

Startups as a source of innovation in the agri-food industry

Startupy jako źródło innowacji w przemyśle rolno-spożywczym

The agri-food industry is considered as a traditional sector, but the evolving conditions of its businesses will force changes that include innovation. The source of these changes can be startups, so the purpose of this paper is to introduce startups as a source of innovation for the agri-food sector. A concept of innovation was presented, including a brief description of closed and open innovations. The features of startups have also been shown to demonstrate that they can be the source of innovation not only in sectors that are creative by nature but also in traditional areas such as the agri-food industry. There are examples of startups that have managed to introduce innovative food production solutions in collaboration with other, often large, companies.

Keywords

innovations, startups, agri-food industry, open innovation, NIH syndrome, blockchain technology

Współcześnie nawet sektory tradycyjne pod wpływem zmian zachodzących w ich otoczeniu nie mają innego wyjścia, niż wprowadzać innowacje. Bez nich trudno bowiem chociażby o dobre dopasowanie oferty do oczekiwań klientów. Przedsiębiorstwa sektora rolno-spożywczego nie stanowią tu wyjątku i również odczuwają konieczność prowadzenia działalności innowacyjnej. Celem artykułu jest przedstawienie startupów jako źródła innowacji w sektorze rolno-spożywczym. Na wstępie ukazano istotę innowacji. W dalszej kolejności przedstawiono cechy startupów jako potencjalnego źródła innowacji nie tylko w sektorach kreatywnych, ale również w tradycyjnych. W opracowaniu zostały opisane przykłady współpracy przedsiębiorstw rolno-spożywczych ze startupami, której wynikiem było wprowadzenie innowacyjnych rozwiązań.

Słowa kluczowe

innowacje, startupy, sektor rolno-spożywczy, innowacje otwarte, syndrom NIH, technologia blockchain

Introduction

Many publications traditionally regard the agri-food sector as a mature and slow-growing industry (Christensen, Rama and von Tunzelmann, 1996; Garcia-Martinez and Briz, 2000). This area is usually characterized by the low research intensity, which also means the low level of research and development (R&D) investment. This sector is also quite conservative regarding the types of innovations introduced to the market (Costa and Jongen, 2006; Sarkar and Costa, 2008).

The agri-food industry was traditionally focused on the minimization of production costs and thus paid little attention to customer needs (Bigliardi and Galati, 2016, p. 19). It turns out that now the food industry has no exit and must move away from this perspective. In recent years, it has undergone a reshaping and now is focusing more and more on

high-quality foods. There is also the necessity to meet legal requirements in terms of safety that make a product and process innovation in food industry complex and risky. At the same time, food companies also need to pay more attention than ever before to health, wellness, and satisfaction of consumers (Aguilera, 2006). Consumers require unique flavors, convenience in cooking, and meeting their individual preferences. Products should be closely tailored to their personal needs and preferences as well as aimed at their health (Costa et al., 2001). Moreover, consumers are cautious of radically new products. In such an environment to meet consumer needs, innovation plays an important role.

The food industry has in fact undergone a process known as „chain reversal” (Folkerts and Koehorst, 1997, p. 11–12). It is also necessary to use various methods of market research in order to gather a better understanding of the differentiated consumer needs. All this concerns a wide group of

small and large entities. There are many economic actors that make up the value chain from farm to fork, including major groups of farmers or fishers, food processor companies, suppliers, distributors and retailers, and finally the consumers of food. This approach determines the need for greater commitment of these entities to be involved in the food supply chain. That observation means that food companies necessarily reside potentially useful knowledge outside of the firm (Grunert et al., 2005). Moreover, it is not just what most of the food industry companies have done so far, especially those from the small and medium-sized enterprises (SMEs) sector, for example, by buying ready-made technology in the form of machines and equipment (Plawgo, Klimczuk-Kochańska, 2015), but rather usage of more sophisticated solutions such as adoption of new types of the product development process that necessarily involves creating or at least including innovative technological solutions. Not without significance, there are also new business models. In the majority of food companies' new product development processes, they also mean taking advantage of other factors of success that reside outside their boundaries (Sarkar and Costa, 2008). Especially, for example, the recent advances in biotechnology, nanotechnology, and information and communication technologies (ICTs) that represent unique opportunities for application in the food industry.

In conclusion, the food and beverage industry are a traditional sector. It is very often associated with the insufficient level or complexity of innovations. However, it seems that the chances of increasing the level of innovativeness of food companies provide them solutions mainly from outside, including through startups. Nevertheless, there are at least two research questions that need to be answered. What will happen if startups in, for example, fields of big data, cloud technology, and the Internet of Things (IoT) continue to make impressive advancements and bring their solutions and services to the food industry? Are startups from the food industry a source of innovation for larger companies in this sector? This paper will attempt to provide early answers to the above questions.

To sum up, the main problems that the paper addresses are: 1) startups as a carrier of innovation in traditional sectors, on the example of agri-food industry; and 2) specific of cooperation between startups and larger companies, especially significant players on the market. Discussion related to these points was presented by using the research qualitative two techniques: the literature review and analysis of case studies. The case study method is used because it will help the author to gain an understanding of the collaboration between startups and corporations regarding innovation in real life

settings and will help answer questions presented above (Merriam, 2009; Yin, 2014). To achieve the goal of the paper the concept of innovation and the definition of the startups are presented at the beginning. Then examples of obtaining innovative solutions from startups are broken in relation to three significant emerging trends in food innovation and investments. All of them are illustrated by using different examples of collaboration between agri-food startups and larger companies.

The concept of innovation

Innovation is increasingly recognized as one of the main determinants of organizational success. New solutions allow for high performance and survival of a company, regardless of its size and the industry. F. Damanpour and M. Schneider (2009) suggest that innovation is often driven by pressure from the external environment. Among these factors are not only the scarcity of resources in the economy but primarily the customer demand. Companies have to adapt their behavior in order to maintain or improve their performance or in other words to respond to mentioned factors as well as other issues such as competition and change of legal conditions in business location.

For understanding role played by innovative entrepreneurs in the economy, it is important to present concept of creative destruction introduced by J.A. Schumpeter (1960, p. 104) in the twentieth century. It means introducing new products or refining existing ones, providing new or improved production methods, opening up new markets, applying new sales or purchases, applying new raw materials or semi-finished products, and introducing new ways of production organization. R.W. Griffin (2013, p. 364) considers innovation as the organization's focused effort to master new goods and services, or new uses for existing goods and services. Especially popular is the notion of innovation presented in the Oslo Manual (OECD and Eurostat, 2005), where innovations are described as the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization, or external relations. The meaning proposed by the Oslo Manual captures changes that are first developed by a firm as well as those imitated by other organizations.

One feature of innovation is that it can be found in all sectors of business and in every organization. This means that innovation is an essential strategic instrument also for the food industry. New solutions

make possible to achieve competitive advantage and to be successful in the gaining of market share (Gellynck, Vermeire, and Viaene, 2007). These benefits are not irrelevant to companies from the food sector which are usually classified as traditional industries but are still playing and probably will play such an essential role in the economies of countries around the world in the future. There is no country, regardless of climatic or economic conditions that can exist without the production of agricultural raw materials and food processing.

Primarily, the close and open innovation may be distinguished. Closed innovation can be described as a kind of model in which a single company has to do everything by itself in the process of creating innovative solutions. In this perspective, the organization runs idea generation, development, production, marketing, distribution, customer service as well as is independently financing own innovation activities (Herzog, 2011, p. 19). It is important for the company to be the first in a race with the competition. Hence all four innovative processes, from the push technology model through the demand-pull model and coupling model to the integrated model, refer to closed innovation (Rothwell, 1994). The closed innovation means no cooperation with external parties. Thus, in the case of closed innovation, only the expertise of the company employees is used. The feature of the closed innovation model is therefore that new solutions are often vertically integrated.

On the other hand, in recent years there is a clear trend towards innovation collaboration across the company boundaries. This observation was summed up in a concept of the open innovation (Chesbrough, 2006, p. 1–12), which has also already started gaining popularity in the food industry (Garcia-Martinez, 2013; Juchniewicz, 2014; Bayona-Saez, Cruz-Cázares, García-Marco, and Sánchez García, 2017). The open innovation shows a different model than old ideas highlighted above, which means that companies have changed their innovation strategies to gain new ideas for products, services, and solutions from external sources. The open innovation may be defined by “(...) systematically performing knowledge exploration, retention, and exploitation inside and outside an organization’s boundaries throughout the innovation process” (Lichtenthaler, 2011, p. 77). External sources of innovation are especially applicable to filling gaps and fixing “blind spots” in the current business models of an organization (Chesbrough, 2003). At the same time, accepting this approach by the organization requires defeating the “not-invented-here” (NIH) syndrome (Clagett, 1967). The NIH syndrome refers to internal resistance in a company against externally developed knowledge. Such an issue of human resources in an organization requires, among other things, to

improve intra-organizational communication or to correct a dysfunctional or inappropriate incentive systems. Obviously, the acceptance of externally generated technologies may also be due to the lack of or negative group experience with external knowledge (Mehrwald, 1999). The companies especially are most likely to experience the NIH syndrome if knowledge is acquired from competitors. However, it was noted that this issue is less and less frequently a problem, and is slowly replaced by many companies by a shift towards “proudly found elsewhere” attitude (Huston and Sakkab, 2006). In the example of food industry companies, we can also notice that these syndromes can vary due to the level of access to the innovative knowledge of startups.

Startups as a source of innovation for companies from the agri-food industry

From a historical perspective, it becomes clear that the most important driver of innovation is people with their energy, imagination, and the keenness to identify and solve problems (Dodgson and Gann, 2010). These characteristics can be attributed to establishing own business in the form of a startup.

According to the concept introduced in the European Startup Monitor (ESM) (German Startups Association, 2015), startups are defined by three characteristics: (1) startups are younger than 10 years; (2) startups feature (highly) innovative technologies and/or business models; and (3) startups have significant employee and/or sales growth. This definition clearly distinguishes startups from conventional businesses and SMEs. Such “traditional” companies do not promote innovative products, services, or business models. Even more generally, the startups are defined by S.G. Blank and B. Dorf (2012) as temporary organizations in search of a repeatable and scalable business model. These authors point out that “(...) large companies’ size and culture make disruptive innovation extremely difficult”. Having said that, we may assume that startups can be seen as “gazelle companies” that are growing young and fast, which rapidly increase their revenues and provide significant opportunities for job opportunities (Birch, 1979). Another perspective was provided by E. Ries (2011) who defines startups as “(...) a human institution designed to create a new product or service under conditions of extreme uncertainty”. This notion makes possible to notice that startups are not always described in terms of the size or industry in which such companies operate.

According to the ESM study from 2016 (German Startups Association, 2016), most startups (89,5%) consider their products to be novel in the market, including over half (51,5%) of startups who showed that they saw their products at the international market innovation, and 42,7% so in terms of technology. Only 3 out of 10 startups see their business models (27,9%) or processes (28,2%) as representing an international market innovation, and a similarly high share see them as either European or regional market innovations. Another notable difference exists regarding the answer that they do not have market innovation. Only 10,5% choose this answer with respect to their products, but about one third choose it concerning their business models (35,3%), technology (30,0%), or processes (33,6%).

The level of innovativeness of startups may drowse in their focus on the needs of customers and thus determines the “customer development model” (Blank, 2007). Such model may be defined as the application of the appropriate methodology of market building and the introduction of new products. Using this model increases the chances of success and avoiding many mistakes when creating a startup. Not without significance is also technology readiness level (TRL), which refers to the technological innovativeness of startup. The European Commission (2014) distinguishes nine TRLs. Using the TRL scale helps to compare startups regarding their technological maturity. TRLs provide brief summaries for those who would like to work in any way with a selected startup. This scale allows startups’ partners to eliminate subjectivity, as well as over-optimism, which can lend itself when people are dealing with a new and brilliant idea (Mankins, 1995).

In conclusion, the ambiguity of the definition of the “startup” should be emphasized, which results from the fact that it is not facilitated by sufficient concepts in scientific research. Therefore, it is not clear and includes businesses from different areas, especially ICT, new technologies, and science transfer to business and lifestyle or the creative sector. However, startups are appearing more and more not only in sectors such as automotive, and pharmacological but also in the agri-food industry. One example of a project of that type is Insylo startup. It presents a solution to remotely monitor the stocks of the silos of the livestock farms and optimize the replenishment routes. This idea composes of a new generation device and a collaborative cloud platform that provides all the apps and services needed by farmers and feed suppliers (https://www.firmware.org/success_stories/insylo, 20.01.2018).

So as more entrepreneurs get into the food business, they are looking for investors of all kinds.

The entities from the food sector that turn out to be strategic partners for startups include the so-called “big food” companies including Unilever, Nestle, and PepsiCo. Of course, these entities do not cooperate with startups without reason. Startups allow big companies to recognize them as a source of open innovation because they often can deliver very surprising solutions that may be not obvious for large agri-food companies when they are focused on closed innovation processes. By paying a startup for a product, service, or technology license, or making cooperation with it, it is possible to get access to solutions that help, among other things, to streamline processes, reduce costs, and increase sales effectiveness. As a consequence, the large food companies may continue to be market leaders who are no longer alone due to the support of other, external entities that create and follow market trends. For startups, such cooperation gives the opportunity to benefit from features of large food enterprises such as access to the food distribution channels and systems. It is also important to gain experience among seasoned entrepreneurs in this segment of the industry. At the same time, from the point of view of the whole food sector, the willingness to cooperate among such actors gives them the opportunity to create a healthy ecosystem for innovation in the industry.

Examples of obtaining innovative solutions from startups

We can notice various proposals for innovations in the food industry both in the form of reports (e.g., <http://www.mintel.com/global-food-and-drink-trends>, 15.05.2017), publications on websites (e.g., Global Food Forums, 2016; <http://www.cargill.com/story/five-trends-shaping-the-future-of-food>, 20.08.2017) as well as more scientific publications (e.g., Bigliardia and Galati, 2013). Analysis of such sources shows that there are several emerging trends in food innovation and investment. Among the significant trends are (1) product personalization; (2) ethical production and alternative sources of proteins; and (3) the application of ICTs such as IoT and blockchain technology. Startups in the agri-food industry can successfully implement innovative solutions that are consistent with these trends. Moreover, it is noted that willing to work in this area meets with larger companies needs because they often may use the potential of startups to gain the ability to compete with or even override their competitors. The further part of this section includes analysis of selected examples of such cooperation between startups and large companies in the food sector.

Product personalization

Personalization is key feature especially for meal delivery services that customize menus to dietary needs. Companies can create products tailored to an individual's gut health, especially if large populations in many countries have problems with obesity, diabetes, and allergies, or if there is the demand for organic and sustainable products. This trend is also due to the fact that there is no one-size-fits-all consumer when it comes to agri-food, so the food industry is trying to get closer to the consumer. At the same time drive toward personalization is changing the way how the people buy the food. It is becoming increasingly popular to shop for food on the Internet and to order ready meals as the so-called diet catering.

As Van Ommen notes (2007), food consumption nowadays is supposed to be a pleasure. This is the contemporary creed of an ever-growing group of companies from the food industry. A personalized diet needs to be not only optimized towards personal health but also aimed at supporting personal convenience. The startup called as CleverFoodies has proposed a solution that can be appealing to many of today's consumers who are increasingly interested in choosing the so-called "convenience food" (Crawford, 2015). The startup has launched the brand "Scramble", which is a natural mix-in for eggs. The founders of the company noticed that the dairy and egg category only see the eggs in the category. The company decided to bring colors and nuance to the shelf. The "Scramble" is a salsa-like blend of vegetables, herbs, and spices designed to give scrambled eggs, omelets, and frittatas a change of flavor. This product allows consumers to create a great tasting meal by avoiding choosing, washing, and cutting vegetables because it is already done. All that consumer has to do is add the eggs.

The startup established a partnership with two companies. First is the Eggland's Best. It is one of the leading distributors of fresh eggs in the United States. The second is Cabot Creamery, an American agricultural marketing cooperative. The "Scramble" is positioned next to the eggs in the dairy aisle to create a clear solution that can increase the basket size by inspiring the purchase of eggs. The partnership with Eggland's Best also helped "Scramble" to secure prime positioning in a high volume, high-velocity category along with the store perimeter, where consumers increasingly shop. The variety of flavors of "Scramble" includes the Cabot Creamery's sour cream as an ingredient. The logo of the Cabot is included on the side of this product container (Crawford, 2015).

Ethical production and alternative sources of proteins

Being close to the needs of the consumer leads to an increase in the importance of ethical aspects of the food production. Consumers seek products that are related to their values, and that they consider being responsibly produced. The importance of social responsibility in the food sector was also confirmed by the results of reports on consumer confidence (cf. reports such as [http://www.nielsen.com/content/dam/niensenglobal/eu/docs/pdf/Global%20Ingredient%20and%20Out-of-Home%20Dining%20Trends%20Report%20FINAL%20\(1\).pdf](http://www.nielsen.com/content/dam/niensenglobal/eu/docs/pdf/Global%20Ingredient%20and%20Out-of-Home%20Dining%20Trends%20Report%20FINAL%20(1).pdf), 14.05.2017; <http://www.mintel.com/global-food-and-drink-trends>, 15.05.2017; <http://www.edelman.com/post/trust-foodbeverage-five-step-recipe-success>, 15.05.2017). The same argumentation goes for many investors looking to participate in the food industry. Moreover, the negative impact of the food industry on the climate and the limited access to food in many parts of the world encourages the creation of alternative sources of proteins. As a result, consumers can meet with such products as sushi made from eggplant, or bars and various snacks with crickets. Companies that produce such products include, for example, Exo Protein, the Aspire Food Group, and startups such as Ronzo and Hotlix.

An interesting example of responsibility in the food industry is the Finnish startup Gold & Green Foods. It aimed to develop innovative, ecological and healthy foods from oats and legumes. The oat as the Northern superfood has positive effects on the heart health, blood sugar, and digestion (<http://www.goldandgreenfoods.com>, 05.08.2017).

The company secret is to collide the oats with some of the traditional Asian production methods. Their products have approximately 30% of the high-quality protein, combined with healthy fatty acids and fibers. The leading product of the Gold & Green Foods is the patent-protected production method that allows producing the fibrous texture of oats and beans under the brand of "Pulled Oats". The pulled oats are alternative meat made by shearing from oats, faba beans, and peas. It is possible to challenge meat products both regarding nutritional value, texture, mouthfeel, flavor (<http://www.pauliggroup.com/pulled-oats-enters-the-big-league>, 05.08.2017).

The company's products can be consumed by vegetarians, flexitarians, and pescatarians. Pulled oats is a product that is coherent with the significant trend of the need for ethical production of food or ecological consumption, especially because it is also compatible with the meatless, non-genetically modified organisms (GMO) and soy-free production approach. Similar companies such as Impossible Foods, Hampton Creek, and Beyond Meat also

operate on the market (<http://www.goldand-greenfoods.com>, 05.08.2017).

The solution proposed by the Gold & Green Foods turned out to be attractive to the large food company: the Paulig Group. The Paulig Group is a family-owned and international enterprise with the principal divisions focused on the coffee, world foods and flavoring, snack food, and naturally healthy food. The company owns strong brands such as Paulig, Santa Maria, and Risenta, which are known in many countries.

The Gold & Green Foods and the Paulig Group signed an extensive agreement in 2016. Paulig acquired the majority stake (51%) of the startup. The partners have a goal of the cooperation — to meet the high demand in Finland and to launch the commercialization of innovation oats product in the international market. The Pauling Group achieved possibility to enter the competition on the market of protein-packed meat substitutes made from wheat, soy, and other beans. This allowed the Paulig Group to enter into competition with companies such as Kellogg (which in the United States owns brands such as Morningstar Farms and Gardenburger) and Monde Nissin Corporation from the Philippines (which bought British company the Quorn Foods). Both of these big companies are leading players in the food market, and each of them has about 13% of this market. Behind them are other “big food” companies such as Nestle, Pinnacle Foods, and Hain Celestial Group (Forsell, 2016).

At the same time, there is a trend of, for example, a burger made entirely from lab-cultured meat. Such solutions are described as the “cellular agriculture”. The products are chemically identical to the natural products form of, for example, meat and milk. Manufacturers claimed that they have the same taste and texture. The described technology is attractive for many reasons. On the one hand, it could reduce the world’s reliance on livestock. On the other hand, the cellular agriculture has the potential to decrease the greenhouse gas emissions, and lessen the use of traditional farming (Zaraska, 2016). In addition, it appears that “production” is more attractive from the point of view of food safety. It is noted that safety too would be improved since existing livestock practices have been linked to antibiotic resistance, viral outbreaks, and cases of bacterial food contamination. Moreover, products could be tailored for specific markets, such as meat with less saturated fats, milk without lactose, or eggs without cholesterol, which may be particularly important due to the increase in the population of people with different food allergies or obesity.

In recent years, many companies have been established that deal with this kind of production. Examples of the cellular agriculture startups include, among others, Perfect Day that is making milk from

cell culture; Clara Foods that is developing a technology to make egg whites from cell culture; Memphis Meats that is focusing on animal-free meat using tissue engineering; and companies such as Mosa Meat, Super Meat and Gelzen that are trying to make gelatin from bacteria and yeast. Another company, Afineur, is working on cultured coffee beans where fermentation that uses specific microbes eliminates unwanted bitter notes (Burke, 2017). To sum up, we may underline that there is already much common confusion around the alternative sources of protein.

The application of IoT and blockchain technology in the food industry

Another important direction of innovation in the food industry is the development of solutions based on the digital technology. There may be solutions ranging from simple ordering applications to, for example, services based on the IoT or the blockchain technology. An example of using a web application may be provided by the SimplyCook. The solution of mentioned startup allows ordering online or via the application to receive fortnightly or monthly boxes containing flavors ingredients and recipes through the box. The SimplyCook offers home recipe kits with easy step-by-step guides to cook restaurant quality food in less than 20 minutes (<http://www.simplycook.com>, 08.08.2017).

The IoT is made up of sensor-embedded technologies that combine and forwards volumes of data from different types of objects to the machines, people, and devices connected to the Internet. The IoT may connect any hardware and object, for example, smart labels may give consumers full visibility into the food supply chain companies. By using a smartphone to scan the package’s Quick Response (QR) Code, consumers can learn where, when, and how each ingredient made its way into the product on the way from the farm to the shop’s shelf. The IoT can also be used in farming, for example, farmers using drones may collect data on crop growth, monitor weather patterns as well as control water and energy usage. It can also be helpful in food safety. For example, network-connected temperature and humidity sensors allow shippers to monitor food containers and trucks objectively, and trigger alerts that head off spoilage or replaces harmful products before they reach the customer. In logistics by bringing sweeping changes to supply chain management, the IoT is shifting the approaches from a reactive to a proactive stance. The Advanced Radio Frequency Identification (RFID) tracking offers increased visibility into the food supply chain, temperature control as well as shipping automation and delivery processes. In addition, various consumer

applications, such as in-store QR codes and barcodes to get product information and coupons were already developed in recent years to streamline the checkout process. There are also works on smart refrigerators with optical scanners that will automatically inform owners when they have a recalled product, while technology-enabled smart pantries will order items for resupply automatically. Using sensors in warehouse management and production allows food manufacturers to improve the quality control, leverage real-time analytics to streamline production, track and replenish inventory, monitor worker productivity, and analyze labor costs (<http://www.loaddelivered.com/blog/5-ways-the-internet-of-things-iot-impacts-the-food-supply-chain>, 10.08.2017).

An interesting example in the field of IoT is provided by the Polish-French startup Blulog that was founded in 2014. This company is specialized in wireless, fully calibrated and affordable temperature monitoring solutions for both transport and storage of temperature-sensitive products. Firstly, among the proposed solutions were the near-field communication (NFC) data loggers. They serve for monitoring of temperature-sensitive products during transportation and whose data are readable with a simple smartphone. Another solution that the company uses is RFID. Its operation consists of real-time monitoring of temperature-sensitive products during storage. This service is associated with providing alerts via SMS or email. The Blulog also invented and developed solutions such as the Coldfinder System, which is based on a QR code. This system allows consumers to check where the products offered in supermarkets were kept in the right temperature conditions. Another solution is the BluRoad, that is, a wireless and continuous temperature monitoring solution designed for refrigerated ground transportation. Blulog also has a system called as the Blutrack that enables wireless, real-time monitoring, and management of the pallets or boxes. The company is already well established in France, Poland, Belgium, Germany, and Spain as well as has nearly 30 distributors and integrators in Europe (<http://blulog.eu/pl>, 05.08.2017).

The solutions of the Polish-French company are used, among others, by the Georg Utz Poland, Isle aux Dessert, Saumextra, Schiever Group, and French restaurants, pharmacies, and food manufacturers. The system is used, among others, by a fast food chain EXKI in France, Belgium, and Monaco; and BagelCorner that operates French sandwich bars and popular locations in Monte Carlo. The Eurocash Group has been deploying with Blulog the RFID temperature control system since 2016. The system will be installed in 200 warehouses and distribution points throughout Poland, and will eventually also monitor the commercial vehicles of

the company. Entities jointly test the technology on delivery vans (<http://www.wiadomosci-handlowe.pl/artykuly/eurocash-wdraza-system-automatycznego-monitoringu-,39143/2>, 08.08.2017).

As for cooperation with other entities, the analyzed startup proved to be an excellent source of innovation for the Georg Utz Poland. These companies started cooperation in 2016. The Georg Utz intends to equip its containers and plastic pallets with technology to control the temperature inside and outside the package. Blulog is responsible for creating components that allow performing current temperature, humidity, pressure, UV radiation, and geolocation based on Global Positioning System (GPS) and Base Transceiver Station (BTS).

Moreover, the Blulog has collaborated with Emball'iso. This company is involved in the development and production of packaging for temperature sensitive products such as medicines and vaccines as well as delivers isothermal packages enriched with thermometric technology. The cooperation between these companies will provide a complete, integrated, and easy-to-use solution for temperature-sensitive shipments.

The Blulog developed technology is expected to gain supporters in the agricultural sector as well. The company by the development of the thermometric technology has improved solutions that fall within the scope of precision farming and can be used, among other things, in the process of pickling. The solution should be available not only for silage production. The technology allows controlling many other factors, such as UV radiation or humidity. Solutions of the Polish-French startup may also be useful to milk producers, growers, and for the transport of cereals and feed. The Blulog can provide technology that allows controlling the temperature of fruit or vegetables under specific transport conditions. The system can investigate the temperature, for example, of an apple or a watermelon, both inside and outside the fruit.

In 2017 firm planned to start work on the implementation of another function. The new system is supposed to be enriched with QR codes. This will allow access to data on product storage history not only for store owners who already have access to this data as they are stored in their cloud but also to consumers. The QR code stickers will be placed on the front of the cabinet or refrigeration cabinet, and customers will be able to scan these codes with the phone to access the database and display the entire temperature range during storage and transport of the product (<http://www.wiadomosci-handlowe.pl/artykuly/eurocash-wdraza-system-automatycznego-monitoringu-,39143/2>, 08.08.2017).

Another example of innovation related to ICTs in the food sector is the blockchain technology. Major

food companies are starting to use blockchain to transform supply chain economics (Wu, 2017). The data extracted from a connected and digitized supply chain could make the more transparent course of food production from the manufacturer of the product to consumers. Thanks to the application of smart packaging it is possible, for example, to notify a customer if a carton has been opened at a time it should not have been, or if it has been transported at the wrong temperature. However, keeping this data secure and unmodified would be difficult. The blockchains by adding a layer of authentication and immutability can improve security and trust. The blockchain could also improve the efficiency, and reduce the financial and reputational costs. For example, one of the tests is the Walmart solution, which in 2016 monitors the movement of individual items and makes it easier to accurately identify specific items or shipments that need to be withdrawn (Kharif, 2016).

Another example in the field of blockchain is the Polish Foodblockchain. XYZ startup that aims at the development of a platform to create, edit, and enter into commercial agreements with quality prerequisites. This company wants to develop a decentralized exchange platform for agricultural commodities and food with guaranteed quality insights. This solution will be in the form of a consumer-oriented application to verify the story of individual products, and a peer-to-peer marketplace (<http://www.meetup.com/pl-PL/Ethereum-Zurich/events/240362907/?eventId=240362907,10.08.2017>).

It has to be underlined that the food industry is increasingly able to adapt various ICTs, both to manage the relationships between the different actors in the supply chain and to better satisfy the varied requirements of consumers. Awazu et al. (2009) stressed that ICTs, in the new conditions of open and distributed innovation, help companies regardless of their position in the supply.

The described examples show that food industry startups are increasingly eager to enter or become themselves carriers of new solutions that have not been used up to now by the big business. These startups can be a significant source of innovation for other entities from the food industry, and there is a tendency that shows that this trend will continue around the world in the coming years.

Conclusions and recommendations

The startups in different ways can become a source of innovation for the industry, including

large enterprises that operate in the agri-food sector. This enables the agri-food industry to become more innovative and catch up with other sectors where innovation is a key feature. Not only production technologies but also new food ingredients as well as the latest ICTs are already gaining attention in this sector. The agri-food sector does not have to be left behind in comparison to other areas. However, it should be noted that the size of entities is losing importance, and it is crucial to have innovative solutions.

Getting partnerships of startups with other, often larger companies, should benefit both sides but that is not always evident. However, it is important to keep in mind the advantages also for startups. We may risk statement that not always being a source of innovation for large companies can be attractive for startups. Besides, there may be problems with cultural and organizational issues that are often the main reason for the failure of such cooperation. In the "Scaling together" report (Bannerjee, Bielli and Haley, 2016) many internal and external barriers to corporate-startups collaboration are presented. Authors divided them into four groups, as cultural, structural, procedural, and strategic.

It is also important to pay attention to the issue of maintaining own brands by startups. It is possible that there will be a situation of the use of the so-called "white labels". This means that startup may resign from its brand. Then the benefit to the startup is the fact that it can sell its product or its solution with a faster chance to enter the market. Hiding own brand may be a problem. Therefore, startups increasingly try to get out of the shadows of big companies by making their attempts to develop their business and brands by raising funds for such purposes focused on the environment of the organization in the form of various types of activities called as crowdfunding.

In addition, large companies in the sector are willing to cooperate with startups by entering into roles as startup investors, offering financial and organizational support for them. For example, large food manufacturers such as General Mills, Kellogg, Campbell Soup, and Nestlé, as well as agricultural companies such as Bayer, DuPont, and BASF, have been setting up venture capitals to invest in food startups. They can also become a startup investor by offering support in the form of an accelerator or angel investment. As an example of this type of cooperation with big business in the agri-food sector, can be presented partnerships of Polish startups Nexbio and SatAgro with the Azoty Group. Finding new solutions and working with this kind of entities is part of the updated strategy of the Azoty Group. By working with these startups, the big company gathers the knowledge of these startups, which could contribute to the development of both the Azoty Group and these startups in the future.

The paper presents the thesis that the startups in the agri-food industries are quite popular and cooperation with them is crucial to bigger companies. Startups can have a specific influence on profits and economic conditions of both sides — startups and companies. Of course, the analysis carried out in the publication has its limitations, but some general guidelines can be drawn on it. On the basis of the above-analyzed case studies the main recommendations for other startups and companies interested in cooperation with the startups are as follows:

- 1) The startup can be the partner of some larger company in the area of implementation of the innovations in the form of a common brand of some innovative product. This situation is convenient for both sides of cooperation because they stay as independent entities, which have some kind of “project” (the example of the “Scramble” presented above).
- 2) Through cooperation, the startup and the larger company can enter new markets with new products as extension of its products range (the example of Gold & Green Foods).
- 3) The startups are more focused on some “narrow” characteristics of some products such as “ethical products” or “cellular agriculture products” for special groups of consumers such as “vegan products”. This type of focus on the niche allows entering companies into it more easily.
- 4) The startups can be the carriers of innovative ICT solutions for traditional sectors. They can look at some improvement of existing solutions, or can introduce some new, e.g., ICT solutions in sectors and fields where it has never been applied yet. Startups ideas very often are “cross-sectoral” and can be a manifestation of technological convergence between sectors.

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PWE poleca



Prezentowana książka ma charakter teoretyczno-empiryczny. Trzy początkowe rozdziały stanowią część teoretyczną. W rozdziale pierwszym omówiono genezę prosumpcji i jej istotę. Wskazano na duże rozbieżności w jej definiowaniu przez różnych badaczy, proponując własną autorską definicję tego pojęcia. Rozdział drugi poświęcony jest prosumpcji jako złożonemu zachowaniu rynkowemu. Przedstawiono ją również w ujęciu procesowym. Omówiono cechy prosumenta jako aktywnego uczestnika rynku i marketingowego partnera oferentów. W rozdziale trzecim przedstawiono natomiast prosumpcję w ujęciu czterowymiarowym, przyjmując, że ma ona wymiar innowacyjny, relacyjny, wizerunkowy i etnocentryczny. Dwa kolejne rozdziały tworzą empiryczną część opracowania, w której na podstawie wyników badań pierwotnych dokonano empirycznej weryfikacji założeń przyjętych na podstawie wyników poznawczo-krytycznej analizy literatury przedmiotu. Podsumowaniem dokonanych analiz jest opracowany przez autorkę finalny model prosumpcji.

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