

MOBILE APPLICATIONS AS KNOWLEDGE-BASED PRODUCTS

Krzysztof Kubiak

Poznan University of Technology, Pl. M. Skłodowskiej-Curie 5, 60-965 Poznań, Poland

Abstract

High-tech industry has been stimulating economic development, providing the market with innovative information and communication technologies. Some of these include mobile technologies, mainly associated with the use of Smartphones and tablets. Mobile devices run various types of software called applications. The purpose of this article is to evaluate a selection of Polish mobile applications in the context of their features typical for knowledge-based products. Such products carry knowledge and stem from many years of work conducted by a group of people. They are based on the latest technology and are able to interact with their users.

Key words: mobile applications, products based on knowledge, information and communication technologies

1. THE IMPORTANCE OF KNOWLEDGE-BASED PRODUCTS

Modern economy attaches particular importance to intangible values, such as information and knowledge that allow people to gain and maintain competitive advantage. These values constitute an essential component of innovative and knowledge-based products. There is a following relationship between these products (Walczak 2010): a knowledge-based product can be an innovative product or due to its features and characteristics it can satisfy potential or existing customer needs. Knowledge needed to manufacture a product should, therefore, be reflected in the actual expectations of customers. Differentiation - offering a product that is unique and better than the competition is crucial to meeting customers' needs. This requires an investment in the knowledge resources of a new product.

Knowledge as a product is an innovation, the result of a company's activity - it is created and later sold (Klincewicz 2012, p. 73). Examples of knowledge-based products may include the following (Klincewicz 2012, p. 74):

- a) technical devices for the creation of which engineering expertise is required,
- b) computer programs, written on the basis of algorithms and programming methods,
- c) magazines, whose writing and publishing would not be possible without journalistic and editorial skills,
- d) TV commercials, prepared using the research of customers' preferences and effectiveness of advertising messages,
- e) fashionable clothes, developed on the basis of a design prepared with the knowledge of current trends in global fashion,
- f) specialized food products, created thanks to the knowledge of flavor combinations and the sources of components supply,
- g) chemical products using knowledge of chemical reactions,
- h) bookkeeping, where it is necessary to know the laws and business practice.

Thus, most of the products available on the market are based on knowledge, which alone does not make it possible to achieve competitive advantage. Only the comparison of one's own company with its competitors allows for the assessment of the value of this knowledge and finding out its relevant traits (Klincewicz 2012, p. 75).

The development of new products plays an important role in the functioning of enterprises (Brdulak 2005, p. 47). A modern product is a combination of the following three elements (Walczak 2010): technologies, services and information. Progressive changes in technology, ever-changing customer expectations, the shortening of product life cycle - are all becoming an increasingly critical element that determines sustainable development and further prosperity of enterprises (Brdulak 2005, p. 48). Innovations in products may take the form of technological solutions, and in this context an increasingly important role is being played by digital products, computer software and mobile applications. These products are becoming increasingly popular in the field of communication and information technology solutions because the message is an important element shaping product ratings and customer feedback. The following figure shows the elements that influence the creation of a knowledge-based product.

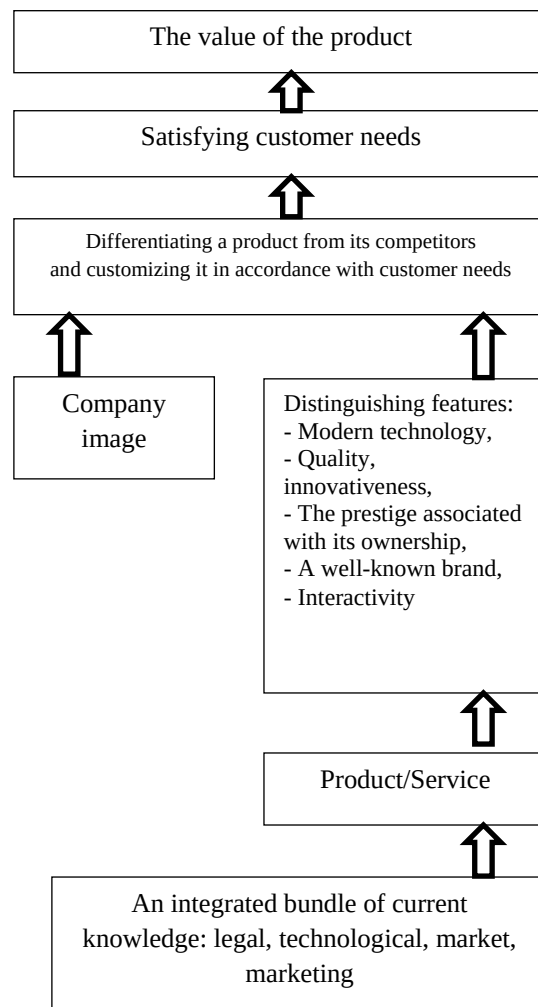


Fig 1. The value of a knowledge-based product

Source: own study based on Walczak 2010.

A product based on knowledge is usually a result of many years of group effort. Group members may be experts, professionals from various industries. Such a product is based on an integrated bundle of current legal, technological, market and marketing knowledge (Walczak 2010). The features that further distinguish this product are the following: cutting-edge technology, high quality and innovativeness, the prestige associated with the ownership of a well-known brand and interactivity. This product is of value to customers if it meets their needs, which constitutes one of the enhancers of

its behavior (Szafrński 2012, p. 15). It is also important to distinguish the new product against other offers.

Acquiring the knowledge of customer needs and the market is an essential condition for the existence of enterprises, while the critical factor of success is the ability to implement this knowledge in practice (Walczak 2010). The need for information is one of the categories of needs which affect the formation of the quality of life (Szafrński 2012, p. 16).

2. THE MARKET OF MOBILE APPLICATIONS

According to the report Generation Mobile 2014 more and more Poles use mobile devices in the course of daily activities. The most popular mobile system used in Poland is Android - 72 percent of respondents use it. The number of applications used has also been increasing (Generationmobile 2014). They can be divided into independent, client and online ones. Independent applications do not require access to the Internet. Due to their poor optimization they are often big burden on both memory and CPU. An example of such an application is a program, which operates the built-in camera. To use the client applications it is necessary to be connected to the Internet. Thus, they save internal memory but also increase data transfer. In contrast, web applications are websites with a superstructured version of their interface and which are available through the browser (Raport Aplikacje mobilne 2013).

Mobile applications should be useful products. For this purpose, it is important to know the needs and preferences of the users. Mobile solutions are solutions of a personal nature. For this purpose, an increasingly important role has been given to the appearance of the interface and the information provided.

The mobile world is governed mainly by meeting the need of information - here and now. The service of geolocation has been developing intensively and targeting media and content optimization to meet the needs of the user. Applications arise where it is justified by the need of the consumer - they carry either useful or entertaining value (Raport Aplikacje mobilne 2013). The development of mobile applications market increases their popularity. Apple and Google currently dominate the market, creating easily accessible app stores. A large number of mobile applications make use of their users' locations. Examples may include the following (Jaszkiewicz 2012, p. 13):

- a) Endomondo Sports Tracker PRO: an application designed to collect and share data on accomplished trainings,
- b) Automapa: car navigation,
- c) WeatherPro: an application informing about the weather,
- d) Locus Pro: tourist navigation site,
- e) Maps: Google Maps,
- f) Street View: Google Maps,
- g) Jakdojade: public transport route planner,
- h) e-podróżnik: journey planner.

Thanks to geolocation the Internet is available via mobile tools in multiple locations and lets one customize the exact message (Badzińska 2012, p. 19).

In mobile applications, therefore, an important role is played by both information and knowledge which are their primary carriers. The examples of knowledge-based applications may include "Jakdojade.pl" and "Mobilnemiasto".

3. KNOWLEDGE-RICH MOBILE APPLICATIONS

One of the mobile applications based on geolocation used in Poland is called "Jakdojade.pl". This product is a search engine of public transport links, making it easy to travel around the city.

The basic determinants of knowledge-based products include an integrated bundle of current legal, technological, market and marketing knowledge and this product is the result of many years of teamwork. The mobile application called "Jakdojade.pl" has an academic pedigree. As part of an engineering degree at the University of Technology an application was created, which was used for travel planning, where the starting point had to be localized using GPS, and the destination was to be typed manually. The solution was to help students in moving around the city. Due to the fact that in 2006 there were not enough phones equipped with GPS, the idea did not make much sense. A positive reception of the product by the academic community motivated the two creators to get involved in the project and create an online planner. The main purpose of the search was to make the program choose the best route from point A to B, using the means of urban public transport. The works took place even before the official start of the business. The work on the project involved the employees of Poznan University of Technology and persons professionally connected with the subject of urban public transport and navigation systems (Kubiak&Skawińska 2015).

After an official launch of the site under the name jakdojade.pl, the cooperation with Miejskie Przedsiębiorstwo Komunikacyjne (Municipal Transport Enterprise) began. New cities were subsequently added as a result of the development of the website. In time, the portal began to be recognized as a nationwide standard.

At the beginning of its activity, City-Nav was able to acquire and positively settle EU funding under the program 8.1 (01.04.2009-31.07.2010). Since the beginning of 2010 the company has made a profit, allowing for rapid development without another round of financing.

Different features of the knowledge-based products include the following: modern technology, high quality and innovativeness, prestige associated with their possession, brand and interactivity. In 2011 [jakdojade](http://jakdojade.pl) was used especially on mobile phones equipped with the Android system. The next step was to create versions dedicated to iOS and Windows Phone. With a brand name and quality products Jakdojade.pl has quickly become one of the most popular mobile applications in Poland. The product has been downloaded to a total of about 1.5 million devices. This application works in the 20 largest Polish cities.

The application called Jakdojade.pl is a search engine of transport links which facilitate travel around the city. The service finds optimal interchange connections, changes in schedules, calculates time to walk and other parameters.

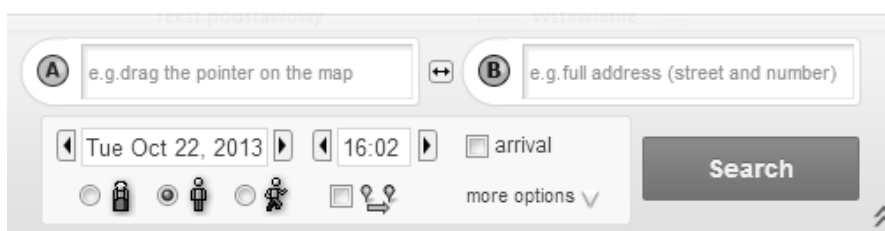


Fig 2. A search box in jakdojade.pl

Source: www.jakdojade.pl

Jakdojade.pl also includes a new approach to planning which involves full freedom in indicating both the starting point and the destination. It is possible to show a point on the map, give the exact address, intersection, or to enter only a characteristic name - e.g. a school, theater, restaurant or a cinema. Thanks to this, everyone who intends to use public transport may plan their trip from point A to point

B and receive information on which line to use, which bus to board, where they have to change, with the exact start and end time of the trip (Kubiak&Skawińska 2015).

The system takes into account the time necessary to get to bus-stops, which significantly improves the possibility to determine an optimal route. The most important advantage of the system is a possibility to find optimal routes and communication links, taking into account all the current changes to the routes of municipal public carriers. The service makes it easier for both residents and visitors to find their way around the city. The website presents the best connections, informing the user about the time of the beginning and the end of the journey, without having to check timetables. To search for a connection, one should only provide the starting point and the destination (and date) of the journey. Additionally, it is possible to choose from several preferences regarding speed or going on foot. Saving such points as: home, school, work giving exact addresses, allows one to quickly plan a trip without the constant need to define the exact starting point and the destination (www.city-nav.com).

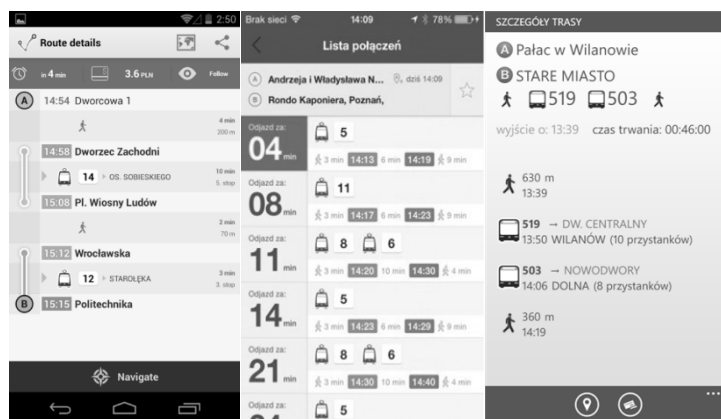


Fig 3. Applications for mobile systems: Android, iOS, Windows Phone

Source: play.google.com, appstore.com, windowsphone.com.

Jakdojade.pl software is not installed by individual carriers (such as programs for managing public transport). Both storing and searching for connections is made via servers and databases which belong to CITY-NAV Ltd. Users can access them using a website, a mobile version, and a native application that can be used on mobile phones. The latter is available at Google Play, the App Store and Windows Phone (www.city-nav.com).

This application is responsive, which eliminates the problems of adapting to different screen resolutions on mobile devices. Jakdojade.pl in its mobile version, in addition to graphic design and a readable layout, also has five available languages (Polish, English, Japanese, French and German). For now only two of them are available, but they are working on introducing new languages.

The application shows the current timetables and assists in the development of public transport commute in 20 Polish cities. The novelty of the service is a possibility to navigate during the trip.

The described application meets information needs of customers, which improve the quality of life. It is also distinguished among competitors by offering a product that finds optimal interchange connections, changes in timetables, time to walk and other parameters.

Another mobile application that meets the standards of the knowledge-based product is "Mobilne miasto" ("mobile city"). The application was created within the framework of the project titled "Integrated system of supporting access to information in urban space," implemented under the X Competition of Development Projects funded by the National Centre for Research and Development. However, due to barriers to funding innovative projects that arise at Polish universities, it has not been implemented.

Basic objectives of the project involved creating a pilot version of the system hosting for the urban users comprehensive and up to date spatial information with descriptive attributes. It makes use of innovative solutions involving an interdisciplinary look at the transfer of information (Goliński&Szafrński 2012, p. 5).

Undoubtedly, the application meets the basic requirement of a knowledge-based product as its creation involved the participation of numerous experts: university staff (economists, marketers, ergonomists, and computer engineers), public administration institutions and businesses. Integrating databases and the usage of the prepared solutions in the urban area were discussed with the staff of the Town hall of the City of Poznań, while LG Electronics Poland Ltd. supported the project activities with a free loan of applications during the testing of the latest models of handsets (Goliński&Szafrński 2012, p. 6).

Other distinguishing features of knowledge-based products include: the technology used, innovativeness, brand or interactivity. The functions of the software that runs on a client's device have been limited to generating an interface to ensure interaction with the user, the collection and transmission of telemetry data from the built-in peripheral components. The software running on the client's device has been developed with the use of Internet technologies (Skawiński 2012, p. 77). This application has been designed in such a way that it can be used on any Smartphone, tablet or laptop.

The primary function of the mobile application was to present information sought by the user. The information was presented in the form of a list of results, in the form of points on the map and a detailed view of the object (Skawiński 2012, p. 79). "Mobilne miasto" allows one to identify users and allows for determining the location of a given address on the map. The following actions can be conducted while choosing the place:

- a) it is possible to save the location as a user's point,
- b) the means of transport can be indicated - on foot, by public transport or by car,
- c) detailed information about a specific place can be displayed,
- d) other nearby points that match the search criteria can also be looked up.

The application also indicates the time of departure from the nearest stops of all means of public transport. Installed navigation suggests the methods to reach a given place - on foot, by public transport or by car. The software can notify its user of events matching his or her interests. The examples of such information include: difficulties along the way, difficulties in public transport, cultural events and giveaways. The mobile application is able to record all user actions for research purposes, without compromising their privacy. Users can add their own points that are associated with their accounts and they are made available after login. QR code function is aimed at generating QR codes on the screen to make them available to other users (Skawiński 2012, pp. 79-84).

Due to the presence of geo-location data in the system, the following two types of data have been distinguished: point data which correspond to urban space objects such as cinemas, ATMs, restaurants, offices, shops, and non-point - used to provide data about objects not belonging to urban space, for example, film in a cinema, premiere at the theater, traffic jams (Skawiński 2012, p. 84). The system also includes pro-quality mechanisms in information processing. The examples of the most important features of the information from the customer's point of view include the following: completeness, timeliness and accuracy.

The designed application was also in line with the expectations and the needs of potential customers. For this purpose application functionality tests were carried out, and the cooperation with City Nav Ltd. (the owner of "Jakdojade.pl") was undertaken in the area of testing the integrity of information.

4. SUMMARY

There has recently been a strong increase in the number of users of mobile devices and it has been accompanied by a phenomenon of a growing number of services. Very often these services provide selected types of information or monitor and record selected types of user activity. There are new

information needs and new habits in acquiring information. The user is no longer satisfied with a traditional access to the Internet. A demand for personalized information and on-line services has been increasing. They are supported by mobile devices in accordance with precisely defined user profiles (Pelc 2012, p.103).

Technology, including mobile solutions is an agent of changes taking place in organizations, and above all, the beginning of the ongoing process of redefinition of some beaten communication scenarios (Łysik&Łopaciński 2008, p. 56).

The revolution in information and communication technology has also been causing profound and dynamic changes in the functioning of the society. Such a rapid development of technology affects our lives, often making them easier, but on the other hand, also making them more complex and it requires constant learning and adapting to current trends (Łysik&Kutera 2013, p.33).

Mobile technology is entering a phase of maturity, and the market is developing towards useful tools integrated with the environment (Mobile Applications Report 2013). Mobile applications are becoming more complex, but offer greater quality. First of all, they are to be functional.

The specificity of the products of modern civilization is primarily characterized by their saturation with knowledge. Especially modern technology creates opportunities for new products to enter the market. Mobile applications have all the features of knowledge-based products. They are innovative, use the latest technology and are interactive. Moreover, they are characterized by directness, as they can be used at any time. By using geolocation technology such applications allow one to identify locations and plan trips. Due to their pro-client attitude mobile applications make it possible to satisfy the essential needs of their users in the provision of services and information via mobile communication channels.

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