
Development of Entrepreneurial and Marketing Capabilities in Engineering & Technology Based Firms

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ABSTRACT

EM (Entrepreneurial Making) and MC (Marketing Capabilities) play a crucial role in the success of a firm. Many engineering and technology firms are run by people having an engineering degree which have less exposure to marketing. A strong EO (Entrepreneurial Orientation) enables the firm to carry out and develop its MC in opportunistic, proactive and innovative way. The EO and MC are shaped and defined by various antecedents i.e. technological and market turbulence, market and strategic orientation. The impact and influence of these antecedents vary as the organization moves from its infancy to growth and maturity. The following research tests the impacts of various antecedents during the various stages of the life cycle of the engineering and technology based firms. To conduct the longitudinal study, the engineering and technology firms were grouped in to four categories temporally i.e. (1) less than 2 years, (2) 3-4 years, (3) 5-8 years and (4) more than 9 years. This allowed a quasi longitudinal observation to find out and compare the changes over time. The results show that the various factors influence the MC in varying degree during the various stages of the life cycle of the firm.

Key Words: Marketing Capability, Environmental Turbulence, Entrepreneurial Orientation, Market Orientation, Strategic Orientation, Competitive Advantage, Engineering and Technology Based Firms.

1. INTRODUCTION

Many engineering and technology based firms often fail in the initial years of creation, as they are obsessed with the technology they have. These technology based business often try to create products that are based on radically new technology that has the power to change the market place [1]. The sales and marketing function become complicated as there is no market research data available for new products [2]. The existing market research data is largely

irrelevant for these new products [1]. This obsession with technology leads to a myopic point of view and in many cases they lose sight of the customer needs.

The EM is different as compared to corporate marketing. In EM the entrepreneur has access to a very limited set of resources tangible or intangible. In many cases he has no ideas of the various segments and the needs of the various segments. It becomes very difficult to rightly position

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ones product or service. The four “P” s of marketing are also not clear. The entrepreneurs use resource parsimony along with boot strapping to find new market opportunities. The scarcity of resources enhances their creativity.

An EM framework has been proposed [3] which combines marketing and entrepreneurship to define this firm. The EM and MC combined are considered as idiosyncratic and intangible resources in this research and the firms can achieve a competitive advantage by the proper utilisation of these skills and capabilities [4]. This research tests the Qureshi model [4-5], of EM during the various stages of the life cycle of the firm. A survey of engineering and technology based firms in Berlin was carried out. The surveyed firms were grouped in to four groups (1) less than 2 years, (2) 3-4 years, (3) 5-8 years and (4) more than 9 years. The impact of various variables on MC was tested using structural equation modelling. EM and SO (Strategic Orientation) has been found to have a significant relationship with the marketing capabilities of the engineering and technology based firms. Marketing capabilities has been found to be significantly related to firm performance. The findings of the research support the earlier research carried out by Klocke and Gemunden [6].

2. THEORETICAL FOUNDATIONS AND RESEARCH FRAMEWORK

Hamel and Prahalad [7] introduced the concept of core competencies to enhance firm performance and gain competitive advantage. The resource based view of the firm highlights the importance of tangible and intangible assets and capabilities [8]. The firms have to be proactive to understand and develop capabilities that can lead to a sustainable competitive advantage. Klocke and Gemunden [6] explains that new firms focus more on exploration in their business models. These new firms

need intensive exploration activities in order to define and implement their business model. If the exploration delivers positive results, the exploitation stage begins. In this stage the companies try to build products or services which are better able to solve the customer’s problems and exploit the existing work done.

2.1 Marketing Capabilities

MC of a firm can be defined as the skills and knowledge of the employees and owners of the firm to understand the customer needs and then to translate that in to a viable product/service. The sub components of the MC are the capability to conduct market research, develop the product, price the product, distribution capability, advertisement and promotion capability and the overall market management capability.

2.2 Environmental Turbulence

The external environment of the firm impacts the various variables of the firm. According to Miller [9], the firms are more innovative in a TE. Turbulence has been defined to be in two ways [10] i.e. market and technological turbulence. The ET impacts the various variables inside the firm. Some of the important variables selected for this study are EM, MC and SO.

2.3 An Integrative Framework

Qureshi [4-5] has proposed an integrative EM model based on the above mentioned variables. One of the external variable is the ET [9]. This impacts the various internal variables of the firm. As the environment becomes turbulent, the company has to be more entrepreneurial (proactive, innovative and a risk taker) higher in market orientation (intelligence generation and dissemination) [11] and better in strategic orientation. These three variables impact each other as well. The EO (Entrepreneurial Orientation) variable impacts the

strategic [12] and market orientation variables. An innovative and proactive mind-set enhances the marketing orientation and strategic orientation of the firm. In the next stage of the model, the EO has a strong impact on the marketing capabilities of the firm [13] As the firm is innovative and a proactive risk taker, the marketing capabilities of the firm become more innovative. The entrepreneurs become creative in their working. In the final stage of the model the MC of the firm have a positive impact on the performance of the firm.

The following hypothesis used in the Qureshi[4-5] model are adopted for this study.

- Hypothesis-1: Higher ET leads to higher EO of the firm.
- Hypothesis-2: Higher ET leads to higher the MC of the firm.
- Hypothesis-3: Higher ET leads to higher SO of the firm.
- Hypothesis-4: Higher EO of the firm leads to higher MC of the firm.
- Hypothesis-5: Higher EO of the firm leads to higher MO of the firm.
- Hypothesis-6: Higher EO of the firm leads to higher SO of the firm.
- Hypothesis-7: Higher the MO of the firm leads to higher MC of the firm.
- Hypothesis-8: Higher MO of the firm leads to higher SO of the firm.
- Hypothesis-9: Higher SO of the firm leads to higher MC of the firm.
- Hypothesis-10: Higher MC of the firm leads to higher firm performance.

3. METHODOLOGY

This research is based on a survey which was conducted in the city of Berlin, Germany. The survey questionnaire was mailed to the owners of engineering and technology based firms working in the technology parks in Berlin. Around 143 owners/senior employees responded. The response rate turned out to be 20%. A structured equation model was developed to test the relationships hypothesised in the model. PLS Smart software was used to test the model.

4. OPERATIONALIZATION OF VARIABLES

The different variables used in the study were previously used and tested. Some of the variables were adapted to the context of technology parks. The various variables used in the study were as follows. The market turbulence variable used was developed by Jaworski, and Kohli [14]. This variable measures the extent of technological change. Strategic orientation variable used was developed by Vorhies and Harker [15]. The EO measures three things i.e. Innovation, proactiveness, and risk taking. This variable was developed by Namen and Slevin [16]. MO variable was developed by Jaworski and Kohli [14]. It measures three things i.e. market intelligence generation, market intelligence dissemination, and to response to the gathered intelligence. The MC variable developed by Vorhies and Harker [15] was used. Firm performance variable used was developed by Venkatraman[17].

5. RESULTS

The testing of the model consisted of two parts. The measurement model and the structural model. The measurement model measures the measurement capability of the variables. The structural model measures the relationships between various variables. **Fig. 1** depicts the structural model for the companies of Group-1.

The companies in the study were divided in to four groups as follows:

Group-1: Companies in existence for less than two years

Group-2: Companies in existence between three to four years

Group-3: Companies in existence between five to eight years

Group-4: Companies older than nine years

The regression coefficients of the model were calculated for all of the groups. Since the four groups consist of companies which are at different stages of the life cycle. This in turn can be a quasi-longitudinal study.

The regression coefficients of the proposed model for all of the four groups along with significance is presented in Tables 1-2.

The quasi longitudinal perspective allows to compare the proposed model in terms time. The objective is to understand which variables are important at various stages of the lifecycle of the firm. The Table 2 uses the abbreviations used in the Qureshi and Kratzer [4] model.

5.1 Discussion and Study Implications

The Qureshi model [4-5] was tested and found to be supported in this research. In the early stages of the life cycle of the firms, ET has a very minor impact on EO and MO. EO has no impact on SO i.e. Hypothesis three is not supported.

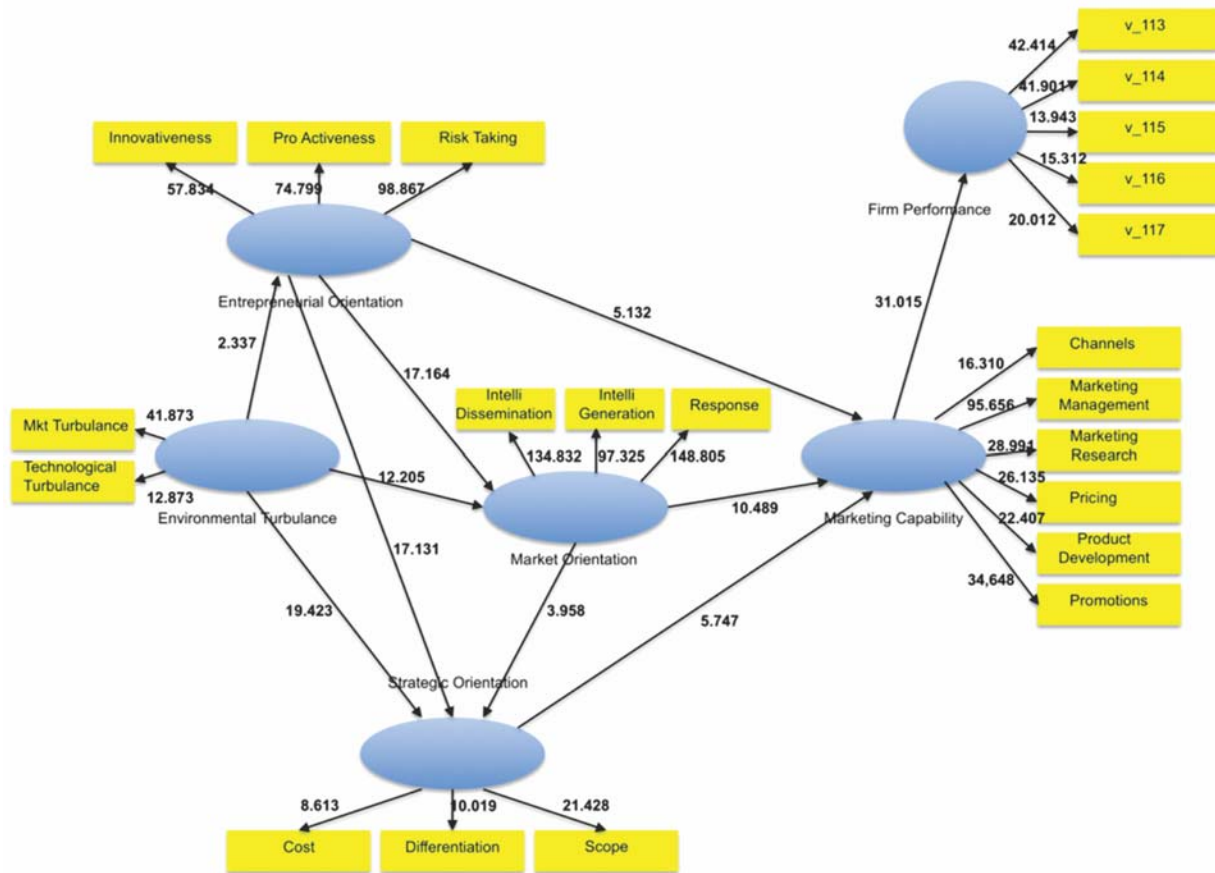


FIG. 1. THE T STATISTICS FOR GROUP 1 OBTAINED USING PLS SMART [4-5]

In Group-1, EO has a strong impact on MO, SO and MC. The companies have technological and innovative idea in the beginning which is driven by high EO. A high EO leads to a high MO and SO. In group two, EO and MO were found to have a strong influence on MC. The focus now is on sales and marketing. The various components of MC are in action to fulfil customer needs. According to Day [18] “it is necessary to monitor the market, conduct

market research, to communicate with suppliers, to design products/services, stipulate prices and carry out promotional events”.

In group three companies EO has a strong impact on SO and MC. As the companies have grown to be bigger, the companies have adopted systems and procedures to run the company.

TABLE 1. PATH COEFFICIENTS

Hypothesis	Group-1	Group-2	Group-3	Group-4
	< 2 Years	3-4 Years	5-8 Years	> 9 Years
ET-EO	0.078	0.576	0.334	0.486
ET-MO	0.231	0.337	0.279	-0.016
ET-SO	0.340	0.197	-0.103	-0.206
EO-MC	0.195	0.231	0.367	0.162
EO-MO	0.464	0.142	0.441	0.467
EO-SO	0.464	0.182	0.679	0.226
MO-MC	0.414	0.246	0.367	0.500
MO-SO	-0.136	0.527	-0.141	0.483
SO-MC	0.185	0.442	0.164	0.218
MC-FP	0.517	0.421	0.469	0.518

TABLE 2. T- VALUES OF THE VARIOUS PATHS IN THE STRUCTURAL EQUATION MODEL

Hypothesis	Group-1	Significance	Group-2	Significance	Group-3	Significance	Group-4	Significance
	<2 Years		3-4 Years		5-8 Years		>9 Years	
ET-EO	2.337	Significance	31.338	Significance	13.342	Significance	16.287	Significance
ET-MO	12.205		10.571		12.114		0.325	
ET-SO	19.423		7.287		4.242		5.161	
EO-MC	5.132		9.308		8.589		6.293	
EO-MO	17.164		6.399		16.462		15.234	
EO-SO	17.131		7.388		21.358		6.118	
MO-MC	10.489		9.586		16.556		17.514	
MO-SO	3.958		29.532		4.115		21.798	
SO-MC	5.747		15.840		3.805		8.126	
MC-FP	31.015		17.887		26.274		22.098	

The companies in group four are in the later stages of the life cycle and must develop new technologies and introduce innovation in products and services. A summary of the findings of all four groups is presented in Table 3. In the first stage of the life cycle EO has a high impact on MC and SO. There is a less impact of EO on MC of the firm. In the second stage EO has a high impact on MC. Now the firm is getting mature and has some marketing data to develop and refine existing strategies. In the third stage EO impact becomes higher on the MO and MC construct. The company has a firm marketing strategy by this time. This impact continues in the last stage. At this stage marketing capability has a high impact on FP (Firm Performance).

One of the limitation of the study is that it was limited to one city i.e. Berlin. This limitation limits the study to be generalised to other places. Another limitation is the key informant bias [19]. Moreover some moderating effects can also be looked to understand the phenomena in detail.

6. CONCLUSIONS

This research is a contribution to the entrepreneurship literature as it highlights the variables which impact the MC of engineering and technology based firms during various stages of the life cycle of the firms. Higher MC in turn lead to better FP.

EM and MC play a crucial role in the success of a firm. A strong EO enables the firm to carry out and develop its

TABLE 3. VARIOUS STAGES OF THE LIFE CYCLE OF FIRMS

Stage	Technology- and Market-Related Activities	Process	Relationship	Impact
1	<ul style="list-style-type: none"> • Overall focus on research • Development of an innovative product idea • First realization of technological concept (e.g., building of a prototype) • Optimization of first prototype • Set-up of commercial production • Getting to know the first customers • Opportunistic sales, little systematic marketing planning 	Exploration	<ul style="list-style-type: none"> • EO-MO • EO-MC • EO-SO • MO-MC 	<ul style="list-style-type: none"> • High • Less • High • High
2	<ul style="list-style-type: none"> • Use of already existing technology base • Small technical modifications to fulfill customer needs better • Strong overall focus on sales/marketing • Systematic activities to build up and strengthen customer base 	Exploration/ Exploitation	<ul style="list-style-type: none"> • EO-M.C • MO-MC • (6 components & construct are high as well) 	<ul style="list-style-type: none"> • High • High
3	<ul style="list-style-type: none"> • Revision and extension of existing technology base to remain at the technological forefront • Differentiation and extension of product lines • Main focus on satisfying existing customers and strengthening the brand • Deepening customer relationships allow individual product solutions 	Exploration	<ul style="list-style-type: none"> • EO-MO • EO-SO • EO-MC • MO-MC 	<ul style="list-style-type: none"> • High • High • Very High • High
4	<ul style="list-style-type: none"> • Option 1: Exploration of fundamentally new technologies for new innovative products • Option 2: Exploration of new markets because the current market is too small for the targeted company growth 	Open	<ul style="list-style-type: none"> • ET-EO • EO-MO • MO-SO • MO-MC • MC-FP 	<ul style="list-style-type: none"> • High • High • High • High • Very High
<p>The comments on the impact of one variable on the other is based on the path coefficients. A path coefficient of more than 0.5 is considered to be very high, less than 0.5 and greater than 0.2 is high. The others are less.</p>				

MC in an opportunistic, proactive and innovative way. The EM and MC are shaped and defined by various antecedents i.e. technological and MT, MC and SO. The impact and influence of these antecedents vary as the organisation moves from its infancy to growth and maturity. The research has tested the impacts of various antecedents during the various stages of the life cycle of the engineering and technology based firms. The results show that the various factors influence the MC in varying degree during the various stages of the life cycle of the firm. In the early stages of the life cycle the EO is the key driver driving the firm. The MO and MC at this stage of the firm are very primitive. The firm owners are not clear about pricing, placement, promotion and product strategies. However the entrepreneurs are very creative to find the first few customers. In the next stages the impact of EO on MC becomes significant. The impact of MO and EO is higher as the company moves to the mature stage of the life cycle. A key finding of this research is that the entrepreneurial founders need not to worry about learning and developing formal marketing capabilities. They have to focus more on small experiments and to make and deliver the product/service to the customer in the best possible way that fulfills the need and adds value to them.

This research provides useful information to the entrepreneurs to develop different MC during the lifecycle of the firm. In addition it appries them of the various antecedents that impact MC and FP at the various stages of the firm.

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