

## Conference Paper

# Designing Open Innovation Based Product Development Process for SMEs using Mobile Technologies

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### Abstract

The use of technology in innovative product design process is becoming very accelerative all over the world. Following that, small and medium-sized enterprises (SMEs) must practice innovative operations due to the fact that they have financial and technical incapacibilities. In spite of all the essentialities, researches showed that research and development (R&D) expenditures of SMEs are under 5% in 2015. Focusing on SMEs, it was observed that R&D infrastructure of them is extremely weak. Research conducted in 2015 in Turkey, according to R&D expenditures of firms showed that first ten enterprises in the list were multinational, so not SMEs.

Open innovation is very fundamental for SMEs to keep their competitive advantages. Nowadays, important multinational firms have left their closed structure about R&D and innovation practices. As a result of this; firms have started to behave accordingly to open innovation systems. In open innovation, all the external partners should participate in the business processes. However, there are not enough researches about it.

The purpose of this paper is to design product development processes of SMEs using mobile technologies. The system which was allowed the effects of external partners was designed for it. According to data collected through in-depth interviews with experts and literature review, the points are given by customers were taken into account and analyzed. The analysis process was applied according to selection criteria specified.

Recently, open innovation has been provided by the "contestification" method. Contestification is the method that enables users to participate in an ideation contest and all the users have right to vote for ideas. As a result of this, innovative ideas come to realize. Despite of the importance as mentioned, there are few researches about the application of contestification method via mobile technologies. For this reason, contestification method was used to accelerate the product development process in this study.

This research sheds light on the contribution of the users for the product development process. In the measurement process, it was observed that SMEs needed this kind of research for the efficient decision making with less financial resources and method developed made the analysis process easier.

**Keywords:** Mobile technologies, SMEs, Open innovation, Contestification, Product development

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## 1. Introduction

The demand of customers have changed with the developing technology. In the increasing competition environment, firms should not ignore what their customers demand. This situation necessitates firms to create new ideas, products or services. This also demonstrates the importance of "innovation" concept for firms.

Today many firms are trying to be innovative in order to keep competitive advantage and strengthen their positions on the market. However, the way firms innovate may be differ. Large firms prefer to take advantage of monetary fund and invest in Research & Development (R&D), while Small and Medium Enterprises (SMEs) have the chance to work with customers closely and adopt the needs and desires of customers to products or services easily. In this case, SMEs have become advantageous in the field of innovation over large firms.

In recent times, SMEs adopt the contemporary way of innovation called "open innovation". However, they are less active than large firms in open innovation because of their particular characteristics such as organization, culture and strategy. A study by the OECD found that only 5-20% of SMEs are actively using open innovation approach.

Some scholars argue that SMEs can achieve greater benefits from the open innovation than larger firms because of their less bureaucracy, increased willingness to take risks, and faster ability to react to changing environments [12].

[5] argues that embracing open innovation is essential for SMEs to grow internationally and they need an educational system which encourages and appreciates creativity, criticism, self-discipline, self-motivation, desire for knowledge and life-long learning, openness, and cooperation.

Open innovation is essential for continuous growth of SMEs especially in the high-tech industries [19]. [4] argue that SMEs largely depend on the resources of their open innovation partners to implement their strategies.

In light of this information; this paper aims at helping SMEs about how to design effective product development process via mobile technologies. It is expected to contribute SMEs in the process of restructuring their innovation perceptions.

## 2. General Information about SMEs

### 2.1. Definition of SMEs

There is no single definition of SMEs. Every single organization use their own definitions to scale "small" and "medium" size meaning. It differs from even one country to another.

Even if SMEs are mostly neglected in comparison to large firms, they represent 99% of all businesses in the EU. Because the rate is high, it is expected for SMEs to contribute the economy of a country or social development considerably. According to [9], the effects and the main features of SMEs can be listed as follows:

Country or Region	Definition			
United States		All manufacturing firms and non-exporting service firms <sup>a</sup>	Exporting service firms <sup>b</sup>	
			Most	High value <sup>c</sup>
	Number of employees	< 500	< 500	< 500
	Annual revenue	Not applicable	≤ \$7 million	≤ \$25 million
				≤ \$250,000
European Union	Number of employees	< 250		
	Annual turnover <sup>e</sup>	≤ €50 million (\$61 million <sup>f</sup> )		
	OR Balance sheet total <sup>g</sup>	≤ €43 million (\$52 million <sup>f</sup> )		
Australia	SME (nonfarm) Number of employees	≤ 200 employees		
	SME (farm) Estimated value of operations	A\$22,500–A\$400,000 (\$18,866–\$335,400 <sup>h</sup> )		
Canada	Number of employees	< 250		
	Annual revenue	< C\$50 million (\$48 million <sup>i</sup> )		

TABLE 1: SME Definitions in the United States, the European Union, Australia and Canada. Sources: USITC, Small and Medium-sized Enterprises: Overview of Participation in U.S. Exports, 2010, table 1.1, 1-3; EC, Directorate-General for Enterprise and Industry, The New SME Definition: User Guide and Model Declaration, undated, 14 and 16; Government of Australia, Australian Bureau of Statistics, "Definition of Small Business," April 3, 2009; Government of Canada, Industry Canada, "Small Business Quarterly," February 2010; IMF, "Representative Exchange Rates for Selected Currencies," June 1, 2010.

1. SMEs provide in a large number of employment opportunities at a better cost. They can be thought as an equilibrant in the total employment.
2. They are flexible. Therefore, they are affected less from the economic fluctuations.
3. They contribute much for the meeting demand of the people.
4. They provide an environment for entrepreneurship.
5. They need small capital to launch.
6. They are indispensable supporter and subsidiary of multinational enterprises.

In today's world, SMEs can even compete with large or multinational enterprises. However, in order to achieve this, they should firstly give much importance for Research & Development (R&D). Focusing on Turkey, in 2012, 16.6% of R&D expenditure was performed by SMEs. (Turkish Statistical Institute). The most strategic step should be the increase in R&D expenditure for SMEs. They should place emphasis on innovation practices.

### 2.1.1. SMEs and Innovation

Innovation is defined as the creation of new ideas, processes and products. In general, innovation aims to solve the problems related to the business. According to ([10]:73-77), the main purposes of innovation as follows:

1. To continue existence for firms: Firms mostly produce more than one goods or services. It results in the necessity of competing more than one markets. Firms should be renovate themselves in order to keep their competitive advantages

2. To be a leader in the market: Firms can be leader as long as they satisfy the needs of customers and what they want exactly. They should also implement all of the innovations in the specified market or technology.
3. To increase profit: Profitability demonstrates one of the key performance indicator of an enterprise. Innovative projects has a specified cost. These projects increase the profitability of a firm over time. If innovations become successful, they also decrease cost and increase effectiveness and performance.

For this reason, the flexible structure of SMEs (close contact with all of the consumers, taking their needs into account faster etc.) and their sensibility to the change of environmental factors made the SMEs inclined to innovation. In this way, SMEs become the sources of increasingly new ideas and inventions and they also contribute for industry to become flexible [8]. According to the research conducted, SMEs have some barriers to keep innovativeness. These are listed below [7, 11]:

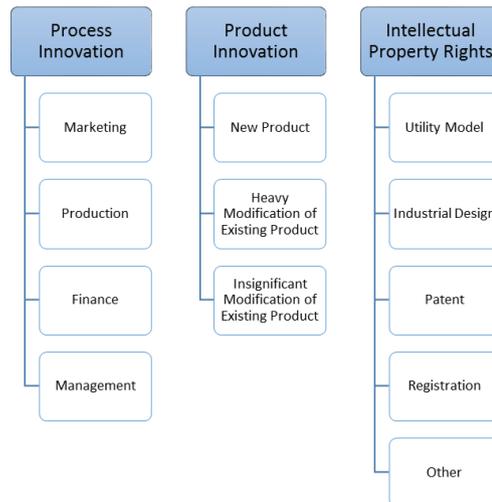
1. Not having enough funding
2. Containing high risk for innovation
3. Lack of know-how technologically
4. Unapproachable or costly technology
5. Lack of qualified personnel
6. Not allocating enough time for innovation
7. Not considering innovation essential
8. Not market or commercialize the innovation

Even though SMEs have to overcome the barriers in order to innovate, there are a number of SMEs applying innovation. Researches show that SMEs put different innovation types into practice.

### 3. Open Innovation

Recently, the concept of "innovation" has taken the new shape. It means that SMEs have already apply some changes in their innovation practices. Today, they are not only limited by the firm itself; they take the other partners' (customers, suppliers, business partners etc.) opinions into account to innovate. This change addresses firms to open innovation. In total, open innovation is defined as 'the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the markets for external use of innovation, respectively.' [1]

Even though some multinational firms still prefer to manage innovation and product development as an internal process, relying heavily on their own knowledge, R&D capacity and technology to create new products in their own (in-house) laboratories,



**Figure 1:** Innovation Types of SMEs. Source: Tektas et al, 2012. *KOBİ lerde Rekabet Aracı Olarak Inovasyon: Farkındalık, Yatkinlik, Kullanım Düzeyi Arastirmasi ve Politika Onerileri.*

Closed Innovation Principles	Open Innovation Principles
Smart People get hired, work for Large companies, are PhDs or Ivey League Universities, give them money	Smart People are everywhere, they can work from anywhere for anyone, their motivations are not just money
To profit from Innovation orientation, we must discover it ourselves, develop it ourselves, and get it to market	Firms must be receptive to Innovation surrounding us, innovation can come from both inside and outside firm boundaries
Patents, IP rights, copyrights give us undisputed monopoly in the market	We don't really have to create innovation in order to profit from it
We must protect our capabilities from others, must not let anyone see or use our capabilities	We can create competitive advantage by letting outsiders use our capabilities and generate revenue as well

TABLE 2: Open Innovation vs Closed Innovation. Source: <http://www.openinnovation.eu/open-innovation>.

which represented their key strategic assets. This method, labelled by [2] as the “closed innovation paradigm”.

However, the other large firms such as IBM, Philips and Procter & Gamble are using open innovation in their strategies [2]. Despite the fact that, open innovation is thought mostly related to large companies, in today’s competitive market SMEs have started to take advantage of open innovation strategies. [1, 18] suggested “innovation funnel” concept. Based on the new suggestion, open innovation model have come in sight.

Authors also identify three forms of the open innovation model:

1. “Inbound” open innovation refers to the use within a firm of external sources of innovation. For instance, a firm may in-license a technology developed elsewhere, integrating that component into its own technology solution rather than seeking to develop an equivalent in-house.

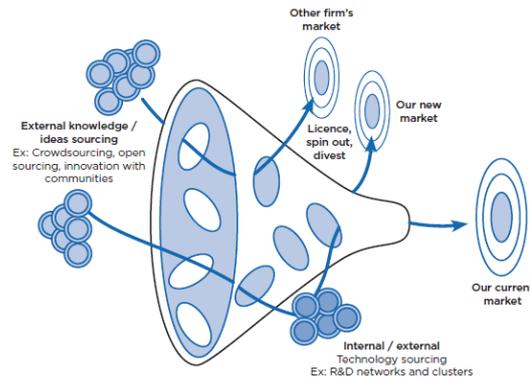


Figure 2: The Open Innovation Funnel Model. Sources: [1, 18].

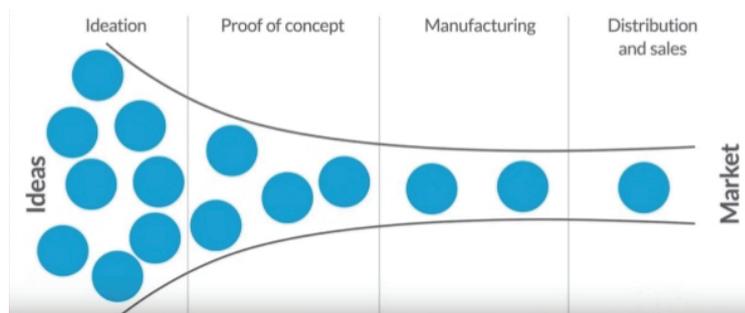


Figure 3: The Closed Innovation Funnel Model. Source: <https://learn.openzstudy.com>.

2. “Outbound” open innovation refers to the use of external pathways for the purpose of developing and commercializing innovations [1]. For example, a firm may out-license its product to another firm that can help to further develop the product, for instance by obtaining necessary regulatory approvals. Or a firm may out-license an invention for distribution.
3. The so-called “coupled innovation process” combines the inbound and the outbound dimensions: rather than sharing existing resources and expertise, firms work together to develop new knowledge and solutions [6]. This type of collaboration can involve close integration, for instance joint venture, or a looser affiliation such as engagement through an innovation competition.

### 3.1. Open Innovation and SMEs

Firms usually determines their own open innovation practices. When considered large firms; [17] have identified four broad advantages associated with open innovation practices, namely: (1) benefit from early involvement in new technologies and/or business opportunities; (2) access to other organizations’ technological capabilities and R&D, through the combination of internal and external channels to market; (3) accessing venture capital funds; and (4) providing educational investments and joint venturing in potential projects at universities or research laboratories.

However, open innovation practices in innovating SMEs have been frequently neglected. Because structure of SMEs is different; they should firstly adapt to open innovation. It means that, they need to establish fundamental managerial capabilities first before moving into open innovation. In contrast to large firms SMEs usually do not have specific internal company units to support change initiatives (e.g. change management offices, department for business development) and sophisticated centralized units that offer necessary change-services during transformation processes: HR services (e.g. recruiting, training, workshops), IP services (e.g. consulting, patenting), IT-services (e.g. implementation of new software tools) Therefore, SMEs have to build up cross-company relationships to external partners in transformation processes more likely than large firms.

Large-scale surveys have confirmed that SMEs are collaborating more frequently with external innovation partners than large companies. The last Community Innovation Survey in Belgium shows that large firms (> 250 employees) are collaborating on average with more external partners than small firms. Yet, smaller firms rely more on open innovation than their larger counterparts—when the number of collaborative deals is divided by the number of employees. This evidence confirms that open innovation is even more important for SMEs than for larger companies.

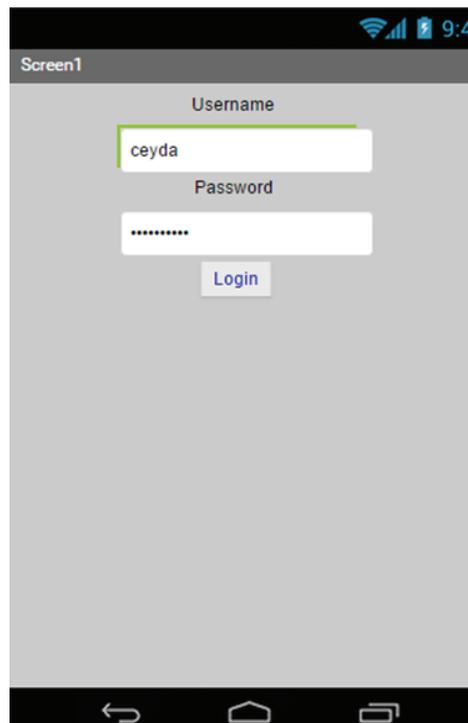
In brief, SMEs can (and they should) open their own innovation processes...

1. to implement internal ideas otherwise unexplored,
2. to ensure access to external ideas,
3. to enable better utilization of their partially hidden innovation potential,
4. to share the wealth and efficiency in resource allocation (e.g. per unit cost accounting basis),
5. to extend their potential for growth via alliances and/or attraction of funding
6. to be offered ample opportunities by larger companies to access resources/knowledge otherwise far too expensive for them.

## 4. Methodology

In the scope the research, firstly personal interviews were executed. During the interviews, it has been observed that SMEs have the need for mobile applications in order to receive feedback about their products. Even though, SMEs are aware of feedback mechanisms after production process was executed, they have rarely enough information about whether it can be made before production. It means that; they can easily know what their customers think about before production process start. In the process of prototyping, they can make possible improvement based on the opinions of customers. "Open innovation concept" was adopted to the study when developing the application.

Recently, open innovation has been provided by the "contestification" method. Contestification is the method that enables users to participate in an ideation contest and

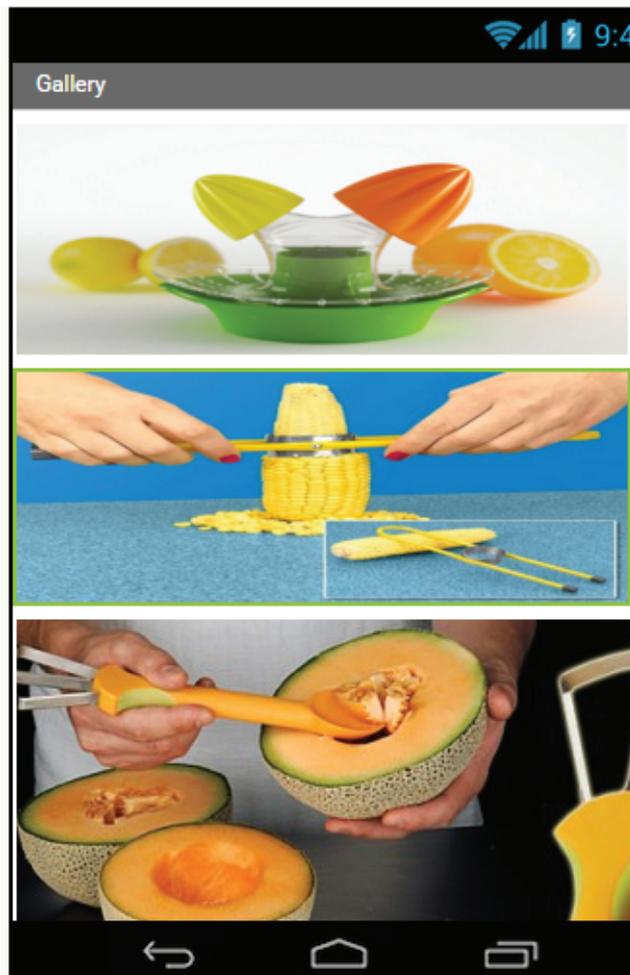


**Figure 4:** Login Screen. Source: Author.

all the users have right to vote for ideas. As a result of this, innovative ideas come to realize. Despite of the importance as mentioned, there are few researches about the application of contestification method via mobile technologies. For this reason, contestification method was used to accelerate the product development process in this study.

In the mobile software development process, Android OS was selected for several reasons, including:

1. Multitasking Support
  2. Ease of Notification
  3. Easy Access to thousands of applications via the Google Android App Market
  4. Diversity of Phone Options
  5. Modified ROM installation support
  6. Easy Widget Access
  7. Google Services support
1. Login Screen : Possible customers of SMEs can easily login with their username and password.
  1. Gallery Screen: Several images can be viewed within this screen. Users can easily access to the prototype image for voting. They do not have to vote for all prototypes. They can choose which one to vote according to the criteria specified



**Figure 5:** Gallery Screen. Source: Author.

After the image wanted to vote for was selected, general information about the product can be seen such as description, price, size, usefulness etc. If admin (authorized person of any SMEs) wants to get feedback based on another criteria except previously specified, they can easily add new criteria. The application developed creates a flexible environment not only for customers; it also supports customization depending on the need for SMEs.

In the last step, the voting process has been started. Customers can vote for the criteria pressing 1 to 5 (1: so bad 5: excellent), then customers became an indispensable part of the product development process by stating their own opinions.

## 5. Conclusion

In this study, open innovation for SMEs in terms of product development process was analyzed. In general, it was observed that R&D expenditure of SMEs was behind the large firms. However, taking advantage of open innovation practices and unique structure of SMEs, they can hold the power of innovation. As a matter of fact, there is still competition between SMEs and large firms for all types of innovation.

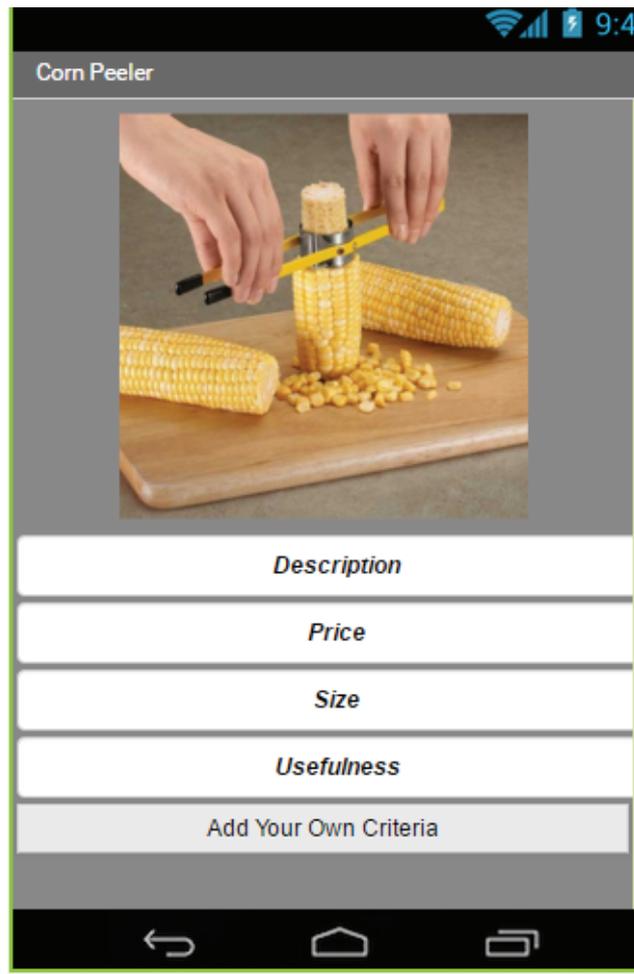


Figure 6: General Information Screen. Source: Author.

The system design developed is expected to provide insights to SMEs in terms of collaborating with customers in the process of product development. It also enhances the use of mobile technologies for SMEs and encourage user involvement in the decision-making process.

In the next step, with the contribution of several SMEs, the application will be published in the Android Market and real time feedback will be provided by customers.

Future studies may also show that the importance of customer co-creation for SMEs having no R&D departments. Besides that, how to effect different criteria on user perceptions can be analyzed in order to enhance innovation process.

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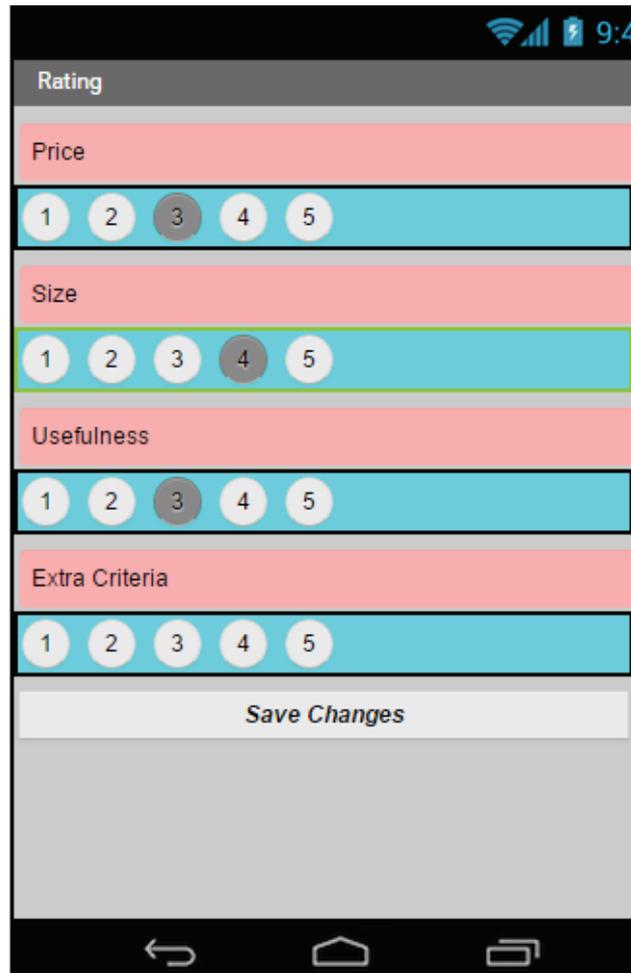


Figure 7: Voting Screen. Source: Author.

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