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Technology-based business model: A startup perspective

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Abstract: This paper examines how a startup can develop its business model for using virtual reality in the healthcare education sector. Due to the detail of the study, which is required to show the mechanisms of business model modification, a single case study was conducted for a startup located in the Czech Republic. The studied company develops virtual reality technology and solutions in industries such as healthcare, education, social services, engineering, and government sector. The study provides empirical evidence on the main mechanisms shaping the elements of a business model and shows the expansion of virtual reality implementation. The study shows also how the digital capabilities and the information technologies can impact the external and internal business processes that respond to the three approaches of BM development: service-oriented approach, network-oriented approach, and user-driven approach. Business model development is required in today's market, typically due to the fourth industrial revolution, which leads to automation and digitization of business processes.

Keywords: business model innovation, startup, virtual reality, technology

1. Introduction

This paper presents an understanding of the impact of technology on a business model design innovation process. Innovation has always been one of the key drivers of growth and competitiveness in business. In recent years, literature and research have confirmed that business model development process increases company's chances of success much more than new products or process improvements (Frankenberger, 2014).

Changing business technological environment becomes a major driving force to develop the business model and adopt it to the current conditions. In this context, there is a need to frame the business model in a dynamic framework. This perspective reveals a company that needs to adopt or renew its business model to remain competitive (Teece, Pisano and Shuen, 2009). The dynamics of changes in the busi-

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ness environment impose aspects of the innovation process itself on the business model design concept. This can be considered in the context of BM modifications. Most often, this involves a single element which should be considered only as a kind of model improvement. Next, firms can replace more elements in the model. Finally, it can be found as a phenomenon of continuous change leading to an innovation process (Spieth, Schneckenberg and Ricart, 2014).

First, the innovation process has implied the changes that indicate new solutions to existing ones, whether at the company, market, or sector level (Massa and Tucci, 2013). Secondly, changes are considered not only in relation to the BM elements, but also to the architecture of the links between these elements. A third important aspect of the BM innovation process is the observable dynamics of these changes over time (Foss and Saebi, 2017). Research shows that the BM innovation process is described as the creation of new entities, especially during the seed period. The creation and development of the various elements of the business model has become key to achieving competitiveness.

Considering the conditions of the fourth industrial revolution, which leads to the automation and digitization of business processes, the business models of modern startups use the capabilities of digital technologies, which are reflected in their increased ability to generate value and achieve efficiency in business (Autio et al., 2018; McDougall and Oviatt, 1996).

The article addresses the shortcomings of the context of the amplification of the BM innovation process as a key competitive factor in business. It is seeking to deepen understanding how technology, notably virtual reality, can impact BM development from the startup perspective. The article attempts to answer the overarching question: *How can virtual reality impact business model design of the startup?*

Referring to the conceptualization of Ibarra et al. (2018) that ICT technologies determine three main approaches in shaping a business model such as service-oriented approach, network-oriented approach and user-driven approach, the objective of the research is to indicate to impact of virtual reality on startup's BM adaptation in the above-mentioned business approaches. In addition, the article analyzes how a startup can make changes in modifying its business model in the area of using virtual reality in healthcare education.

Due to the extent of the study necessity to present the main mechanisms that innovate the startup's business model and to show the broadening of virtual reality implementation, an abductive study was conducted. In particular, the research was based on a case study methodology on the basis of qualitative interviews and additional sources related to a Czech virtual reality startup.

The paper provides two contributions. Firstly, it is a research attempt to investigate the impact of the technology on startup's BM developing process. Secondly, the paper contributes by developing the existing approaches (service-oriented approach, network-oriented approach, and user-driven approach) concerning main adaptations of startup's business model design and revisits the consideration of these concepts.

The paper begins with briefly reviewing business model literature and related virtual reality technology concept. Then it is presenting the empirical study method characteristic and provides the case of Czech startup description. And finally, it discloses the results obtained in the study and discusses them in the light of the theoretical framework and the research objective.

2. Literature review

Business model (BM) is one of the constructs that have been heavily investigated in management science. Furthermore, the managerial practice domain has brought inspiration to the development of business model concept related to new ventures mainly from e-business sector and the need to provide the potential stakeholders with explanation of sustained value creation (Amit and Zott, 2001; Demil, 2015; Massa, Tucci and Afuah, 2017).

There are some postulates that BM concept has become for strategic management researchers an object of study and examining the main sources and mechanisms that enable organizations to do business and show how businesses are developed on holistic perspective (Amit and Zott, 2001).

Based on the recent literature studies on business models two dominant approaches can be found in the conceptualization adopted (Speith et al., 2019). There are the element-based approach and activity system-based approach.

Due to the element-based approach the concept of the business model presupposes that BM consists of three interchangeable elements: value creation, value proposition and value capture (Baden-Fuller and Mangematin, 2013). Value creation is understood as a way how the firm creates the value along the value chain (Achtenchagen and Melin, 2013) and value proposition explains what offerings and solutions the company provides to its customers, while value capture shows how a company achieves revenue streams to cover costs and earn sustainable profits (Bouncken, Kraus and Roig-Tierno, 2021).

The activity system-based approach concentrates on the holistic systemic configurations of activities that create value (Baden-Fuller et al., 2013). This holistic view of BM concept has pointed out that business models can create value through efficiency, novelty, complementarities and lock-in (Speith et al., 2019). The four mentioned value drivers reflect the sequence of different activities to meet the rationale for value creation generated by BM (Amit and Zott, 2001; Zott and Amit, 2010). In the domain of business model scholars are looking for different sources of value creation (Demil, 2015) and trying to understand mechanisms for value delivery and capture (Casadesus-Masanell, 2010).

Recent research provides many findings on business model development process. However, there remains still a research gap in deepen understanding the creation and development of business models for startups. Limited research exists with reference to the validation of the business model construct, existing BM change mechanisms for technology startup companies.

It is important to emphasize that startups are examples of business entities operating under uncertain conditions and in a permanently changing environment. Hence, the discussion on the formation of a startup business model, its development and its innovation is a very big challenge for its creators and founders. One of the methods used in planning activities and evaluating the results of startups is the lean startup concept introduced by Ries (2011). The application of this method refers to building value through innovation. The concept can be an inspiring subject of research on new directions of thinking about the strategies of companies and in the context of creating and developing business model (Yordanova, 2022; Raneri et al., 2022).

The increasing impact of Information and Communication Technologies (ICT) can be observed in business models' innovation process to embrace the digitalization (Ibarra, Ganzarian and Igartua, 2018). ICT systems can be one of the most powerful drivers for gaining the sustained com-

petitiveness for organizations. The current observed external business conditions as volatility of markets demands shortened innovation and product life-cycles force enterprises to look for new ways of shaping business models (Arnold, Kiel and Voigt, 2017). Among ICT technologies, virtual reality offers a huge potential for business model development and innovation. Virtual reality technology has been explored for more than fifteen years and is applied in many sectors such as medicine, industry, education, video games, or tourism (Gutierrez et al., 2017).

According to Sacks et al. (2013), virtual reality is a technology that uses computers, software, and peripheral hardware to generate a simulated environment for its user. The term 'virtual reality' (VR) refers to the overall simulated reality created by computer systems using digital formats. Researchers point to three key drivers associated with VR systems: Immersion, Interaction, and Visual Realism (Rosenblum and Cross, 1997). Immersion refers to virtual technologies and devices, such as virtual goggles or motion-sensor gloves, that allow the user to interact with a virtual environment. A virtual reality environment will require the appearance of real-time interaction. The user will receive feedback that allows them to react and send instructions to the computer through input devices (Riva, 2006). Output devices creates the conditions of visual realism and realistic illusion in that way that hardware and software should render detailed scenarios with physical models to be credible.

VR solutions have found application in educational settings. In this sector, VR facilitates and supports the development of learning styles and allows the simulation of various learning scenarios. The technology allows an infinite number of scenarios to be built. The only limitation one notices is the human imagination (Norris, Spicer and Byrd, 2019).

In education, VR enables the creation of a new way of teaching and learning, allows for improved performance, and increases the motivation of academics, the development of collaboration skills, and the enhancement of psychomotor and cognitive skills (Gutierrez et al., 2017). Furthermore, adopting a virtual learning environment offers several advantages over traditional learning environments, such as flexible schedules, greater individual accountability, mobility, student-centred learning, and more. Despite these benefits, virtual learning spaces require less investment than building a classroom infrastructure. According to Kirkpatrick and Kirkpatrick (2006), training effectiveness has been defined as a four-level model. This model explains four important issues linking the effectiveness of the training process with the use of VR technology. First, the VR training programme should elicit a strong response from the participants. The technology fully engages the trainees in action and has a real impact on them. Unlike a traditional learning environment, VR provides the actual feeling of being in a realistic world. The second level relates to knowledge transfer. The VR system allows the user to check progress and test the level of knowledge and skills acquired. The third level is related to measuring the impact of the training. The VR application accurately measures whether the learning objective has been achieved. Finally, the fourth level results in major implications for training efficiency and cost reduction. VR improves the learning process in terms of employee performance.

Virtual reality is an exemplification of digital technology and is recognized by scholars, both from the technology domain and the business domain as a solution to drive business innovation processes for few decades to come. It is breaking down the traditional way of making business and gives a strong support to rethink the existing business models. It is trans-

forming the institutional logics of running business, in which business model has become a descriptor of value creation, value delivery and capturing.

ICT technologies have become the key value driver within organizational consequences and opportunities. This creates opportunities for the development of business models and influences the adoption of different approaches in companies' operations triggered by technologies. According to Ibarra et al. (2018), there are three different approaches affecting business models such as service-oriented approach, network-oriented approach and user-driven approach.

The service-oriented approach is observed within industrial enterprises operating within Industry 4.0 (Klaus-Dieter, Wiesner and Wuest, 2017). There is the evidence that business models of companies under the technological challenges and requirements of business landscape are forced to change from product to service mindset. Considerable attention has been paid to the concept product-service system that integrates development, realization and offering of solutions with product-service bundles for the customer (Ibarra et al., 2018; Martinez et al., 2017). As a result, we can observe the tendency of creating the ecosystem of partners delivering the value to the customers. The key idea of service-oriented approach is to consider the firm as a service provider. In such a situation, it is very common for a company to provide services to meet the needs of the end user. For companies where technology is a core activity, this can also be considered at three levels: services, processes, and protocols (Estrada et al., 2010).

The conceptual base for network-oriented approach refers to the creation of the network of many entities. In this case, business models are developed through horizontal and vertical integration of activities along the value chain. New actors emerge and their roles increase in creating value for customers. The resulting ecosystem of interconnected forms and organizations delivers far greater economic value than that offered by individual companies (Di Toma and Ghinoi, 2021).

The context of user-driven approach through the use of digital technologies creates opportunities for companies to be more responsive to the customers. Companies in such a technologized environment will develop the ability to know the market and clients and build an adjusted user/customer experience into their offerings. The potential of the business model is based on customization of services and precise insight into customer needs (Chang et al., 2021). There is big evidence that the technology is main driver for health industry. The potential technological solutions enable organizations to develop applications, systems readily accessible to patients and healthcare providers, optimize business models and reduce unnecessary resource expenditures (Eppley et al., 2021).

3. Methodology

3.1. Aim and the hypothesis development

The study aims to increase and enrich the accepted assumption of the impact of technology on BM development from a startup perspective. It is going to answer the question whether virtual reality is influencing main elements of business model design.

A service-oriented approach puts companies in the foreground as service providers, also considering the satisfaction of end-user needs. Technology becomes this factor, which can be considered at three levels: services, processes, and protocols (Estrada et al., 2010). It can therefore be stated that:

H1: Technology directed at business model has a significant influence on provision of different services, processes, and protocols.

A manifestation of the development of the business model is the horizontal and vertical integration of activities and functions within the value chain. Emerging new actors that enhance customer value creation can be integrated into this business (Di Toma and Ghinoi, 2021). Technology allows the integration and networking of such entities. It can therefore be assumed that:

H2: Technology enables the emergence of an ecosystem of business linkages delivering far greater economic value than that offered by individual companies.

ICT creates opportunities for companies to better respond to customer needs. Companies operating in such a technological environment will develop the ability to learn about the market and customers and to build customized user/customer experiences into their offerings. Hence, this seems to sustain the assumption:

H3. The potential of technology in business model development is based on tailoring services to customer needs.

3.2. Research design

The study sought to enhance knowledge about the impact of technology on BM development from the startup perspective. To master the study's explorative character and to capture its complexity, the qualitative research approach was followed. To achieve the main objective of the study, which is the impact of technology on the design of a startup's business model in three approaches such as service-oriented approach, network-oriented approach and user--driven approach, an abductive exploratory survey was made.

Since the objective is to understand the impact of technology on business model development, it was necessary to go back and forth between theoretical concepts of BM development and the field to understand the process of BM development based on technology within startup. In abductive approach the research process starts with the facts and elements that seem to be surprising for the researcher, so that the research process is devoted their explanation (Dudovskiy, 2018). Due to the nature of the problem, which is the process of business model development, and research objective—a complex, current and contextual phenomenon over which the researcher has no control—the assumptions of qualitative research were adopted. The single case methodology was chosen for the reason and need to investigate the process of business model development in both of in-depth and comprehensive manner (Dunford, Palmer and Benveniste, 2010).

3.3. Industry and case selection

To cope with the research goal, first there an industry was sought out and then the company that relies on technological innovation to create value from changes in business model design.

It has been decided to focus the attention on virtual reality technological sector for several reasons. First, virtual reality has a worldwide importance from the perspective of developing sales, marketing activities and business models, notably evidence for education in Industry 4.0 (Paszkiewicz et al., 2021). Second, ICT technologies are opening the opportunity for startups to capture new markets and develop business models more efficiently (Eppley et al.,

2021). Moreover, there are few studies with a contribution linking BM design, impact of the technological factors and consideration of the three approaches such as service-oriented approach, network-oriented approach, and user-driven approach.

The study refers to a technology startup operating on the Czech market. Many reasons led to the choice of the case. First, virtual reality is evidenced as an emerging technology with a big potential to enhance training and educational business area. Second, virtual technology is found as solution creating opportunities for innovation of business model in terms of creation the benefits (value proposition) to the market. The study focuses on a startup as the business entity that has the greatest potential to create, modify, and change its business model. Hence, the identification of this startup has followed the theoretical sampling criteria (Yin, 2021). The company has been able to use virtual reality to develop value creation and value proposition as main elements of business model design. It is worth underlying that the case is relevant consistently with the research question.

For reasons of confidentiality and anonymity of the company's owners, the name of the company was not provided. To ensure anonymity, in the study the name of the analyzed firm will refer with the following pseudonym: *Virtual Institute*.

3.4. Data gathering

The study was conducted from January 2021 to February 2022. The entire study was based to rely on data in multiple ways. The data obtained were from in-depth interviews with the company founders and management teams, internal company documents, website, and other secondary materials obtained from the company. Primary data source consists in 4 semi-structured interviews involving owners and co-founders of the startup (four persons). Interviews lasted from one hour to two hours. Interviews were conducted with usage of MS Teams communicator and all recorded and then transcribed to ensure the quality of the data. Moreover, the researcher took the notes manually during the interviews and then transcribed.

Table 1. Data source

Method	Data type	Quantity	Original data source
Single case study	Semi-standardized interviews	4	Interviews with co-founders and management team
	Internal documents	10	Presentations, reports, meeting minutes, notes, memos
	External documents and sources	14	Company website, news articles, industry report, LinkedIn, podcasts, blog articles

S o u r c e: Author's own elaboration.

In the study the questions and problems discussed refer to the existing policy and business model elements and mechanisms. A first set of questions regarded the general view of business model design (including questions such as: "What is your value proposition?", "What is your value delivery and how can you describe your value chain in VR ICU?" and "What are the main sources of making profits and capturing the value?"). The further step was to explore the attitudes of startup co-founders towards virtual reality as a key value driver to develop the business model to better execute organizational activities. During the interviews, the subjects were asked

about their perspective on the impact of technology on business model development in terms of three approaches: service-oriented approach, network-oriented approach, user-driven approach.

In accordance with the research objective, the interviewees were asked to describe and comment such their business performance undertaken by the firm showing changes in the business model taking into account the approaches mentioned above. Due to the service--oriented approach the interviewees were asked to indicate the factors that can contribute innovations within business model design in service orientation.

The secondary source of data was relying on internal documents, as presentations, reports, memos, and notes from meetings to reach the conceptual saturation of the data collection. It is worth underlying that internal documents were reflecting the process of incubation the technological solution towards Virtual Reality Intensive Care Units in Czech healthcare market. The documents and materials showed the changes in startup's performance before and after the usage of VR technology. To achieve additional objectivity in the data obtained, external sources of information were analyzed, such as the company's website, social media profile, its blog and an industry report.

3.5. Case description Virtual Institute

Virtual Institute is a technological startup established in 2018 in the Czech Republic and it operates in the industry of virtual reality. The startup was founded by another company that has been operating for 16 years in the education and business training services sector. The activity of the founding entity is focused on business training, coaching and neuro-linguistic programming services, but without using any technological solutions.

The leitmotif of the startup establishing was to introduce virtual reality to coaching, which would enrich the services provided by the mother company and allow for introducing unconventional solutions for the company's clients. The startup continued to introduce technology to hold virtual meetings and systematic coaching. The company expanded into other sectors such as schooling, academic education, business trainings, the military sector as well as healthcare educational services. The company provides a wide range of virtual solutions that could be implemented for different purposes and markets. The firm concentrated on services to the business where VR solution is used within training to enhance soft skills, facilitating feedback meetings, kick-off sessions of business projects, supporting recruitment process and conducting crucial conversations. They had also the experience of usage VR for the development of hard skills of training participants as onboarding procedures in companies and some processes or activities to be executed by a few employees. Moreover, they expand the market by reaching out to the senior segment. In this case VR is used to activate and socialize seniors thanks to the VR solutions.

The company's core activity is mainly based on the competence of its employees. The company has its own VR development studio with 15 employees who create and develop applications and virtual reality systems. Moreover, a team of trainers, coaches, and people with high qualifications in the field of didactics, training, coaching and mentoring create and develop the scenarios for the services offered to the market.

The strategic competence of the company is building their business relying on VR as main value proposition to support the educational system at all levels: from the primary schools up to the university level. The whole management team is strongly convinced of the VR value as a critical success factor in facilitating and accelerating learning. The company started its activity on the Czech market. Currently, it also operates on international markets serving business customers in Austria, Germany, and the United States.

The company is trying to expand the market by entering the medical sector with VR. The business strategy assumes the development of virtual reality, eyewear software, enabling training for the medical industry (hospitals, universities). Due to the Covid circumstances and the preliminary research the company made, the forthcoming service is mainly tailored to support Intensive Care Units (ICU) in the hospitals, by offering a virtual ICU simulator, enabling training for medical staff and medical students by creating the real environment of an ICU ward and restoration of the medical procedure.

The last proposed service is in the incubation stage. The owners of the company are convinced of its strategic importance and treat it as the main direction of the company's activities. Research on both the technological development of the service and its market commercialization is supported by external funding through a grant received by the company from the Ministry of Development of the Czech Republic.

The Covid pandemic has become a business impulse to capture the need for change from the company perspective. The management is assessing the technological VR environment as main driver to impact the current company's business model. Moreover, pandemic becomes the motivation for searching the new market opportunities and ways of delivering the unique value.

The company sees very high potential in providing services using virtual reality for ICU. In this case, medical staff training programmes are being developed. The business activities are concentrated on cooperation with both hospitals and clients, as well as with medical device manufacturer. The solutions created by the company are to be standardized so that they can be implemented in different markets. Working with medical equipment suppliers allows the company to enter foreign markets. The company develops a scenario for training medical staff in the use of the equipment. The proposed service is universal. It creates opportunities for replication of the solution all over the world.

In the study, the process of BM modification will be exemplified using VR to shape training services for medical staff in ICUs in medical settings, hospitals, and medical universities.

4. Results

4.1. A service-oriented approach

To map the status of different service-oriented activities the participants involved in this study were asked several questions about the importance of services to meet the needs of Virtual Institute's customers. According to the study, the entrepreneurs of Virtual Institute demonstrated to be able to strategically orient the company along its key development service potential. When it comes to identification how virtual reality technology can contribute to innovations within business model design in service-oriented approach, the respondents could indicate those factors that are relevant to their company. The findings are depicted in Table 2.

Table 2. Factors that can contribute to innovations within business model design in service-oriented approach

Virtual Institute performance	Respondent 1	Respondent 2	Respondent 3	Respondent 4
Association of services to business objectives	٧	٧	٧	٧
Better fulfillment the business goals of the company's customers				٧
Providing services adjusted to the client's business process	٧	٧	٧	٧
Improvement of business processes of the clients	٧	٧	٧	٧
Possibility of reuse the services and solutions	٧	٧	٧	٧
Larger scalability of the services	٧			٧
Optimizing the business processes	٧			٧

S o u r c e: Author's own elaboration.

Referring to the findings given by respondents in the survey, they see the greatest impact of virtual reality in the case of the association of services to business objectives, adjustment of services to the client's business process and the big potential of reuse the services and solutions to the other market or client. A much lower potential of influence of virtual reality relates to scalability of the services and better fulfillment the business goals of the company's customers.

The analyzed firm has admitted to the integrated development, realization and offering of service bundles as a solution to the customers. The management due to the pandemic see the significant growth and growing demand for e-learning, certification and professional courses and online training environment available for the medical personnel. From the very words of one of the co-founders:

> Our original plan was deployed in the Intensive Care Unit segment by providing VR training for the personnel. We have already conducted the preliminary research in the Czech medical universities and showrooms centres. This is how we want to enter the healthcare market. We can complete deliver solutions, software, and hardware. Of course, we realized that our customers would need the controls of the VR trainings and hot-line services provided by our customer accounts.

Virtual Institute managers are looking to develop a business model that will work and bring business benefits in bigger scalability of services. In this regard the co-founder stated:

> We are looking for the business model pattern which is flexible, enables to replicate our value proposition and the strategy can consolidate the general idea of VR usage in health sector. That's why we always deliver the complex training environment available for many doctors and physicians. However, we realized that some legislation and formal factors forced us to differentiate our performance.

The service mindset is associated with the Virtual Institute goals and key activities. The company has even created the architectural model composed of services, processes and protocols. The last element can be described as a set of activities that produce a specific result/service or product.

> Our VR solutions can save the time of our customers. When we take into account the medical staff on ICU, it gives the financial gains because it is saving the time for trainings, reducing errors, providing grater variability and substitutivity of staff.

4.2. A network-oriented approach

The company is looking forward to elaborating the pattern of business model in which implementation of the business ecosystem of partners and incorporating them into the value creation can benefit of unique offering and delivering the value to the market.

> We have identified several stakeholder groups and elements of our business ecosystem. We grouped them by role in our operations into strategic, operational and tactical partners. This market requires us to understand the operations of both hospitals and their executives, as well as the teachers or trainers themselves.

The strategic pillar for VR ICU is based on the cooperation with the medical equipment providers. As it was stated by one of the co-founders:

> Thanks to our partners we have access to new customers and markets. For example, one big global provider of medical machines operates on international markets such as Germany, Austria, and the USA. We have just started the collaboration, but our first deals are really successful, and this partnership can be beneficial in the future to enter the foreign markets.

Virtual Institute is going to establish relationships with technology suppliers. Even the development department counts 16 employees, and they concentrate on core activities within virtual reality solutions and they outsource the other activities such as AI functionality. The owner is underlying that:

> We need to remember that even if we cooperate with some other technological companies, our role is crucial, because we know the market and the special needs of our customers. In many cases we are in the position to integrate all sides. I mean the hospitals and medical universities and medical machines suppliers, with the technological providers, as AI development firms.

The company for the moment is also looking at acquiring a variety of revenue streams and investments. Funding strategy is one of the main elements of the business model shaping and innovating. The company obtained already the funding needed for product development. The management is considering raising funding for the entering the markets. Both traditional and modern sources of funding are considered. One of the directions is crowdfunding, a type of fundraising on dedicated social networks. The method includes a share of the project's profits towards individuals who invest once the company has achieved its strategy and goals.

4.3. A user-driven approach

Using digital capabilities, Virtual Institute can obtain more and precise information of its customers. Virtual reality gives the possibilities to customize better its services to the end user.

> Doctors, nurses, and technical personnel appreciate the virtual environment, and they can make any repetition of the training as they want. Our scenarios are recognized as an ability to train crisis and unconventional situations.

Virtual Institute has acknowledged that customers play a key role in the value creation process. They have become the co-creators of the services and based on their experience, the company can evaluate and modify the services.

The company is convinced of the strategic use of VR for medical staff education offerings in the ICU. However, it has realized that the final offering should be tailored to the needs of the users themselves, i.e., the medical staff participating in the VR-based training. The company is pro-client oriented so that the virtual reality application provided is customized to the customer's cravings. The special VR ICU platform is dedicated to the users of VR trainings. Based on virtual reality and digital technologies, the company is analyzing the customers' behaviours and it can obtain the precise information of their preferences and training longings, and it can improve and optimize their services and business processes.

5. Conclusions

This study has implications for both academic and practical purposes. Transforming a business model is essential for many companies and can gain the sustained competitive advantage, especially in the context of the fourth industrial revolution, which leads to digitalization of business processes.

The study shows how startups can create and develop their business models using technology solutions. It should be emphasized here that technology can be a seed for the creation of new services, but also give the potential to enter new markets. In this case, the use of virtual reality has become a key factor to modify the business model in relation to creating, delivering and capturing value.

BM modifications also come down to finding new patterns to use. Research has shown that virtual reality allows a company to adjust its business model in three approaches such as service-oriented approach, network-oriented approach and user-driven approach. This manifests itself in the company's efforts to enhance customer services, build an ecosystem of relationships with partners and stakeholders, and increase the value creation across the value chain, as well as to track the customer experience and tailor its solutions to meet their needs.

Finally, the paper provides a better understanding of the use of VR in the educational process, with a focus on the healthcare sector. VR solutions appear to be the technology of the future due to its functionality, secure technical environment, ability to work remotely, and market expectations in the future.

6. Limitations and avenues for future research

While the study has provided the proposition and contribution to the literature on business model design innovation process from startup perspective, there are limitations concerning the research methodology, data sample and potential bias. First, in terms of the data and the focus on the single case study from one country, the future research should confirm the obtained results by developing this approach in the different geographical and market context. Second, the obtained data in the research should be further developed as measures that would allow the quantitative empirical study. Finally, the future research is needed to identify typical factors that can impact business model design while the startups are following three discussed paths towards service-, network-, or customer-centred orientation.

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Model biznesowy oparty na technologii: perspektywa startupu

Abstrakt: Prezentowany artykuł odnosi się do procesu modyfikacji modelu biznesowego W artykule przeanalizowano, w jaki sposób startup może rozwinąć swój model biznesowy w zakresie wykorzystania wirtualnej rzeczywistości w sektorze edukacji zdrowotnej. Ze względu na charakter omawianej problematyki, wymaganej, aby pokazać mechanizmy modyfikacji modelu biznesowego, przeprowadzono badanie metodą studium przypadku, którego przedmiotem był startup zlokalizowany w Czechach. Badana firma rozwija technologię wirtualnej rzeczywistości i rozwiązania w takich branżach jak opieka zdrowotna, edukacja, usługi społeczne, inżynieria i sektor rządowy. Badanie dostarcza dowodów empirycznych na temat głównych mechanizmów kształtujących elementy modelu biznesowego i pokazuje rozwój wdrażania wirtualnej rzeczywistości. Badanie pokazuje również, w jaki sposób możliwości cyfrowe i technologie informacyjne mogą wpływać na zewnętrzne i wewnętrzne procesy biznesowe, które odpowiadają trzem podejściom rozwoju modelu biznesowego: podejściu zorientowanemu na usługi, podejściu zorientowanemu na sieć oraz podejściu zorientowanemu na użytkownika. Rozwój modelu biznesowego jest wymagany na współczesnym rynku, głównie ze względu na czwartą rewolucję przemysłową, która prowadzi do automatyzacji i cyfryzacji procesów biznesowych.

Słowa kluczowe: innowacyjność modelu biznesowego, startup, wirtualna rzeczywistość, technologia