

HOW TO DEFINE THE PROBABILITY OF SUCCESS OF INNOVATIVE STARTUPS?

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Abstract. The aim of this research was to test new generation of strategic management theories to discover the most appropriate qualitative factors for an innovative e-startup assessment and produce the probability formula in order to estimate the chances of success of any other innovative e-business. The qualitative factors are analyzed against a sample of 30 innovative successful e-businesses startups which were founded after 2004. The data have been loaded to an SPSS program and analyzed according to the stated hypothesis. The research has identified several factors which are more correlated with a startup's success than others and therefore are more reliable as assessment criteria.

Keywords: value innovation, value curve divergence, buyer utilities, dynamic capabilities, professional management.

Jel classification: M13, M15, O30, O31, O32

1. Introduction.

The history of innovative e-business start up assessment has known various failures and uncertainties. There is a list of the missed investments which include such companies as Google, Skype, Baidu and Akamai, probably, due to during the pitching period those companies have failed to meet the level of investor's initial assessment of investment's effectiveness (Anaselli 2009). It is similarly to the case of Alfred Bell and Western Union when the company refused to buy a patent for telephone (Christensen 2004). New companies put forward the idea which is to be successful in the future; however it currently seems as unreasonable an unattractive investment.

There is a need for insightful research of business criteria by analyzing new strategic management, innovation management and entrepreneurship theories to estimate the probability of success of the innovation start-ups.

The aim of this research was to test contemporary strategic and innovational theories to discover the most appropriate qualitative criteria for an innovative e-startup assessment and produce the probability formula in order to estimate the chances of success of any other innovative e-business.

2. Literature review

The real value of the business is in its customer base, revenues and its growth potential (Dodge 2011), However as it is put forward in “Seeing what's next” (Christensen 2004) an industry, mar-

ket and market development criteria are not very applicable to innovation which does not have a defined market as well as the defined industry borders. The investor should look for particular qualitative factors when evaluating an innovation e-business start ups.

Firstly, one should assess whether an innovation is a worthy investment at all. Therefore investors could start by assessing the innovation product or service the company presents. It is worth to turn to ‘The blue ocean strategy’ (Kim, Mauborne 2005 a, b) that suggests that the key to huge market success is Value Innovation. Value innovation is focused on aligning innovation with utility, price and cost systems. Therefore the value innovation is pursuing not only differentiation but also low cost. Kim and Mauborgne (2005 a, b) claim that the appropriate strategy for an innovation product requires the creation of a new value curve or a divergence - company's profile should be different from the industry's average player profile. Authors of BOS (2005 a, b) have presented the buyer utility map (BUM). It is the most important to identify the few boxes on the BUM where company will focus efforts to create unprecedented new utility versus what is offered today. However using Value Curve Divergence and BUM metrics is not enough to receive a comprehensive qualitative assessment of an innovative product. Therefore it would be wise to use a framework that is designed to show a larger picture of the situation. Comprehensive set of innovation criteria similar to PESTEL framework, but adopted and expanded for innovative companies is

Preliminary Innovation Evaluation System (PIES). In his article on an innovate on Udell (2009 a, b) argues that the innovation can be systematically assessed in terms of its feasibility and market value in a way of 42 criteria matrix named PIES IX evaluation criteria: Societal, Market Acceptance, Business Risk, Competitive strengths, Demand analysis, Experience and Strategy. These criteria present a very detailed framework not only to the inventors but also to the potential investors. Therefore we have multiple criteria for evaluating the innovative product.

Even though BOS, BUM and PIES are very popular and recognized theories one should also examine strategies that are likely to work in free market setting. In their exciting book “Funky Business Forever” Ridderstrale and Nordstrom (2004) describe the enterprise Funky Inn that is most likely to succeed in the forthcoming future. The first trait of Funky Inc. is its focus. Focused organizations should be sharp and narrow implying their focus on a global competitive advantage; they considered that the corporation of the future should be focused on a few core businesses which it can master to perfection. The next trait of Funky Inc. is its leverages. Leveraging implies building up company’s core competences to compete in its chosen niche. Leveraging is done in three stages. Internal leverage implies creating a learning organization which would be able to transfer and transform knowledge throughout the company. Industrial leverage implies using company’s core competences in all relevant industries. International leverage implies that company is able to deal with their international markets. The authors of Funky Business forever state that continuous innovation is one of the essential things the company must perform to overcome almost instant technology and business model copying in order to stay unique. In Funky Inc. everyone is involved in total innovation of all aspects of the company. The most important aspect of innovation is strategy reinvention where company realizes market opportunities and changes its ecosystem. Similarly McKinsey consulting group in their article on flexible strategy (Zuboff 2010) implies that real value of innovation goes beneath standard competitive thinking of the industry and creates value for which there is no direct competition or analogue product. Competitive strategy and innovation behavior of Funky Inc. is quite similar to the ideas of BOS. Even though these theories gives a very solid basis to understand which product and strategy is likely to succeed, there is still lack of understanding how the company can retain its competitive position and protects its unique business model. Therefore one could turn to the book “Seeing What’s Next” by

Christensen (2004) where describing company’s competitive position authors introduce the concept of the sword and shield of asymmetries. It implies that the disruptive company’s major strength lies in the weakness of its incumbent competitor and its motivations and priorities are also of the different nature than the incumbent’s. Company should pursue to exploit following opportunities: the opportunities of non-customer market; the opportunities of undershot consumer market and the opportunities of overshot consumer market. Therefore potentially successful company should have both asymmetric motivation and asymmetric skills that is quite similar to the ideas of the BOS where companies strategic canvas are expected to be different from the industry average and this brings us to the one of the most important principle of BOS: reach beyond existing demand, thinking non-customers before customers. Three tiers of non-customers can be transformed into customers (Kim, Mauborne 2005a, b). Therefore Christensen (2004) provided us a precision on that matter.

Further important aspect of the success is startups ability to sustain competitive advantage in long run. How to ingrain sustainability into the internal business practices and behavior of the company management? Dynamic Capability approach (Teece *et al.* 1997) is fully applicable to the e-business environment where the rate of the change and the ferocity of competition are so great. In his book “Dynamic capabilities and strategic management” Teece (2009) identifies the set of capabilities of a sustainable enterprise in the free market setting. The theory discusses competitive advantage through sustaining superior performance using three major capabilities of sensing and seizing opportunities as well as the capability of reconfiguration of resources. Christensen (2004) also insists on the dynamic behavior by the new disruptive ventures and warns them of having a detailed deliberate strategy. This is similar to the idea expressed The Boston Consulting group by from in their article “Does your strategy need stretching?” (Kachaner, Deimler 2008). Thus Strategy must be highly flexible and approached in a more subtle manner than it is classically assumed. Therefore an investor should also look for a strategy which is stretchable and dynamic rather than formally elaborated.

Even having a perfect product, the winning strategy and dynamic behavior there is still probability of failure due to mismanagement. There are a lot of theories on management but this particular research has focus on manager’s ability and potential to sustain the enterprise from its launch to its sale, IPO or stable maturity stage. This choice was

motivated by the fact that big percentage of startups declare their failure during the first or second year of operations and a big percentage of those cases are caused by mismanagement.

There are two major theories about corporate lifecycles and their management. One of them is Greiner's (1998) six-stage model. The model concentrates only on management issues and behaviors as well as on possible problems that are common on each stage of corporate development. The second lifecycle model by Adizes (1999) explores this problem model in greater detail so that it is more comprehensive and applicable to the current research. The Adizes theory is based on the assumption of viewing an organization as a living being from birth to death. Adizes (2004) identified key management roles that are crucial in each of the lifecycle periods. "P" role stands for purposeful performance of management (i.e. doing what one was meant to do). This behavior and capabilities enable effectiveness in the short run. It implies the ability for functional actions to satisfy desired client needs. "A" role stands for administrative behavior which enables efficiency in the short run. It implies the ability to systemize the processes in the company. "E" role stands for entrepreneurial activity which makes the company effective in the long run. It implies the ability to be proactive in the company's ecosystem. "I" role stands for integrative behavior which enables efficiency in the long run. It implies that organization is becoming more organic rather than mechanistic (i.e. more flexible).

Summarizing frameworks of this part of the research we have concluded that in order to predict enterprise success an investor should investigate an appropriate experience in the management team, its PAEI and the nature of problems the company faces.

There are many empirical evidences that professional management is a must in innovative startups. In 2001, the youthful founders of Google, Larry Page and Sergey Brin, responded to pressure from their venture capitalists by recruiting 46-years-old Eric Schmidt, former Chief Executive of the large software company Nowell, to run their company. In 1997 eBay's headhunters came up with a candidate for the job of CEO and President: Margaret Whitman. Whitman had received her BA in economics from Princeton and her MBA from the Harvard Business School. Her experience also included job as senior vice president of marketing for the Walt Disney Company's consumer product division. In 1986 Michel Dell brought in Lee Walker, a 51-year-old venture capitalist; as president and COO Walker helped him learn how trans-

late his fertile entrepreneurial instincts into effective strategic plans and actions.

Concluding literature review of the research a set of criteria has been defined for an innovative e-start-up assessment.

3. Theoretical framework

Independent variables can be sorted in two groups according to their implicit meaning – product and strategy. The product group discusses and evaluates the innovation itself while the strategy group discusses two strategic aspects of the strategic business plan. Product variables include: Value Innovation, Value Curve Divergence, Buyer Utility and PIES criteria. Strategic variables include: Global Focused strategy and Asymmetric Attack/Defense strategy criteria. However having product and strategy is not enough to succeed in the marketplace therefore a set of internal sustainability variables are put in between the startup and its success, due to the fact that strategic rigidity and lack of professional management mentioned earlier can ruin even a perfect strategic business plan.

The moderating variable is one that has a strong contingent effect on the independent variable-dependent variable relationship. That is, the presence of a third variable (the moderating variable) modifies the original relationship between the independent and the dependent variables (Sekaran, Bougie 2009). Therefore a set of managerial abilities like its skills, talents and experience of the management team and its PAEI potential were put as moderating variables. As this research is devoted to evaluation of the e-businesses start up potential the dependent variable is chosen to be their success as it is the factor the research attempts to predict.

Success of an e-business is measured by its return on investment (ROI) and profitability. Also the most common way to assess the current user value of a webpage is Google Page Rank index. This index indicates the usefulness of webpage's content by counting its citations on other internet pages. Google Page Rank takes value from 1 to 10, where the value of 10 indicates the highest user value. However in current research we have chosen an additional indicator of Alexa rank or a similar Alexa Reach index due to identified direct correlation between the startup value and Alexa Reach index (Alizar 2007). Alex rank combines the number of users reached and web pages views. Dependent variable like all the rest researched variables takes values from 1 to 3 where: 1 – Return on investment below risk free rate, low or no profit company, Alexa index below 500; 2 – Return on investment from 10 to 50 percent, moder-

ate profitability, Alexa index 500-1000; 3 – Return on investment starting from 100 percent, high profitability, Alexa index more than 1000.

Then two non directional hypotheses have been developed in order to see whether there was a correlation between variables and if the relationship was strong enough to be significant.

Hypothesis 1. There are some criteria in terms of products, strategies and internal sustainability that determine success of innovative e-business start up more than other. Correlation between several variables and the dependent variable is significantly greater than correlation to other variables. Hypothesis is proven with $p < 0.05$ level of significance.

Hypothesis 2. It is possible to determine the probability of success of investments in an innovative e-business start up by assessing the star ups' qualitative success factors. Hypothesis is proven if the chosen set of variables is able to predict up to 80 per cent of the general population's cases and there are several variables which play the strongest roles in the company's success.

4. Description of investigation

A startup founded after 2004 is chosen to be the unit of analysis in order for the research to be the most up to date as possible. The information has been gathered mostly by means of internet in order to take the widest international sample possible. The start-up profiles have been found on by browsing the internet and randomly choosing e-start-ups founded after 2004 to include in the sample. Further authors have explored each particular case to identify whether there was sufficient information to examine company's strategy and product potential as well as the 3-5 years operational outcome. In cases when the authors have had access to the management team interviews have been taken. Regarding sampling, 30 e-business companies founded after 2004 on Web 2.0 will be chosen according to the simple random sampling technique where any startup around the world has equal probability to be presented in the sample. Due to the fact that the population of innovative startups is unknown the size of the sample is defined by the realistic correlation reliability margin at $p < 0.05$. The constraint of choosing 2004 as the earliest date of the startup's launch is motivated by the fact that 2004-2005 have been considered as a start of the Web 2.0 of Internet age. Sample sizes larger than 30 and less than 500 are appropriate for most researches for business (Sekaran, Bougie 2009).

Regarding measuring, companies have been further rated according to four variables of products, two variables of strategies and four internal

sustainability variables that were derived from the literature research and presented in the theoretical framework. Most of the variables had its sub criteria in order to facilitate the analysis. It was assumed that all of the sub criteria have an equal contribution to their criteria. Performance of the company according to those criteria has been measured according to 1 to 3 point scale which is concise, comprehensible and commonly used in strategic assessment models which is rather similar to the performed study. Therefore the measured variables will have values from 1 to 3 implying that: 1 – variable is weakly exposed; 2 – variable is moderately exposed; 3 – variable is strongly exposed. The rating of each case has been based according to case study analysis made by exploring customer opinions, value offering, information on the management team and other information that could give a clue on the independent and moderating variables or an expert opinions in analytical publications and relevant articles in case if one is published. In case if there was no expert opinion or comprehensive case study on the startup, the authors have tried to contact the management team for their self assessment or used their own judgment if the case was obvious and no support was needed. The search of information starts on professional discussion forum of habr.ru where experts and customers opinions were gathered. Further the authors consulted webpage's main statistical data.

The next step was the search for similar services in the web with the help of a search engine and similar website index ranking service. Further research was the examination of the management team by browsing their CV's and any mentioning of them. Next step was the research of corporate behavior on the historical basis as well as examining corporate responses to challenges. Further browsing has been done on an as available basis. Greater preference was given to analytical articles. The data have been loaded to an SPSS program and analyzed according to the stated hypotheses. Firstly authors presented a hypothesis test level for correlation at required $p < 0.05$. Further the table of correlations of nine variables was presented followed by the discussion of the most influential sub variables in their groups. Following the correlation analysis authors presented the results of a regression analysis. Then authors have interpreted received data according to the stated hypotheses. Concluding authors have commented every hypothesis made.

5. Data analysis and interpretation

Hypothesis 1. There are some criteria in terms of products, strategies and sustainability that

determine success of innovative e-business start up more than others. In order to see how reliable are the correlation received from the sample of 30 companies the study of statistical reliability was performed. For this particular research the significance below 0,360 indicates reliability at $p < 0,05$ confidence level.

We have identified (Table 1) that there are three string correlation between a success of an innovative e-business as follows: Value Curve Divergence - Pirson's correlation is 0,756 and Sig.(2-sided) is 0,000; Dynamic Capabilities - Pirson's correlation is 0,710 and Sig.(2-sided) is 0,000 and PIES criteria - Pirson's correlation is 0,797 and Sig.(2-sided) is 0,000.

Table 1. Correlations between of groups' variables and start ups' success

N 30	Success
Value Curve Divergence Pirson's correlation Sig.(2-sided)	0,756 0,000
Value Innovation Pirson's correlation Sig.(2-sided)	0,483 0,007
Exceptional Buyer Utility Pirson's correlation Sig.(2-sided)	0,555 0,001
PIES criteria Pirson's correlation Sig.(2-sided)	0,797 0,000
Dynamic Capabilities Pirson's correlation Sig.(2-sided)	0,710 0,000
Professional Management Pirson's correlation Sig.(2-sided)	0,626 0,000
PAIE criteria Pirson's correlation Sig.(2-sided)	0,585 0,001
Global Focused Strategy Pirson's correlation Sig.(2-sided)	0,422 0,020
Asymmetric Strategy Pirson's correlation Sig.(2-sided)	0,455 0,012

Further analysis has shown confidence intervals for each of the most significant correlations in order to test the reliability of all of them. Further analysis has break three previously found independent and moderating variables in their sub-groups in order to define the most important sub criteria

The most important sub variables are: Value Curve's Delta (pure difference between industry's and company's value curves) - Pirson's correlation is 0,684 and Sig.(2-sided) is 0,000; Coherent Strategy (strategic criteria of a wise, purposeful, effec-

tive and efficient resource allocation) - Pirson's correlation is 0,616 and Sig.(2-sided) is 0,000; Risk criteria of PIES - Pirson's correlation is 0,674 and Sig.(2-sided) is 0,000; Market Acceptance criteria of PIES - Pirson's correlation is 0,632 and Sig.(2-sided) is 0,000; PIES Managerial Experience criteria - Pirson's correlation is 0,689 and Sig.(2-sided) is 0,000; and a Dynamic Capability of Seizing opportunities - Pirson's correlation is 0,730 and Sig.(2-sided) is 0,000 as shown in Table 2.

Table 2. Correlation between sub groups of variables and start ups' success

N 30	Success
Value Curve's Delta Pirson's correlation Sig.(2-sided)	0,684 0,000
Strategic Profile Focus Pirson's correlation Sig.(2-sided)	0,519 0,003
Coherent Strategy Pirson's correlation Sig.(2-sided)	0,616 0,000
PIES Societal criteria Pirson's correlation Sig.(2-sided)	0,180 0,340
PIES Risk criteria Pirson's correlation Sig.(2-sided)	0,674 0,000
PIES Demand criteria Pirson's correlation Sig.(2-sided)	0,425 0,019
PIES Market Acceptance Criteria Pirson's correlation Sig.(2-sided)	0,632 0,000
PIES Competitive criteria Pirson's correlation Sig.(2-sided)	0,409 0,025
PIES Experience criteria Pirson's correlation Sig.(2-sided)	0,689 0,000
Dynamic Capabilities Sensing Pirson's correlation Sig.(2-sided)	0,121 0,523
Dynamic Capabilities Seizing Pirson's correlation Sig.(2-sided)	0,730 0,000
Dynamic Capabilities Transforming Pirson's correlation Sig.(2-sided)	0,572 0,001

All of them are significantly correlated with the dependent variable and are also statistically representative. Further those calculations are also tested for reliability; it was proved that all of the correlations are highly representative and statistically reliable.

Hypothesis 2. *It is possible to determine the probability of success of investments in an innovative e-business start up by assessing the star ups' key success factors.* Following the correlation analysis authors presented the results of a simple and multiple regression analyses. In order to produce a wider picture analysis on the observations of 30 e-startups authors made a regression analysis in order to see how these variables influence the success in the integrated system as opposed to one by one comparison. Coefficients summary has shown the most influential analyzed factors (Table 3) on the dependent variable.

Table 3. Result of regression analysis

Multiple R	0,908		
R square	0,824		
Adjusted R square	0,744		
Standard errors	0,33013		
Variables	Non standardized Beta	t	Sig t
Value Curve Divergence	0,704	3,369	0,003
Exceptional Buyer Utilities	0,981	2,654	0,015
Professional Management	0,664	1,557	0,135

The coefficient of determination *R*-square provides the information about the goodness of fit of the regression model; it is a statistical measure of how well the regression line approximates the real data point. Simple correlation coefficient *R* has shown that there is a very strong positive correlation among the chosen factors and the innovative start ups success). High value of *R*-square coefficient implies that innovative e-businesses can be successfully judged by the combination of the chosen criteria as those would determine startups success or failure in 82,40 percent of cases. Adjusted *R*-square is smaller due to the relatively small sample taken, however still significant 0,744. Standard deviation in this case is fairly small 0,33013 which indicated the reliability of the received results.

Multiple regression analysis has shown that the following variables have the strongest connection with enterprise success: Value Curve Divergence; Exceptional Buyer Utility and Professional Management. Those criteria are also among the statistically significant for this particular research. Following the example of the similar success probability formula by Teece (2007, 2009), the conditional probability formula can be presented

as a result of this research. Then, $\Pr(S|I) = \Pr(VCD|I) * \Pr(PIES|I, VCD) * \Pr(\Pi|E, VCD, PIES) * \Pr(M|I, VCD, PIES, \Pi) * \Pr((S|I), VCD, PIES, \Pi, M)$; where: $\Pr(S|I)$ – is a probability to build a Successful business on a particular innovation; $\Pr(CDV|I)$ – is a probability to create a Value Curve Divergence of innovative product which is different from the industries average; $\Pr(PIES|I)$ – is a probability to meet the PIES criteria for innovation; $\Pr(\Pi|E)$ – is a probability of successful Dynamic capabilities towards to seizing a new business opportunities on innovation in the external environment; $\Pr(M|I)$ – is the probability that the Professional Management would be able to run the innovative start up successfully. According to simple regression analysis this formula is able to predict of the e-start up success up to 82,40 percent.

6. Conclusion

The aim of this research was to test contemporary strategic and innovation theories to discover the most appropriate qualitative criteria of success for an innovative e-startup assessment and produce the probability formula in order to estimate the chances of success of any other innovative e-business.

In this work all the objectives were met successfully. Hypotheses have been proven with $p < 0,05$ level of confidence. When assessing the startup one should draw special attention to the company's Value Curve in terms of its divergence from the industry average. Also one should pay special attention to Buyer Utility of the product keeping in mind that delivering an exceptional buyer utility for an affordable price is a key to innovation success. When assessing a startup one should also pay attention to the Management team. According experience of handling uncertainties resourcefully and relevant technical expertise is one of the greatest assets for an emerging e-business. Also the management should be examined for their Dynamic Capabilities. Especially important is the capability of seizing opportunities. In order to weight all aspects of innovation one should use PIES criteria especially focusing on Risk and Market Acceptance criteria. It is necessary also take into consideration other factors apart from the theoretical framework and keep in mind that it is relevant only for 82,40 percent of the cases.

Apart from natural limitation in time the research has a relatively small sample of companies examined and analyzed. Also limitations in terms of volume have limited the number of sources used as well as the overall level of expression and explanation. Innovation theories that were pub-

lished after 2000 and startups founded after 2004 are also constrains have chosen to narrow the researched field. However work generalizes e-businesses and makes no differences between them in terms of analysis. Also the research does not take into account the majority of soft issues encountered in business.

The authors would propose to make a longitudinal study on the topic in order to see the developments in sphere on innovation and e-commerce while also attempting to predict the future. Also it is worth considering dividing the sample according to the types of an e-business and making a similar analysis taking about 30 cases in each group. Further research of Alexa index and forecasting its growth should be performed in order to forecast the value of each particular e-business.

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