Environmental factors affecting innovation strategies of companies: Customers and suppliers effect

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Abstract

We aim to identify the effect of customer characteristics, the effect of supplier characteristics and the effect of firm specific features on innovation level of firms. As the dependent variable has binary values, whether the firm makes innovation or not, the effects of independent variables on innovation activities are analysed by using binary logistic regression model. We have the following results from the earlier analysis of the data. The firms’ motivation for innovation is mainly affected by their customer’s and supplier’s characteristics. Specifically, we found that if the spans of the customer and supplier increase, firms are more likely to innovate. Furthermore, if the turnover is generated by few companies, firms are less likely to make product innovation. Likewise, if the firms have higher number of customers and suppliers, the innovativeness levels of the firms become higher.

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Keywords: Innovation; process and product innovation; customers; suppliers

Introduction

Many low and medium added value product producers have lost their competitive advantages in the markets recently. Some of the reasons for firms’ failure for losing their competitive advantage are globalization, access to cheap labour forces and rapid dissemination of know how through Internet and IT Technologies. It has been witnessed that economic growth and development in the developed and developing countries are mostly determined by innovation level rather than efficiencies of the firms as
innovation enables companies to produce high added value products. Thus, innovations and ability to innovate become vital for firms in order to sustain their competitive advantage. Innovation strategy of a company is not only determined by company’s workforce, capital and technological ability but also by how environmental factors force R&D activities and innovation level. Firms operating in the same sector have different innovation levels. Thus, the effect of environmental factors on innovation level and different innovation strategies also become important for sustaining competitive advantage of the firms.

In recent studies, innovation abilities of companies have been analyzed extensively through in-organization factors or through customer and supplier relations of companies. However, the effects of external environmental factors on organizational innovation capability have not been thoroughly analyzed. The characteristics of suppliers and customers are the most vital factors affecting innovation level of a company. The variety of customer demands lead companies to serve in a more competitive environment and this force firms to become more innovative. The high numbers of competitive suppliers enable companies to learn new ideas from them, thus enable the possibility of accelerating innovation trends in the company.

This paper focuses on two main questions: 1) How does customer characteristics affect firms’ innovation level? 2) How does supplier characteristic affect firms’ innovation level? In order to answer these two questions, dataset from European e-Business Market Watch survey is analyzed.

The dataset used in this project is more comprehensive; thus it will enable several original contributions to the literature. We analyze how customers’ and suppliers’ competitiveness and their changes in market share affect firm’s innovation level. Our findings reveal that the competitiveness of suppliers and customers greatly affect the innovation level of the companies.

**Literature Review**

Relations with customers and suppliers are the most important factors affecting innovation strategy of a company. The recent studies in the literature emphasize the effect of customers and suppliers on innovation level of the organizations. The suppliers’ impact on new product management has been analyzed in terms of innovation by Hakanson et.al. (1993). The close relations with suppliers result cost reduction, quality increase and faster release of new product in the markets (Wynstra et.al, 1999; Handfield et al. 1999; LaBahn et al. 2000; Takeishi, 2001). The effect of customers on innovation level has been studied by Von Hippel (1986), Lundwall (1986) and Biemans (1989) and results have shown that the feedback from customers lead to unique innovations. Johnsen et al. (2006) have analyzed the level of customer and suppliers’ effect on innovation process. The results have shown that the customers affect the innovation in the early phases and the suppliers affect the innovation in the later phases. Salomo et al. (2003) showed that customer orientation in innovation projects has a positive influence on new product development success and the degree of product innovativeness increases in due course. Atuahene-Gima (2005) argued that customer orientations support product innovation. Lukas and Ferrell (2000) analysed the customer orientation’s effect on products. Chen and Tsou (2012) have emphasized the IT abilities of customers and the fact that the process innovation is led through organization’s performance. Romereo et al. (2012) have supported the thesis that the factors affecting process and product innovation should be analyzed separately. Romereo et al. (2012) stated that the personal motivations have a certain effect on process innovation, however has no considerable effect on product
innovation. They also emphasized the effective role of management approach on product innovation. The customers’ and suppliers’ effect does not show an impact on process innovation however has affects product innovation. Wagner (2010) studied the effect of customers on innovation levels underlying the importance of suppliers’ relations in the same concept.

Verga-Jurado et al. (2008) stated that innovation could not only be explained with sector specific structural features and the performance of organizations, but the in-organization factors should also be taken into account, which found the audience by Pellegrino, Piva et al. (2011). De Jong et al. (2010) analyze the innovation with a macro approach and support the national level of innovation should be considered as well. Szajnfarber et al. (2010) stated the effect of customer relations on innovation Alegre et al. (2008) studied the in-organization factors’ effect on product innovation.

Studies conducted in this area mainly focus on effect of customer and supplier relations on innovation of organizations. In this study, we analyzed the effect of customer and supplier features and the segmentation of customer and suppliers, whether they are competitive and the changes in the market share, on companies’ innovation level. Both product and process innovations are analyzed and various sectors are studied to get more valid and applicable results.

Hypothesis

**Customer Related Questions:**

The innovation level of companies lead to competitive organizations, as the competitive market is a driving force for innovation. As the firm’s market scope increases, the number and size of the rival companies will also increases. Thus, firm has to make more innovation as the competition become fiercer. Thus, we hypothesize the following

H1: As the size of the companies increases, firms are more likely to make innovation.

Firms can sell products to mainly the same group of customers or firms’ customer base change frequently. If firms’ customer base remains mostly the same, it is relatively easier for firms to retain the customer as the switching cost of the customer is high. However, if firms’ customer base changes frequently, the bargaining power of the customer is much higher. Thus, firms force to make the innovation in order to keep and convince customers and we have the following hypothesis:

H2: As the firms’ customer changes frequently rather than firms having the same group of customers, firms are more likely to make innovation.

We also think that as the firms’ number of customer and type of customer increase, firms are more likely to force making innovation as there will be more and different type of request from customers. Thus, we have the following two hypotheses:

H3: As the number of customer increases, firms are more likely to make innovation.
H4: As the turnovers are generated mainly by few customers, firms are less likely to make innovation.

**Supplier Related Questions:**

As a recent trend, firms buy most of the goods and services from other firms rather than in house production. This makes firms more dependent to supplier for production of goods and services and the innovation capability of supplier become more important for companies to make innovation. We think that international suppliers are more innovative than local supplier as they are in a more competitive environment. As these suppliers have more information and they can transfer these know how, we hypothesize that:

H5: When firms have international suppliers rather than local suppliers, they are more likely to make innovation.

The high numbers of competitive suppliers and different type of suppliers enable companies to learn new ideas, thus enable the accelerating innovation trends in the company. As the companies get in contact with different suppliers, it is more likely that feedbacks from various suppliers lead to more innovation. Thus, we have the following hypotheses:

H6: If the firms prefer to buy from varying suppliers rather than the same group of suppliers, then they are more likely to make innovation.

H7: As the number of firm’s supplier increases, firms are more likely to make innovation.

H8: As the firm prefers few suppliers, it is less likely to make innovation.

**Methodology**

In this study, we aim to identify the effect of customer characteristics, the effect of supplier characteristics and the effect of firm specific features on innovation level of firms. The Dataset consists of chemical rubber and plastic, steel and furniture sector with a total 2113 answers from 7 different European Union member countries and US. As independent variable, we used two questions (European E-business Market Watch):

- “During the past 12 months, has your company launched any new or substantially improved PRODUCTS or SERVICES?”
- “During the past 12 months, has your company introduced any new or significantly improved internal PROCESSES, for example for producing or supplying goods or services?”

The first question represent whether the firm is making product innovation while the second one is the answer for process innovation. The answer to these questions takes two values: Yes or No. As these answers are in binary form, we used binary logistic regression model to formalize and test the hypothesis given above.
The term \( Pr(\text{Innovation}) \) express the probability that firm’s making innovation. As we have two types of innovations, we will evaluate the result of this model for both product and process innovation.

As independent variables, we used the following survey questions. (European E-business Market Watch)

### Customer Related Questions

- **Sales Market**- “What is your company's most significant market? Is it mainly the regional market, the country market, or international markets which you consider your main sales area?”
- **Customer Type**-“What characterises the relationship with your customers: Are you mainly selling to regular customers or rather to a changing customer base?
- **Number of Customers**-“Has the number of customers in the past 12 months increased, decreased or stayed roughly the same?”
- **Customer Size**-“How large is the share of your turnover generated by your three largest customers? Is it less than 20%, 20 to 40%, up to 60%, up to 80% or more than 80% of your total turnover?”

### Supplier Related Questions

- **Supplier Market**- “Do you procure primarily from suppliers in your region, in country or from an international supplier base?”
- **Supplier Type**-“What characterises the relationship with your suppliers: Are you mainly buying from regular suppliers or rather from a changing supplier base?”
- **Number of Supplier**-“Has the number of suppliers in the past 12 months increased, decreased or stayed roughly the same?”
- **Supplier Size**-“How large is the share of supplies procured from your three largest suppliers? Is it less than 20%, 20 to 40%, up to 60%, up to 80% or more than 80% of your total procurement?”

As control variables, the size and the age of company will be used. We used natural logarithm of age and size as this transformation increases the explanatory power of the model. In order to incorporate sector specific and country specific differences, we also use the dummy variable for the sectors and countries firms operate in.

The regression outputs of Eq. (1) are given below. We also provide odds ratio of the variables. Odds ratio is calculated by \( e^{\text{Coefficient}} \) where \( e \) is the base of natural logarithm. The odd ratio represents that if a variable increases by 1 unit, there will be \( e^{\text{Coefficient}} \) times increase in the ratio of probability of innovation to probability of no-innovation. We also checked whether there is multicollinerity in the data as well. We find that Variance Inflation Factor (VIF) score of the variables range from 1.03 to 2.17. As these statistics are less than 10, we conclude that there is no multicollinearity in our dataset.
Table I: Logistic Regression Output for Product and Process Innovation

| Explanatory Variable | Product Innovation | Process Innovation |
|----------------------|--------------------|--------------------|
| Sales Market         | 0.3468             | 0.1838             |
| Customer Type        | 0.0843             | 0.0169             |
| Number of Customer   | 0.3411             | 0.3436             |
| Customer Size        | -0.1416            | -0.0070            |
| Supplier Market      | 0.2878             | 0.1643             |
| Supplier Type        | 0.0588             | 0.0809             |
| Number of Supplier   | 0.3012             | 0.3808             |
| Supplier Size        | -0.0608            | 0.0388             |
| ln(Age)              | -0.0167            | -0.0161            |
| ln(size)             | 0.1367             | 0.2405             |
| Likelihood Ratio     | 219.53             | 193.76             |
| Psueduo R2           | 0.0777             | 0.0676             |
| Number of Observation| 2113               | 2113               |
Table II: Odd Ratios of Independent Variables

|                      | Product Innovation | Process Innovation |
|----------------------|--------------------|--------------------|
| Sales Market         | 1.4145             | 1.2018             |
| Customer Type        | -                  | -                  |
| Number of Customer   | 1.4065             | 1.4100             |
| Customer Size        | 0.8679             | -                  |
| Supplier Market      | 1.3334             | 1.1786             |
| Supplier Number      | -                  | -                  |
| Number of Supplier   | 1.3515             | 1.4635             |
| Supplier Size        | -                  | -                  |
| ln(Age)              | -                  | -                  |
| ln(size)             | 1.1464             | 1.2719             |

We support Hypotheses 1 and 5 as the empirical results also show that the coefficients of the sales market and supplier market are significant at the 1% level with a positive sign. Thus, if firm’s main customer market changes country market to regional market or international market to country market, the ratio of probability of product (process) innovation to no-product (process) innovation will increase by 1.4145 (1.2018) times. Similarly, if firm’s main supplier changes country supplier to regional supplier or international market to country market, the ratio of probability of product (process) innovation to no-product (process) innovation will increase by 1.3334 (1.1786) times. Thus, as the scope of customer and supplier increases from regional towards international, firm is more likely to make innovation. We also find that as the number of customer and supplier increases, firms are more likely to make innovation. Specifically, as the firm’s number of supplier increases, the likelihood that firm make product(process) innovation increases by 1.41 (1.4065) times whereas as the firm’s number of supplier increases, the likelihood that firm make product(process) innovation increases by 1.3334 (1.1786) times. Hence we can support Hypotheses 3 and 7.

We also show that as the firms sell their product into mainly the same group of customer, they are less likely to make product innovation. Particularly, as the size of main customer increases by 20%, the ratio of probability of product innovation to the probability of no product innovation decreases by 0.8679 times. However, firms’ process innovation activities are not affected from change in main customer size. Thus, Hypothesis 4 is supported partially. Similarly, both product and process innovations are no affected from main supplier size. For this reason, we could not support Hypothesis 6. We also find that as the size of firm increases, they are more likely to engage in both product and process innovation activities.

**Conclusion**

In this paper, we investigate how supplier and customer affect firm’s innovation capabilities. We found that if the spans of the customer and supplier increase, firm are more likely to innovate. Furthermore, if the turnover is generated by few companies, firms are less likely to make product innovate. Likewise, if the firm have higher number of customers and suppliers, the innovativeness level of the firm becomes
higher. In general, our finding supports the idea that the role of competition is substantial for the innovation activities of the firms when external factors are considered.

As there are very detailed questions in the survey, this study can be extended in several ways. Since we have several countries involved in the questionnaire, cross cultural effect can be analyzed. We can also investigate sector specific differences and the difference between product innovation and the process innovation in more detail. Furthermore, the effect of different question on innovation can also be analyzed.

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