

COMPETITION POWER AND INNOVATION IN FOREST PRODUCT INDUSTRY

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ABSTRACT

Developing new products and innovation causes substantial differentiations in the lifecycle of companies. Production of new products, processes and information are extremely important for a firm to keep up and compete with others in the market. In this study the process of innovation produce in the sector of forest product industry was investigated. This study, conducted in 102 small and middle size firms, showed that the export companies are more successful in innovation, information production is tremendously effective in innovation, and new products and processes are indispensable for competition. It was further determined that if research activities in forest product industry were supported with sufficient financial resource, the production of new products, process and information could be achieved satisfactorily, and market and competition domination could be gained in national and international market.

Keywords: Turkey, Forest Product Industry, Innovation, Competition Power

JEL Classification: A10

ORMAN ÜRÜNLERİ SANAYİNDE REKABET GÜCÜ ve YENİLİK

ÖZET

Yeni ürün gelişimi ve yenilik oluşturmak firmaların hayat döngüleri içerisinde farklılaşmalara neden olmaktadır. Ürün, süreç ve bilgi üretimi firmaların yaşam süreleri boyunca rekabet edebilmek ve hayatta kalabilmek için yapmak zorunda oldukları işlemlerdir. Bu çalışmada Türkiye'deki Orman ürünleri sanayi sektörünün yenilik oluşturabilme süreci incelenmiştir. 102 küçük ve orta ölçekli işletmede gerçekleştirilen çalışmada; ihracata yönelik olarak çalışan firmaların yenilik oluşumunda ön sıralarda yer aldıkları, bilgi üretiminin yenilik oluşumunda etken olduğu, rekabet edebilmek için yeni ürün ve süreçlerin öncelikli olduğu belirlenmiştir. Orman Ürünleri sanayi alanında AR&GE fonksiyonunun istenilen düzeyde finansal kaynakla desteklenmesi sağlanırsa ürün, süreç ve bilgi üretimi yeterli düzeye taşınır ve ulusal ve uluslararası alanda rekabet ve pazar hakimiyeti elde edilebilir.

Anahtar Kelimeler: Türkiye, Orman Ürünleri Sanayi, Yenilik, Rekabet Gücü

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1. Introduction

The fact of globalization, which is the result of New World Order, forces the companies to be active in international markets, keep up with changes quickly, and cope with market conditions consisting of uncertainty and complexity. The companies need to have a structure that is innovative and able to compete in the market.

Innovation, accepted as creating new product, improving the existing ones, or creating an organizational process that would have positive effects on organization, industry or society (Higgins, 1996), can be defined as a critical component of firms in sustaining their competition power (Leifer et al., 2001; Cooper, 2000; Schumpeter, 1934; Porter, 2000; Özçer, 2005).

Innovation applies to both products and processes. When new information, technology and methods are applied to processes, in particular at the supply chain level, significant value can be added for both actor enterprises and the end customer (De la Roche and Dangerfield, 2002). All types of innovation form the lifelines of companies and are the key to survival (Cavusgil et al., 2003).

Understanding the role of innovation at different stages of industry evolution is of interest to academics and industry practitioners alike. For example, insights into the evolution process will allow managers to make appropriate innovation-related investments aimed at maintaining competitiveness. (Hansen, 2006) Innovation process was investigated in many research papers and projects in many different ways (Rogers, 2003; Cooper, 1990; Cooper et al., 2002; Marxt et al., 2004). While some studies are about developing new products and their modeling (Veryzer, 1998; Reid and de Brentanis, 2004), some studies focus on success factors (Balachandra and Friar, 1997; Cooper 1999). Many studies in this field has proved that there is a positive relation between the competition power and innovativeness of the company (Han et al., 1998). These studies also showed that many companies lack the ability to improve new products and compete in the market (Yaldız, 2007). Kısacık indicated in a study, realized in 2005, that the companies that can not constitute innovation have to develop new cost strategies to survive and compete.

In industrial structuring, the companies in manufacturing industry are in the first place in constituting innovation because of their ability and power for innovation and being in a relatively competitive market. Manufacturing industry companies has a relatively quite low performance compared to the EU countries (Özçelik and Taymaz, 2004). Forest products industry, in which companies produce many different products for both commercial and personal use, has an important position in the manufacturing industry.

The world market for forest product industry is competitive, both between individuals and between exporting nations. The industry also faces an increasing competition from other materials such as concrete, plastics and steel materials (Anders et. al., 2001). The Global forest products industry finds itself faced with many

challenges. These challenges are multifaceted and complex, and the need for the application of innovative ideas and solutions is obvious. However, the process from innovative knowledge to implanted or consumed innovation is not clear (Van Horne et al., 2006). Several studies have found the forest sector to be conservative and less innovative than the average for the industry (Jacobsen et al. 2001). The forest products industry finds itself compelled to react to mounting pressures resulting from globalization. The pressure is manifested as heightened competition and the demand for sustainable development from governments and customers, which requires new approaches to manage and transform natural resources (Van Horne et al, 2005). Also, world wide overcapacity and prices led to the consolidation and restructuring of many companies. The forest products industry is an active player in the knowledge revolution that has changed the structure of many economies (Simard, 2000). The environment has become a key issue for all stakeholders of the forest product industry (Van Horne et al., 2006). Consequently, forest products industry should put more effort and give more importance to developing new products because climate change in the world.

The forest product industry is most important to the Turkish national economy and forests are vital renewable natural resources in Turkey. Forest products firms represent nearly 22.3% of the total manufacturing industry and employee portion is nearly 11.5% of all the employees in Turkey. It includes 59.690 firms (SIS, 2005) of that total 98.5% are classified as micro and small scale firms. Forest product firms are scattered all over the region and therefore, these firms have an important role in employment level and social welfare in Turkey (Akyüz, 2006).

Compulsion over the forests, being formed due to environmental pollution and global warming in the world and Turkey, necessitate the firms to develop innovation. In this study, the importance of developing innovation upon determining competitive capacity of forest products industry, having an important role for the economy of Turkey, was investigated and the situations of the firms upon developing innovation was determined.

2. Materials and Methods

The survey was conducted in three different cities Düzce, Kastamonu and Bolu. Düzce, Bolu and Kastamonu were chosen for this research because of two reasons. Firstly, they lied at the heart of the Turkish forest resource with over 2.390.676 ha of woodland. Secondly, production and added value mostly come from forest products industry sector in the region. This sector is very effective in the region because of the products it provides to both consumers other industrial sectors. The region is among the low priority regions in terms of development, and the employment in the region is predominantly provided by this sector. Also there are production companies that know the forest product industry very well and carefully follow the consumer needs and demands.

The method used in this study comprises scrutinizing the literature, producing a map for the region in terms of forest products industry, preparing questionnaire, conducting pilot study, and proceeding to implementation. This study covers only furniture and panel producers. The Questionnaire form was structured to obtain basic information on the firm level, R&D activities and expenditures, employment, competitiveness levels, aims of innovative activities and organizational innovations, sources of information for innovation, and obstacles to innovation. Innovation is explicitly defined at the firm-level. In order to check the quality of responses, firms who claim to be innovative are asked to describe their product and process innovations. Respondents' descriptions seem to suggest that their responses are quite reasonable (Özçelik and Taymaz, 2004). A total of 102 small and middle size firms working in forest products industry were investigated in this study in 2007.

3. Empirical Results

A summary of the main characteristics of the sample is shown in Table 1. These data reveal that a typical Forest product industry firm is relatively small (mean employment = 47 workers), well established (there are few new firms in the sample), highly export-oriented (overall sample mean = 47,1%) and moderate R&D active. The capital companies, which include Limited Company and Joint Stock Company, were responsible for nearly 79,4% of all the firms. 55,9% of firms use their production in mass production, 23,5% of them in order production and 17,6% of them in batch production. Export oriented firms are 47,1%. Examining the supply chain of the companies, it was determined that the percentage of companies procuring raw material from national companies, international companies and both national and international companies are 26,4%, %11,8% and %61,8% respectively.

When the new product development time of companies were investigated, it was seen that the percentage of companies, changing combination of their products in less than one year, in between one to five years, in more than five years are 11,8%, 14,7% and 20,6% respectively. It was also found out that 50% of companies do not change the combination of their products.

Whether the companies allocated any budget for research was also asked to the companies. According to the results, it was determined that 67,7% of the companies allocate budget for research projects. The percentage of companies allocating 1%, 3%, 5%, and 10% of their general budget were 5,9%, 8,8%, 8,8%, and 8,8% respectively.

The companies participating in this study were also examined in terms of their competition conditions, and it was determined that 88,3% of companies work in highly competitive environments.

The goals of the companies were also analyzed and presented in Table 1. Here, respondents were asked to rank the impact of 6 factors along a 5-point scale

(ranging from 1; not important to 5; most important). Mean index score per factor are listed in the first column, whereas the second column shows the standard errors.

Table 1: The Goals Of The Companies

Firm aims	Mean score on index ^a	Std. error
Creating new products	3,88	2,11
Creating employment	3,68	1,51
Surviving the company	3,21	1,68
Profitability	3,09	1,90
Productivity	2,79	1,27
Customer satisfaction	2,56	1,56

^aMean score along a five-point scale, ranging from 1 (not important) to 5 (the most important)

As seen in the table creating new products gets the largest share in the company goals (mean score 3,88). Creating employment and new products have relatively lower rankings. Customer satisfaction has the lowest score on the list (mean score 2,56), suggesting that creating new products is an evident condition of survival in a competitive environment. The firm representatives indicate that profitability and customer satisfaction could be achieved automatically through the creation of new products. The survival of the company was associated with creating new products

The factors affecting the competition power of companies participated in this study are shown in Table 2. Here, respondents were asked to rank the impact of 17 factors along a 5-point scale (ranging from 1; not important to 5; most important).

Table 2: Competitive Factor in the Forest Product Industry

Factor	Mean score on index ^a	Std. Error
Product quality	4,13	1,36
The price of product	3,78	1,21
Timely delivery	3,78	1,45
Cost of production	3,73	1,63
Customer oriented products	3,72	1,30
Knowledge and experience	3,72	1,37
Product diversity	3,66	1,33
Technology	3,56	1,34
Product appearance	3,50	1,50
Closeness to market	3,48	1,36
Being able to create new product	3,44	1,34
Ease of product use	3,34	1,21
After sale services	3,32	1,56
Socioeconomic environment	3,31	1,47
Product differentiation	3,28	1,49
Qualified work force	3,19	1,49
Closeness to raw material	2,91	1,40

^aMean score along a five-point scale, ranging from 1 (not important) to 5 (most important)

The most important condition for forest products industry firms to be able to compete is the necessity of producing quality products (mean score 4,13). The second important factor is that the price should be reasonable and the product should be delivered on time (mean score 3,78). The third factor affecting the competition is the production costs (mean score 3,73). The importance given to the new product creation by companies falls to the ninth place (mean score 3,44). The least important factor seems to be the closeness to the raw material (mean score 2,91). This study resulted in that the research activities and new product creation are given relatively less priority in terms of competition strategies. The main goal of the companies is to determine the quality and price according to customers' requests. Product representation, quality and price are the means of competition in forest product industry for the goods. The companies do not feel themselves disadvantageous because of the location.

The companies that participated in this study were studied in terms of their position in the sector of forest product industry and it was determined that companies were not in a desired structure in terms of their research capacities (mean score 1,91). On the other hand, firms are determined to be in the same position compared with the average of the sector in terms of qualified work force (mean score 2,15), ability to implement the innovations (mean score 2,15) and ability to use technology (mean score 2,24).

The companies that participated in this study were analyzed in terms of possessing necessary tools and facilities related with creating new product and it was seen that a considerable number of companies do not have a research department (mean score 1,81), and the companies are not aware of national and international development and related organizations. It was found out at the end of the study that companies take advantage of the researches done by the state organizations and web sites. About seventy-five of the companies in forest product industry are aware of the EU standards related with the sector.

The companies were asked to determine the departments affecting the constitution of innovation and the results are shown in Table 3.

Table 3: The Departments Affecting the Constitution of Innovation

Department	Mean score on index ^a	Std. Error
Export department	1,31	0,471
Research department	1,28	0,457
Marketing department	1,12	0,331
Management department	1,09	0,296
Production department	1,09	0,296

^aMean score along a five-point scale, ranging from 1 (not important) to 5 (most important)

When the obtained results are evaluated it could be seen that the export department highly contributes to constituting innovation (mean score 1,31), This is followed by research department (mean score 1,28) and marketing department (mean score 1,12). It is believed that management and production departments affect the innovation least (mean score 1,09). It is seen that the companies exporting and participating in fairs and work trips are ahead of the other companies in competition and creating new products. Export intensity is higher for innovators than for non-innovators. The research departments, working together with the export department expedite the innovation substantially. The budget allocated to innovation in forest products industry generally is quite low. Linking the export performance of firms with their technological orientation, relevant studies have adopted a number of measures and proxies for the degree of success in foreign trade and the inclination to innovative behavior (Özçelik and Taymaz, 2004). Lall and Kumar proved in a study, conducted in 1981, that large export companies are more successful in innovation. Furthermore Hirsch and Bijaoui (1985), indicated that companies that tend to export give more importance to research. Wakelin, (1998) emphasized that innovative and non innovative companies show different performances in export. Another work shows that new product development is affective not only on the export performance of the companies but also countries (Roper and Love, 2002).

The knowledge value chain and its effective management should naturally lead to innovation. The efficient management of the knowledge and information that is created within organizations, regardless of the source (customer feedback, centers of expertise, employees, or other stakeholders) has a long effect on the development of both radical and incremental innovation (Van Horne et al., 2005).

Information recourses, owned by forest products industry, about new product development shows differences. Producing and sustaining information based on both product and process are realized slowly in forest product industry sector than the other sector and included in value chain. Especially reducing the cost, reaching the customer, new products and markets, increasing the added value and innovation work related with stability is of top priority issues.

The information resources utilized by the companies are examined and the results are shown in Table 4.

Table 4: Oral Information Resources Utilized in Innovation

	Mean score on index ^a	Std. Error
Advisors	1,53	0,507
Researches	1,47	0,431
Department worker	1,34	0,483
Middle level managers	1,23	0,425
Top level managers	1,15	0,364

Creation, use, management and preservation of information are mostly performed within the company in forest product industry. We were faced with the fact that the consultants were the most frequently applied units by the firms for producing information and innovation (mean score 1,53). Research department follows this (mean score 1,47). An interesting point obtained as one of the result is that top management posts hardly contribute to innovation. Personnel who are involved directly in manufacturing process are more active in terms of developing new products and creating new information. The first step in creating information is to obtain data, which come from employees, customers, government organizations and scientists. In order to be used by a company, data needs to be available, accurate, valid and distributed to the right hands (Davis, 1993). In this stage the data is transformed into information and need to be managed properly to be able to use it effectively. Information management is about people and the processes to gather data, share information, transform information into technology, learning, applying and innovation (Lee and Young, 2000). Dissemination of information is realized in various ways such as conferences, workshops, seminars, discussion groups and exchange via e-mail and conveyed to all the personnel. As a consequence of sharing, information is transferred in to the application phase and thereby innovation process is started. Forest product industry mostly obtains information for developing new products from public research organizations and universities (mean score 1,80). The data provided by research teams in universities and public research organizations are transformed into companies' desired forms, shared via seminars, conferences and discussion groups and finally conveyed to the process of innovation.

The firms in the sector seem to be affected in terms of new product development by the products of competing companies (mean score 1,55). The export companies choose the way in which products seen abroad are imitated in developing new products. The activities towards new product development to match the desires and demands of international customers seem to be the second effective factor (mean score 1,52). Tending to develop new product based on imitating other national companies' products and customers seems to have a low effect in innovation (Table 5).

Table 5: The Starting Phase of Innovation Process

	Mean score on index ^a	Std. Error
The product of international rivals	1,55	0,506
International customers	1,52	0,509
The product of national rivals	1,28	0,457
Market research	1,20	0,407
National customers	1,18	0,392

Many studies concerning new product development evaluated the innovation process in a holistic manner (Rogers, 2003; Krishnan and Ulrich, 2001; Reid and de Brentanis, 2004). While some of the studies focus on the process of new product de-

velopment and modeling the process (Veryzer, 1998; Cooper et al, 2002; Marx et al, 2004) some others focus on success factors. (Balachandra and Friar, 1997). In those studies the innovation process are accepted as works toward augmenting the value and providing customer satisfaction in terms of products and technology. The companies participating in the survey are asked about the kind of changes in their own companies they accept as innovation and it is concluded from the responses that changes augmenting value in any stage of manufacturing process are perceived as innovation (mean score 1,29). Variation created on existing product and being able to produce a new product are perceived as secondary level innovation (mean score 1,23). Looking at development or industrial level of countries, while developed countries realize first investment and then positive changes in manufacturing processes as innovation, the developing countries provides innovation via transferring the technology (Dahlman et al., 1987). The works to realize technological innovation are very rare in developing countries. Generation of firm-level technological capabilities is influenced by such factors as firm size, organizational and managerial skills, adaptability to new methods and technologies, and access to skill from the market, external technical information and support, and embodied technology (Lall, 1992, p. 169). In this study it seems that the capacity of participating companies has a lower capacity for technological innovation than the ones toward processes and products.(mean score 1.03) The results are presented in Table 6.

Table 6: The Type of Innovation in Companies

	Mean score on index ^a	Std. Error
Process newness	1,29	0,461
Product newness	1,23	0,430
Technologic newness	1,03	0,174

In recent studies it has been determined that there is a positive relationship between the scale of the company and innovation in that the small size companies are much less innovative compared to the larger size companies (Rametsteiner and Kubeczko, 2003; Eurostat 2001). In the scope of this study, most of the firms are also small, employing less than 30 employees. This means that most of the companies in this sector can not be able to own the necessary financial resource for research and innovation (mean score 4,03).

The problems that companies are faced with during innovation studies are also investigated and the distribution is presented in Table 7. The table shows that the companies are facing significant problems in terms of financial resources (mean score 4,03). The economical crisis and deficiencies in technological potential are indicated as the same level of problem (mean score 4,00) and the inadequate technological support given by the government is accepted as an obstacle for innovation in the forth place (mean score 3,70). Especially, the deficiency of state and university in research activities shows up as an important problem. There are several studies

available about the factors influencing the generation of start-up from universities and research institutions (Lunnan et. al., 2004). A study conducted by Di Gregorio and Shane suggests that research activities, done in universities towards innovation are necessary but not enough. Especially local firms that are active in a limited region are financially weak and, when this is coupled with the economically negative conditions of country, no sufficient financial resource could be allocated to innovation. One other important problem firms are faced in new product development is implementing the innovation in either product or process phase (Globerman et al., 1998, Kremic, 2003).

Table 7: The Problems Faced in Innovation

Factors	Mean score on index ^a	Std. Error
Expensive financial resources	4,03	1,314
Economical crises	4,00	1,500
Expensive technologies	4,00	1,275
The deficiency in state support to innovation	3,70	1,489
Inadequate quality work force	3,36	1,365
Negative expectations about the future of the sector	3,33	1,407
Not being rational about the incentives for investment areas and tools	3,32	1,166
Inadequacy in consultancy and information	3,24	1,559
Inflation	3,23	1,360
The deficiency of technological infrastructure	3,22	1,660
The socio economical environment not supporting innovation	3,03	1,332
Cartelization and monopolization	2,94	1,436
Companies' Lack of need for innovation	2,94	1,540
International agreement	2,91	1,422

1. Results and Conclusions

For a firm to be able to produce new products, process or information is related with foreseeing and understanding the future needs of customers. To be able to survive in the long term, it is vital for a company potential and future need should be determined and this foresight should be turned into new products. This could lead the company to be in an effective position in the market and to direct the market in a certain way. There is a need of continuous analyses to avoid the failures and repeat the success in innovation process. Therefore the innovation process of the companies should be examined and improved continuously.

The global changes and differentiation process going on in the world effects not only many industrial companies but also the sector of forest product industry.

The trend especially towards the forest and forest products is much denser than the other product groups. The influences of global warming brought the necessity of using more forest areas and the need of producing new products. The sector of forest product industry comes forward in this structuring.

In this study, the process of innovation in forest products industry, which is in an important position in manufacturing industry that is Turkey's production locomotive, and will be in an effective position in terms of changes and product variations in the future, is evaluated. In the scope of this study 102 companies were interviewed and the importance of the relation between innovation and competition was emphasized. Gathering data from companies took some times and companies' representatives are interviewed during this period.

The companies participating in the study indicated that their prior goals were innovation and they formed the organizational structure of their companies accordingly. Presenting the product in quality and in a reasonable price are evaluated with new product development and it is determined that innovation should be supported with cost. The companies want to match the expectations of the customers with their existing technological structure and thereby they do not see transferring technology feasible because of economical conditions and technologic adaptation problems. While most of the companies do not allocate any budget for research, very few companies allocate enough budgets for new product development.

Innovation and research activities are critically important for companies to compete not only in national but also in international markets. Besides, exporter companies are far better than the others in terms of the ability to develop new products. While companies prefer to change their process completely to develop new products, they don't look at technological change as a feasible operation because of financial conditions. They give significant importance to technology transfer in new product development. One other important issue is the economic crisis experienced in Turkey and their negative impacts on industrial sectors. The devaluation realized during those crisis increased the companies' competition power in international markets and provided them with significant advantageous. On the other hand, those crises resulted in a situation that small and middle size companies lost a lot of money and thereby could not invest on technology. Consequently firms came to a position that they could not allocate any money for research and new product development. The survival of companies depends on their success in innovation activities.

Forest product industry realizes the activities toward developing new product by taking future trade possibilities and volume into account. In order to do this, export companies uses information they obtained from both customers and rivals in the first place in innovation. In this sector, the feasible processes improved with the help of knowledge exchange and consultancy are transferred in to the production

The competition for the firms could only be possible with developing new products and innovation. Transferring the information obtained into the production

requires sufficiency of financial resources. In order to improve the forest products industry and thereby country, companies should participate in both national and international fairs and organizations, and these kinds of organizations and participations should be supported.

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