacturing abilities that are essential for the market success of a new product? 1=Not at all, ... 5=We have all the technological abilities needed
	Order of entry	How do you consider the order entry of your new products? 1=Not suitable at all, ... 5=Entry was always at the best time
	Dedicated human resources	Does your company have the essential human resource for R&D activities? 1=Not at all, ... 5=We have all the human resources needed
	Dedicated R&D resources	Have your company the essential R&D resources for developing your products, processes? 1=Not at all, ... 5=We have all the R&D resources needed
Firm Process Characteristics	Structured approach	How was formalized product developmental process typical for your firm in this case? 1=We did not have like this, ... 5=It was a planned, formalized developmental process
	Predevelopment task proficiency	Did you generate product ideas consciously with the participation of the staff within the company, for example with brainstorming or other technique? 0=No, ... 5=Yes, it was professionally well organized
	Marketing task proficiency	Did you have marketing/market research during the product developmental process? 0=No, ... 5=It was professionally thorough research
		Was concrete marketing conception made before starting product development? 0=No, ... 5=Professionally established, fixed in written form
		Were there preliminary calculations regarding rate of return before starting R&D? 0=No, ... 5= Professionally established, fixed in written form
	Technological proficiency	What kind of R&D activity is typical for your firm during innovation? (Multiple response) 1=Have own R&D activity, 2= We give R&D assignments to other companies, organizations, 3= We buy R&D results and licenses
	Launch proficiency	Was a marketing strategy, market entry program made for launching a new product? 0=No, ... Professionally established, fixed in written form
	Reduced cycle time	Was market entry timing of the new product consciously pre-planned? 0=No, ... 5= Professionally established, fixed in written form
	Market orientation	Was the continuous implementation, application of the competitors' analysis incorporated into the product developmental process? 0=No, ... 5=Yes, in a conscious, planned way
	Customer input	Do you implement customer (target segments) opinion directly into the product developmental process, in its full phase? 0=No, ... 5=Yes, in a conscious, planned way
	Cross-functional integration	Who participated in the innovation, product developmental process? (Multiple response) 1=R&D organization, staff, 2=Marketing organization, staff, 3=Sales organization, staff, 4=Human resources, staff, 5=Production, manufacturing organization, staff, 6=Logistic organization, staff, 7=Customer service organization, staff, 8=Financial/economic organization, staff
	Cross-functional communication	What kind of regularity is characteristic for the cooperation among the organizational units during the process? 1=Disorganized, ad hoc ... 5=Regular, intense cooperation
	Senior management support	What role did the top management of the firm play in the product developmental process? 1=Was not active or supportive, ... 5=Very active and supportive
Product Characteristics	Product advantage	How do you consider the competitiveness of your product compared to the main competitor? 1=Not better at all, ... 5=Much better
	Product meets customer needs	How much is your product able to satisfy customer needs? 1=Not at all, ... 5= Fully
	Product price	How do you consider the value for money ratio of your product? 1=Very weak, ... 5=The best available in the market
	Product technological sophistication	How do you consider the technological sophistication and the level of development of your product? 1=Not good at all, ... 5=Better than any of the competitors"
	Product innovativeness	How do you consider the innovativeness of your product? 1=Not innovative at all, ... 5=Outstanding, precedes competitors
Market Success	Market share	Market share growth
	Total profit	Total profit growth
	Profit margin	Profit-margin growth
	Revenue	Revenue growth
	Awareness	Awareness growth
	Brand value	Brand value increase
	Number of customers	Increase in customer number
	Loyalty	Growing customer loyalty
	Satisfaction	Growing customer satisfaction
	Royalty and licence fees	Revenue growth from royalty and license fees

What was characteristic for the factors below after the market entry of the new product compared to the other products of the company?
1= Lower, ... 5=Higher

Competitive Response	Likelihood of competitive response	How did you consider competitors' reaction after the market entry of the new product? 1=No reaction ... 5=Every competitor reacted
	Competitive response intensity	All in all what was the intensity of the competitors' reaction like after the market entry of the new product? 1=Very weak, ... 5=very strong

2.2. Data collection and analysis

In order to test the hypothetical model, we carried out a questionnaire survey. Statistical population related to the sample was made up of companies having R&D activities and operating in a small EU member country whose name we would not intend to reveal. Population size was 1,774 companies. We used the R&D register of the national statistical office during sampling. Sampling method was simple random technique which is part of the so called random methods. Sample size was 94 companies. Sampling error was ± 9.8 percent at 95 percent confidence level.

Data collection happened in autumn of 2012. During the data collection process experienced, trained operators carried out computer assisted telephone interviews (CATI) in our contact center. Respondents were mainly from the managerial levels of different companies. In case of small and medium size companies (SMEs) chief executive officers were mainly asked. As far as large businesses concerned, heads of certain functional departments (product development, marketing, etc.) were interviewed. Length of the interview was approximately 20-30 minutes. During data analysis, we carried out univariate, simple analyses on the sample including frequency tables, means, crosstabs, ANOVA, correlation. Latent variables in the model were created by principal component analysis (PCA). Before principal component analysis we tested the reliability of our scales with Cronbach's alphas. Model verification was done by structural equation modeling (SEM). We used Excel, SPSS Statistics and AMOS software during data analysis (see Arbuckle & Whotke, 1999).

3. Major Findings

We tested our hypothetical model in which five latent variables can be found by AMOS. We called the latent variables as follows: firm strategy (STRAT), firm process (PROC), product characteristics (PROD), market success (SUCC) and competitive response (RESP). There was a possibility to include the 33 observed variables in the model beside the above mentioned latent variables. However, we disregarded the inclusion of the observed variables for the sake of simplicity and transparency and we did use the latent variables produced from the observed variables (see Byrne, 2001). Figure 2 shows the empirically tested model.

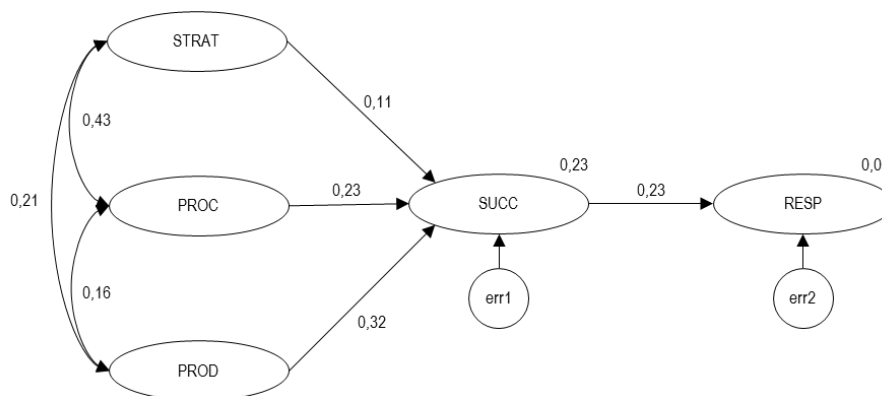


Figure 2 Empirical model of factors influencing market success of new product development

We found that market success was influenced by three factors: strategy, process and product characteristics. We also found that the strategic characteristics of the company (marketing and technology synergy, dedicated human and R&D resources) influences market success directly, to a small but significant degree (Standardized Regression Weight, SRW=0.112; P=0.039). Therefore we accepted our first hypothesis 1 (H1). Moreover, it was found that strategic characteristics of the company had an impact on both the process of product development and product characteristics. These latter findings are supported by the correlation between the strategic characteristics and the process features ($r=0.427$) and the correlation between the strategic characteristics and the product features ($r=0.205$). Although we cannot conclude any causal relationship from the correlation coefficient, we can do believe that corporate strategy determines the company processes and the product characteristics, and not vice-versa.

According to our second hypothesis (H2) product development process (R&D process) has significant effect on market success. We found that this influence is stronger (SRW=0.227; P=0.019) than the direct impact of the strategy on the market success, therefore we accept H2. We also found that there is a weak correlation between the process characteristics and product features ($r=0.162$) and market success was significantly influenced by product characteristics (SRW=0.320; P=0.007). Of all the factors analyzed, product characteristics influences the success of new product launches in the market to the largest extent. As a consequence, we also accepted the third hypothesis (H3).

Furthermore, we tested the relationship between the market success of our new products and the competitive response. We found that that there is a relatively strong, positive relationship between the number and intensity of competitors' reactions and the success of the new product launch (SRW=0.232; P=0.012), so we accepted the fourth hypothesis (H4).

To complete the model testing, we analyzed the uni-dimensionality, reliability and validity of the model according to Janssens, Wijnen, De Pelsmacker and Van Kenhove (2008). Results supported the validity of the empirical model: (CMIN) P=0.056; CMIN/DF=1.668; GFI=0.950; AGFI=0.851; TLI=0.946; CFI=0.934; RMSEA=0.017.

4. Implications

Research findings of our empirical analysis confirmed that incorporation of marketing into R&D is inevitable for companies to be successful in their core markets. There is no market success without proper product development, which must be fully met customer expectations. The new product must be competitive, it must satisfy real customer needs. The value for money ratio of the new product must be significantly higher than that of the rival products. Innovative, technologically sophisticated new products have a very positive impact on the profitability. It is also very important for companies to make their R&D processes more customer oriented, and more marketing-controlled. A formalized product development process including formalized idea generation, pre-planned market research are prerequisites of successful product launches. Time-to-market strategy, continuous competitor analysis, inclusion of the customer voice into R&D, cross-functional R&D teams and intense cooperation between them are also important factors in the market success of new products. The whole R&D process must of course be supported by the senior management of the company. We also found that strategy had weak impact on successful new product launches. Therefore marketing, technological, manufacturing and human capabilities, blended with sufficient R&D resources are also necessary but not sufficient conditions of market success. If a company would like to achieve market success with innovation, optimization of product characteristics is insufficient because process characteristics and strategic characteristics also have direct, but weak impact on market success, however, their effects are not negligible at all. Therefore, for a company to achieve market success with new products, the optimization of product characteristics, strategy and R&D

process is required. We also found that successful innovations will ignite strong reactions from the competitors signaled by the growing number of their more and more intense reactions. Therefore, if we see intensifying reactions from our competitors after a NPL, we might say that the future profit and sales outlook of the new product is very promising.

As far as the limitations of our research concerned, the most important limitation is stemming from the relatively small sample size, which cause relatively high sampling error. The other limitation is the national characteristics of the sample, although a lot of respondents were not national companies but multinational branches located in the survey country.

5. References

Arbuckle, J.L. & Wothke, W. (1999). *Amos 4.0 User's Guide*. Chicago, IL: Small Waters Corporation.

Byrne, B.M. (2001). *Structural equation modeling with Amos – Basic Concepts, Applications and Programming*. Manhaw, N.J.: Earlbaum.

Cooper, R.G. & Edgett, S. (2009). *Successful Product Innovation: A Collection of Our Best*. Product Development Institute Inc.

Drucker, P.F. (2008). *The Essential Drucker: The Best of Sixty Years of Peter Drucker's Essential Writings on Management (Collins Business Essentials)*. Harper Business.

Evanschitzky, H., Eisend, M., Calantone, R.J. & Jiang, Y. (2012). Success Factors of Product Innovation: An Updated Meta-Analysis. *Journal of Product Innovation Management*, 29, 21–37.

Henard, D.H. & Szymanski, D.M. (2001). Why Some New Products Are More Successful Than Others. *Journal of Marketing Research*, 38, 362-375.

Janssens, W., Wijnen, K., De Pelsmacker, P. & Van Kenhove, P. (2008). *Marketing research with SPSS*. Harlow, UK: Pearson Education Limited.

PwC's Private Company Trendsetter Barometer (2011). *US Private Companies Prioritizing Innovation as Growth Engine*. Available from <http://www.barometersurveys.com/vwAllNewsByDocID/54AE305195DC70E08525784C007109A4/index.html>.

Stankovic, L. & Djukic S. (2004). Problems Of Measuring Success Of A New Product, *Facta Universitatis, Series: Economics and Organization* 2 (2), 101-110.