


## RECENT DEVELOPMENTS AND CHALLENGES OF CUSTOMER-BASED INNOVATION THROUGH DIGITAL TOOLS IN SMEs

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**Abstract.** *Purpose* – the purpose of this paper is to map out the current state of customer-based innovation through digital tools in small and medium-sized enterprises (SMEs), highlighting advantages but also challenges, tools, methods and procedures involved.

*Research methodology* – a twofold methodology comprising desk research and literature review is drawn upon.

*Findings* – the authors conclude that customer-based innovation can be crucial for the success and resilience of SMEs and thus, the European economy. In order to provide SMEs with practical advice, further empirical research on the use of digital tools for customer-based innovation in SMEs is needed.

*Research limitations* – this research paper is limited to a theoretical scope and serves as a preparatory research for quantitative and qualitative surveys that will be run in various EU countries after the publication of this paper.

*Practical implications* – this research paper is relevant for SME managers, advisors and researchers that are interested in digital customer-based innovation in companies. Based on the theoretical framework provided in this paper, concrete training and education measures in the field will be developed.

*Originality/Value* – the assessment of feasible customer-based innovation measures in SMEs is crucial in order to secure their competitiveness and productivity, especially for companies in north-eastern Europe that are competing with low-wage countries. Based on this paper, further concrete empirical research, training and education measures will be developed.

**Keywords:** SMEs, innovation, customer-based, digital tools.

**JEL Classification:** O31, O36, M14.

**Conference topic:** Business Processes: Development, Digitalisation, Social Responsibility.

### Introduction

Staying innovative in a digital world represents one of today's major challenges for small and medium-sized enterprises (SMEs). Moreover, productivity and customer satisfaction is of crucial importance for their growth in the twenty-first century. While SMEs play a key role in Europe's economy, constituting for 99% of all businesses in the EU, they are facing severe constraints when it comes to innovation due to resource scarcity. As highlighted by Stich, Zeller, Hicking, and Kraut (2020) SMEs in particular often lack the financial and time resources as well as fundamental digital expertise to integrate the potential of digital tools in their daily work and in the further development of business models. According to the European Commission's factsheet on SMEs (2020b), in fact only 50% of all SMEs in the EU undertake innovation activities and only 17% of all SMEs have successfully integrated digital technologies. Even if it can be questioned whether all SMEs benefit from innovations (Rosenbusch et al., 2011), it is evident that most companies need to engage in innovation activities in order to stay competitive in the globalised economy nowadays (Hogeforster, 2014; Oksanen & Rilla, 2009). This holds especially true for companies in north-eastern Europe, which otherwise cannot compete with low-wage countries.

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An innovation is considered to be a product, a service, or a process that is new or due to incremental changes regarded as new by its creators. While product innovations are only relevant to very specific areas in manufacturing SMEs, almost all companies can benefit from process innovations. In this context, new business models are a particularly interesting process innovation for SMEs (Scozzi et al., 2005). One such process innovation that can be essential for SMEs and will in fact result in innovative products and services, is the customer-oriented (digital) business model. With mobile devices and mobile internet, customers have easy access to product or service information anytime and anywhere. They can compare products and services within seconds, before actually making the decision which one to purchase. Customers generally seek products that are tailored towards their individual needs and expectations (Mulligan & Cormican, 2016). These developments place SMEs in a challenging position, as they are competing with global enterprises since purchasing has become less regional (Breuer, 2019). One effective possibility to address this challenge is the introduction of digital tools as a resource-saving method to business model extension, allowing new possibilities to realize innovation activities. This might also help SMEs to minimize entrepreneurial risks in introducing innovation activities since customers are active parts of innovative activity and therefore, market needs can be met more efficiently. Especially in today's knowledge society, tacit and explicit knowledge are both important to secure competitive advantages and customer centricity can be a crucial part of this (López-Cabarcos et al., 2020).

While large companies such as LEGO, IKEA and Apple fruitfully implement customer-based innovation through digital tools in order to improve their products and services, little research and guidance exists on customer-based innovation specifically for SMEs and the barriers for realizing such measures, taking into account the specific SME conditions with restricted resources and digital innovation skills. The conducted research revealed that the majority of papers focusing on customer-based innovation are either theoretical works, or relate to specific industries and regional areas (e.g. Flowers & Meyer, 2020; Habel et al., 2020; Matriano & Rahman Khan, 2019). The aim of this paper is to enhance the existing literature by the elaboration of a practice-oriented approach to familiarize SMEs with customer-based innovation and related digital tools. Therefore, this paper is to summarise the current state, the challenges, the benefits as well as the tools, methods and procedures of customer-based innovation through digital tools in SMEs in order to provide the basis for concrete implementation advice and curricula for SME managers and education providers.

The methodology of this report consists of a targeted desk research in combination with a snowball literature review in order to provide a contextual understanding of the field. Based on the insights, conclusions and further implications will be drawn. These will serve as guiding measures for future work in customer-based innovation measures in SMEs. In fact, the overall long-term goal of this research is to strengthen the innovation potential of SMEs through digital tools and hence, to securing the competitiveness of European SMEs.

In order to present novel opportunities for SMEs to integrate digital solutions into their business models in a resource-efficient manner to realize customer-based innovations, the paper is structured as follows: First of all, the role of the customer in the digital economy is emphasised. This is followed by a definition of customer-based innovation before outlining available methods of customer-based innovation through digital tools in SMEs. Then, potential advantages and challenges coming with this specific innovation measure will be summarized. Finally, conclusions and implications for further actions will be drawn.

## **1. New dimension of the customer in the digital economy**

Customers today are more aware than ever before. Thanks to digital technologies and the Internet, they can quickly find exactly what they are looking for, when and where they want, and often at the lowest available price. Digitization creates conditions for dialogue between companies and consumers, which can contribute to the creation of innovation. Users can get involved in innovation processes within virtual communities. In fact, the importance of customer-involvement in innovative activities significantly increased with the development of digital communication tools, allowing for dialogue on a mass scale (Von Hippel, 2005). Furthermore, customers can use digital technologies to adapt goods and services to their personal requirements and needs. By doing so, they not only generate valuable ideas, but also develop new products, commercialize innovations, and even create niche markets (Chang & Taylor, 2016). Rapidly rising expectations compound this effect. Customers demand the best possible experience and sensations in all transactions, especially online.

It is the customers' expectations about the online and offline products or services they desire that shape the demand in the digital world. Nowadays, people are used to the fact that their needs are met immediately, in a convenient place. If one company is unable to offer such a product or service, it can be assumed that soon another enterprise will be able to do so. Digital technology unlocks sources of supply that were previously inaccessible or whose usage was economically unprofitable. Digitalisation fills gaps in demand and provides customers with easy access to comprehensive information. Customers more and more expect to be able to use various sales channels seamlessly while shopping, further improving their (e-)commerce experience (Boniecki et al., 2016). With new sources of supply and perpetual demand, market makers can reach customers and consumers, lowering transaction costs while minimizing information asymmetry.

Another amendment for the sake of achieving customer satisfaction is the so-called value proposition where the benefits, costs, and value for the consumer are reviewed and communicated. Enterprises adjust their value propositions to meet customer expectations, sometimes even against their current business model. Many new offers, combining the virtual and physical world, are based on universal access to the Internet and huge data resources. Thus, new methods of delivering value emerge.

Clearly, putting the customers' needs centre stage brings new values for enterprises. Digital technologies are changing the traditional relationship between consumers and businesses. These relationships are slowly transforming and changing, from models where contacts dominated, through the model where the application development has occurred, to the stage of engaging consumers in innovation development. In this context, enterprises must seek to meet new dimensions of customer satisfaction through innovations that meet or exceed the market expectations.

## 2. Definition and status quo of customer-based innovation through digital tools in SMEs

Various authors such as Desouza et al. (2008), Euchner (2004), Zahay and Griffin (2004), Steinhoff and Breuer (2009), Romero and Molina (2015), Schaubmair (2017), and Zajkowska (2017a, 2017b), state different definitions and terms for practices, methods, and approaches in the customer-based innovation field. Based on the insights of the literature review, the following definition for customer-based innovation through digital tools shall serve this research paper:

*“Customer-based innovation describes product or service innovation processes in which the customer is integrated in different degree and at different stages. This means that the customer takes an active role and becomes a source of idea generation, implying that innovation processes happen with both input from inside and outside of the company.”*

The following table shows three different approaches in the field of customer-based innovation, outlining how the customers can be involved in innovation processes with different intensity. In all cases, the customers' needs and expectations lie at the heart of the innovation processes. As Table 1 shows (Desouza et al., 2008; Martinelli, 2018; Matriano & Rahman Khan, 2019), customers can be involved in innovative processes in a multi-layered way. This illustrates the great value of customer integration, especially for SMEs. This paper focuses on the customer-centric innovation approach. SMEs following this approach, aim at open innovation processes in which their main role lies in communicating with customers outside the company. The information gathered from the outside is then processed and integrated into existing or newly created processes to create innovative products, processes or services. At this stage, digital tools can be used to support both the communication outside the SMEs as well as the processing of the newly acquired information within the company in a resource-saving and targeted manner.

Table 1. Different terms and approaches to customer-based innovation  
(source: Desouza et al., 2008; Martinelli, 2018; Matriano & Rahman Khan, 2019)

Terms and approaches	Customer-driven Innovation	Customer-centric Innovation	Customer-focused Innovation
Central entity	Customer	Customer and organisation	Organisation
Degree of customer involvement	Innovation by customers	Innovation with customers	Innovation for customers
Role of organization	Coordinator	Communicator	Innovator
Type of innovation	Dynamic innovation	Open innovation (in case of business customers, these are innovations able to provide a potential and real value for business customers)	Closed innovation
Degree of control	Impossible to control	Difficult to control	Easy to control
Degree of coordination	Emergent coordination	Difficult to coordinate	Easy to coordinate
Critical innovation stage	Commercialisation (ideas are over-generated and developed, but difficult to commercialise)	Idea development (ideas are abundant, but difficult to develop), requires reaching out for the available data from industry research labs and discovery centres in order to gain regular insights into the changing customer demand and dynamics	Idea generation (ideas are scarce)
Types of innovation to focus on	Products and services, output interaction with products and services	Communication with customers, customer interaction with organisation	Customer segmentation and customer analysis
Critical issues with innovation types	“Sticky” and tacit knowledge transfer requires high levels of human interaction; customer must be segmented for proper analysis	Investment in infrastructure; high-quality communication needed; risk of copycats	Analysis must be ongoing; systems must be integrated; information overload possible

Previous research shows that although many break-through innovations often come from small developers, new innovation strategies are often developed and implemented first by large firms and only later adapted by SMEs. This applies for example to the field of open innovation, which was initially developed by large companies with easier access to knowledge institutions (Van de Vrande et al., 2009). The implementation of an open innovation strategy and the shift to customer-based innovation by large companies and SMEs has similarities. However, resilient corporations for example between SMEs and universities take longer to build up, although such networks are of great importance, especially for medium-sized companies (Hogeфорster & Priedulena, 2014). While large companies have long since integrated customers into their innovation processes, small and medium-sized companies are lagging behind. SMEs typically lack external R&D departments that work on innovations. In fact, new innovations are usually initiated by the owners themselves in small companies (Bougrain & Haudeville, 2002). Yet, the implementation of open innovation strategies and customer-based innovation measures entail enormous potential for SMEs. While major companies value open dialog and knowledge sharing (Väyrynen et al., 2017), small companies require a higher level of trust before opening up. But precisely this trust-building could be an advantage for SMEs, as they usually know their customers better and more personally than large companies. Findings indicate, that this personal trust is key in making customers involved in service innovations (Nicolajsen & Scupola, 2011).

Summing up, the term of customer-based innovation has been studied and described widely in the literature (e.g. Bettencourt & Ulwick, 2008; Desouza et al. 2008, Edgeman & Eskildsen, 2012). However, the existing literature has mainly focused on the general relationship between customer knowledge management and innovation (e.g. Castagna et al., 2020; Mejía Trejo et al., 2016), the benefits of customer-based innovation in a sector perspective (e.g. Flowers & Meyer, 2020) or the practice of innovation activity in large companies (e.g. Euchner, 2004). Few authors have dedicated their research activities to SMEs, in particular to SMEs in Europe. For example, a research study by Jirinova and Kolis (2013) investigated customer involvement to innovation processes in Czech service-industry SMEs. The findings show that SMEs can benefit from customer integration within a specific country and sector focus. Furthermore, analyses on the integration of selected digital tools for business activities in SMEs often miss direct links to the innovation context (e.g. Cesaroni & Consoli, 2015). Therefore, a need for further, cross-sectoral and transnational research within the area of customer-based innovation in SMEs has been identified. Hence, focusing on the implementation of digital tools for the realization of customer-based innovation will add additional value to the existing literature.

### **3. Digital tools for customer-based innovation**

The introduction of digital tools and the digitalisation of business activities poses a major challenge for SMEs. While some SMEs have already recognized and implemented opportunities and possibilities of this new way of working digitally at an early stage, the new technological possibilities may pose a challenge for SMEs with less digital affinity (Breuer, 2019). Many digital tools, such as project management, calculation and design applications, have been around for a long time, and many businesses use them to improve productivity by speeding up product creation, bookkeeping and design. In fact, digital tools pose the opportunity to be individually implemented and adapted to the particular needs of the respective SME. Company managers that do not use them effectively may suffer from a performance lag. However, there is a much newer class of resources that businesses are turning to in order to learn more about their consumers and markets, many of which are based on recent technological advances. SMEs who can learn as much as they can about their clients do a much better job of coming up with successful new products and services, that really meet the customer demands. Crucial features regarding the integration of digital tools for customer-based innovation are to establish a community, to get to know the customer and to ensure that the customers' needs lie at the heart of the product and service innovation processes.

Digitalisation enables SMEs to promptly identify changing customer needs and to act accordingly (Stoldt et al., 2018). Besides opening up innovative activities to external actors (customers), digital tools also offer a great opportunity for process and management innovations. Therefore, SMEs may move to more resource-efficient business processes.

Nowadays, a broad variety of digital tools offer new fast, efficient and accessible ways without spatial constraints of engaging with customers in order to collect data that can be used for innovation measures. These digital processes involve collecting, classifying and processing customers' information (data). Based on the literature reviewed, several digital tools, chosen according to their potential for customer-based innovation activities, were identified (Cesaroni & Consoli, 2015; Columbus, 2020; Lee, 2013):

- Responsive company websites or apps;
- E-mails and newsletters;
- Forums and blogs;
- Wikis and social tagging;
- Social media (e.g. Facebook, Instagram, Twitter, LinkedIn etc.);
- Project management tools (e.g. Google My Business);

- Online surveys;
- KMS (Knowledge Management System);
- ERP (Enterprise Resource Planning);
- Cloud computing services;
- Big Data;
- Artificial Intelligence;
- Distributed Ledger Technologies (DLTs);
- Digital manufacturing (computer-controlled manufacturing processes, 3D printing, robot technology);
- Augmented reality, Virtual Reality;
- Cookies and web-server logs.

Clearly, the technological requirements as well the level of specific skills needed to introduce the enumerated tools vary significantly. According to the annual Digital Economy and Society Index Report – Integration of Digital Technology by Enterprises from 2020, 92% of all European SMEs used some kind of information and communication technology (ICT) in 2019. The use of any kind of social media by SMEs in 2019 amounted for 52%, which constitutes a slight increase compared to the use of any kind of social media by SMEs of 47% in 2017 (European Commission, 2018, 2020a). Remarkably is the fact that both the use of customer relationship management (CRM) and enterprise resource planning software by European SMEs stagnates at 32% and 33% between 2017 and 2019. While these numbers give some insight into the use of selected digital applications, a lack of up-to-date empirical data on the use of other mentioned digital tools by SMEs can be identified. More qualitative and quantitative insight into the practical use of tools of customer-based innovation in SMEs are needed.

#### **4. Advantages of customer-based innovation**

The reviewed literature provides evidence of concrete advantages and benefits for enterprises when engaging in customer-based innovation measures. Besides increasing the level of innovation in an enterprise, the involvement of customers or clients when developing new products or services will also increase their loyalty. Customers are much more aware of the products they are buying and using. Identification with the company is increasingly important, which is why concepts for corporate social responsibility (CSR) are on the rise also within SMEs. The strategic use of CSR is then again a driver for product or process innovations (Bocquet et al., 2017). A relevant pillar for a sustainable CSR concept is a close relationship with the social environment of the enterprise, thus in particular with its customers. It can be concluded that the involvement of customers in the innovation processes not only strengthens the innovation potential of the company as such, but also directly strengthens the bond with the customers, the loyalty, which is of particular importance for sustainable growth.

Besides the possibility to integrate customers in different degrees at different stages of the innovation process, the use of digital tools for customer-based innovation offer additional advantages to SMEs. Among the most frequently addressed economic advantages in the literature reviewed are the following (Wintermeier, 2020):

- Increase of profit, productivity, and customer satisfaction and loyalty;
- Attraction of new customers;
- Improvement of competitiveness, market position, and product and service quality;
- Opening possibilities of new markets and geographic expansion;
- Expansion of product and service portfolio;
- Reducing production and distribution costs.

With regard to the implementation of digital tools for customer-based innovation activities, the main advantages for SMEs lie in the low financial resources needed, as customer data is available online in vast amounts that can be analysed for innovation processes (Günther et al., 2017). Furthermore, digital tools help SMEs expand their local networks, making it possible to gather a variety of customer feedback and ideas for internal use (Cesaroni & Consoli, 2015). When customers are engaged in active communication channels, SMEs are able to strengthen their brand reputation and build long-term relationship to enhance their business models with respect to customer needs (Edgeman & Eskildsen, 2012). The stronger relationship with customers can be seen as part of a lifetime value concept for the company and can have a lasting effect as part of marketing (Hoekstra & Huizingh, 1999). Furthermore, the set-up of fast communication and feedback circles may shorten innovation processes and therefore save further company resources (Castagna et al., 2020).

#### **5. Challenges and critical concerns of customer-based innovation in SMEs**

When discussing customer-based innovation measures in SMEs through digital tools, there are several challenges, barriers and critical concerns that stand out in the literature consulted (Abel-Koch et al., 2019; Cesaroni & Consoli, 2015; Schaubmair, 2017; Stoldt et al., 2018; Zimmermann, 2018):

- Financial constraints (e.g. costs for personnel trainings, hardware, and software);
- Time constraints;
- Lack of employees with digital innovation and management skills;
- Lack of adequate technological infrastructures;
- Uncertain legal conditions (e.g. protection of intellectual property, digital privacy and security);
- The added value is unclear or not convincing since it is hard to predict in each individual case before hand resulting in a lack of trust in the use of customer-based innovation in SMEs through digital tools;
- Lack of information and trainings on customer-based innovation through digital tools specifically for SMEs;
- Inadequate external conditions (e.g. lack of government subsidies);
- Difficulties in finding customers that provide valuable information and feedback;
- Difficulties in translating customer ideas into concrete products or services;
- Unclear internal responsibilities regarding customer management.

Clearly, SMEs face a variety of barriers and obstacles when it comes to customer-based innovations through digital tools. Especially IT security issues such as data processing and storage and a shortage of digital skills to process the data in a targeted and efficient manner pose major hurdles (Abel-Koch et al., 2019). Hence, targeted trainings within SMEs in order to generate an overview of the needed skills, the available tools and management opportunities for customer-based innovation measures are very much needed (Cesaroni & Consoli, 2015; Schaubmair, 2017). In fact, small companies need to catch up with digitalisation despite of their tendency to be cautious and sceptical of new technologies (Stoldt et al., 2018). In order to achieve this, owners and employees must be trained to increase the level of digitalisation in their SME (Zimmermann, 2016). Against the background of demographic change and the average age of company owners, this can certainly be a challenge. Given the changing demographics and the average age of business owners, this can be a difficult task. As a company owner grows older, his or her ability to use digital technologies and innovate decreases (Zimmermann, 2018). This is especially true in the creation of process technologies like the introduction of customer-based innovation. The introduction of digital tools to capture customer preferences may also face a cultural hurdle. The advancement of artificial intelligence increasingly allows for very human-like chatbots (Sidaoui et al., 2020), putting the company into the position needing to decide whether it is ready to let machines talk to its customers.

## **Conclusions**

In conclusion, it can again be emphasized that SMEs are an important component of the European economy and must therefore be considered as central actors for the implementation of novel digital tools for the generation of innovations, in the narrower research context, customer-based innovations. Customer-based innovation measures can be integrated into SMEs through various digital tools that require different amounts of digital skills, financial and time commitments. SMEs can in fact choose from a selection of tools according to their different circumstances. Even SMEs with basic digital innovation knowledge, can already align their business activities to integrating customer needs with relatively little effort by actively using e.g., webpages and emails to integrate customer feedback. SMEs with advanced capabilities can use such tools as cookies and Big Data to identify and integrate specific customer needs using analytical methods. This wide range of tools thus offers interested SMEs the opportunity to adapt their innovation activities to customer needs and thus create competitive advantages for themselves.

This paper illustrated the benefits but also challenges when it comes to integrating customer-based innovation measures in SMEs and by doing so, laid the foundation for further research and implications. In the next step, quantitative and qualitative surveys in selected EU countries will be carried out in order to get practical insights into the field in different regions and industry branches. The general awareness of the possibility of using digital tools for customer-based innovation, the status quo of the practical application of customer-based innovation, and the hindering as well as enabling factors for the implementation of customer-based innovation will be further examined. Future implications include the design of specific training programs targeting SME managers and employees, as well as the development and adaptation of specific curricula on digital customer-based innovation in SMEs for educational institutions. To achieve this, it is essential to have a productive collaboration between different stakeholders such as SMEs, educational and research institutions.

In conclusion, this research paper has contributed to the field by providing a theoretical framework of practice-oriented SME research related to the use of digital tools for implementing customer-based innovation measures.

## **Disclosure statement**

The authors do not have any competing financial, professional, or personal interests from other parties.

## References

- Abel-Koch, J., Al Obaidi, L., El Kasmi, S., Acevedo, M. F., Morin, L., & Topczewska, A. (2019). *Going digital – The challenges facing European SMEs. European SME Survey 2019*. [https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Studien-und-Materialien/PDF-Dateien-Paper-and-Proceedings-\(EN\)/European-SME-Survey-2019.pdf](https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Studien-und-Materialien/PDF-Dateien-Paper-and-Proceedings-(EN)/European-SME-Survey-2019.pdf)
- Bettencourt, L. A., & Ulwick, A. W. (2008). The customer-centered innovation map. *Harvard Business Review*, 86(5), 109–114, 130. <https://hbr.org/2008/05/the-customer-centered-innovation-map>
- Bocquet, R., Le Bas, C., Mothe, C., & Poussing, N. (2017). CSR, innovation, and firm performance in sluggish growth contexts: A firm-level empirical analysis. *Journal of Business Ethics*, 146(1), 241–254. <https://doi.org/10.1007/s10551-015-2959-8>
- Boniecki, D., Namysł, W., Krok, W., Iszkowska, J., Borowik, M., Broniatowski, M., & Rabij, M. (2016). *Cyfrowa Polska* (Raport). McKinsey & Company. <https://www.mckinsey.com/pl/our-insights/cyfrowa-polska#>
- Bougrain, F., & Haudeville, B. (2002). Innovation, collaboration and SMEs internal research capacities. *Research Policy*, 31(5), 735–747. [https://doi.org/10.1016/S0048-7333\(01\)00144-5](https://doi.org/10.1016/S0048-7333(01)00144-5)
- Breuer, C. (2019). Wissenschaftliche Politikberatung: Chancen der Digitalisierung nutzen. *Wirtschaftsdienst*, 99(5), 302–303. <https://doi.org/10.1007/s10273-019-2449-1>
- Castagna, F., Centobelli, P., Cerchione, R., Esposito, E., Oropallo, E., & Passaro, R. (2020). Customer knowledge management in SMEs facing digital transformation. *Sustainability*, 12(9), 1–16. <https://doi.org/10.3390/su12093899>
- Cesaroni, F. M., & Consoli, D. (2015). Are small businesses really able to take advantage of social media? Discovery Service para Universidad Del Pacifico. *Electronic Journal of Knowledge Management*, 13(4), 257–268. <https://issuu.com/academic-conferences.org/docs/ejkm-volume13-issue4-article733>
- Chang, W., & Taylor, S. A. (2016). The effectiveness of customer participation in new product development: A meta-analysis. *Journal of Marketing*, 80(1), 47–64. <https://doi.org/10.1509/jm.14.0057>
- Columbus, L. (2020). *Why digital transformation always needs to start with customers first*. Retrieved March 2, 2021, from <https://www.forbes.com/sites/louiscolombus/2020/08/30/why-digital-transformation-always-needs-to-start-with-customers-first/?sh=327ea6e62c61>
- Desouza, K. C., Awazu, Y., Jha, S., Dombrowski, C., Papagari, S., Baloh, P., & Kim, J. Y. (2008). Customer-driven innovation. *Research-Technology Management*, 51(3), 35–44. <https://doi.org/10.1080/08956308.2008.11657503>
- Edgeman, R., & Eskildsen, J. (2012). The C4 model of people-centered innovation: Culture, consciousness, and customer-centric co-creation. *Journal of Innovation & Business Best Practice*, 2012, 1–14. <https://doi.org/10.5171/2012.932564>
- Euchner, J. (2004). *The practice of innovation. Customer-centered innovation at Pitney Bowes*. [https://www.pb.com/bv70/en\\_us/extranet/contentfiles/editorials/downloads/ed\\_wpaper\\_innovation\\_css\\_whitepaperstemplatefinal.pdf](https://www.pb.com/bv70/en_us/extranet/contentfiles/editorials/downloads/ed_wpaper_innovation_css_whitepaperstemplatefinal.pdf)
- European Commission. (2018). *Digital Economy and Society Index Report 2018 – Integration of digital technology*. [http://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=52243](http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=52243)
- European Commission. (2020a). *Digital Economy and Society Index Report 2020 – Integration of digital technology*. <https://ec.europa.eu/digital-single-market/en/integration-digital-technology-enterprises>
- European Commission. (2020b). *Unleashing the full potential of European SMEs*. <https://doi.org/10.2775/296379>
- Flowers, S., & Meyer, M. (2020). How can entrepreneurs benefit from user knowledge to create innovation in the digital services sector? *Journal of Business Research*, 119, 122–130. <https://doi.org/10.1016/j.jbusres.2020.01.025>
- Günther, W. A., Rezazade Mehrizi, M. H., Huysman, M., & Feldberg, F. (2017). Debating big data: A literature review on realizing value from big data. *Journal of Strategic Information Systems*, 26(3), 191–209. <https://doi.org/10.1016/j.jsis.2017.07.003>
- Habel, J., Kassemeier, R., Alavi, S., Haaf, P., Schmitz, C., & Wieseke, J. (2020). When do customers perceive customer centricity? The role of a firm's and salespeople's customer orientation. *Journal of Personal Selling & Sales Management*, 40(1), 25–42. <https://doi.org/10.1080/08853134.2019.1631174>
- Hoekstra, J., & Huizingh, E. (1999). The lifetime value concept in customer-based marketing. *Journal of Market-Focused Management*, 3(4), 257–274. <https://doi.org/10.1023/A:1009842805871>
- Hogeforster, M. (2014). Future challenges for innovations in SMEs in the Baltic Sea region. *Procedia – Social and Behavioral Sciences*, 110, 241–250. <https://doi.org/10.1016/j.sbspro.2013.12.867>
- Hogeforster, M., & Priedulena, E. (2014). The significance and impact of innovation networks of academia and business with a special emphasis on work-based learning. *Baltic Journal of European Studies*, 4(2), 69–82. <https://doi.org/10.2478/bjes-2014-0016>
- Jirinova, K., & Kolis, K. (2013). Research of customer-centric approach and involvement of customers into innovation process across Czech SMEs. In *7<sup>th</sup> International Days of Statistics and Economics* (pp. 521–531). <https://www.semanticscholar.org/paper/OF-CUSTOMER-CENTRIC-APPROACH-AND-INVOLVEMENT-OF-Jirinová-Kolis/9a07ba71ba1923e0d900ae8fc8803aa02a6e1dfe#paper-header>
- Lee, J. (2013). *Customer focused growth: Rising expectations and emerging opportunities*. <http://www2.deloitte.com/content/dam/Deloitte/ca/Documents/consumer-business/ca-en-consumer-business-customer-focused-growth.pdf>
- López-Cabarcos, M. Á., Srinivasan, S., & Vázquez-Rodríguez, P. (2020). The role of product innovation and customer centricity in transforming tacit and explicit knowledge into profitability. *Journal of Knowledge Management*, 24(5), 1037–1057. <https://doi.org/10.1108/JKM-02-2020-0087>
- Martinelli, E. M. (2018). Customer centric innovation: Adoption of 3D printing in the Italian jewellery sector. *Rivista Piccola Impresa/Small Business*, 2, 59–85.
- Matriano, M. T., & Rahman Khan, M. F. (2019). Customer-centric innovation: Case of Oman entrepreneurship. *International Journal of Management, Innovation & Entrepreneurial Research*, 5, 33–39. <https://doi.org/10.18510/ijmier.2019.515>
- Mejía Trejo, J., Sánchez Gutiérrez, J., & Maldonado Guzman, G. (2016). The customer knowledge management and innovation. *Contaduría y Administración*, 61(3), 456–477. <https://doi.org/10.1016/j.cya.2015.11.011>



- Mulligan, D., & Cormican, K. (2006). A customer centric process innovation toolkit for SMEs. In *2006 IEEE International Technology Management Conference (ICE)* (pp. 1–8). IEEE. <https://doi.org/10.1109/ICE.2006.7477080>
- Nicolajsen, H. W., & Scupola, A. (2011). Investigating issues and challenges for customer involvement in business services innovation. *Journal of Business and Industrial Marketing*, 26(5), 368–376. <https://doi.org/10.1108/08858621111144424>
- Oksanen, J., & Rilla, N. (2009). Innovation and entrepreneurship: New innovations as source for competitiveness in Finnish SMEs. *International Journal of Entrepreneurship*, 3, 35–48. <https://cris.vtt.fi/en/publications/innovation-and-entrepreneurship-new-innovations-as-source-for-com>
- Romero, D., & Molina, A. (2015). A multidisciplinary framework and toolkit to innovate customer-centric new product development. In *2015 IEEE International Conference on Engineering, Technology and Innovation/ International Technology Management Conference (ICE/ITMC)* (pp. 1–10). IEEE. <https://doi.org/10.1109/ICE.2015.7438638>
- Rosenbusch, N., Brinckmann, J., & Bausch, A. (2011). Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs. *Journal of Business Venturing*, 26(4), 441–457. <https://doi.org/10.1016/j.jbusvent.2009.12.002>
- Schaubmair, S. (2017). *Customer-centric product innovation strategy for SMEs*. Universität Linz. <https://epub.jku.at/obvulihs/content/titleinfo/2246300>
- Scozzi, B., Garavelli, C., & Crowston, K. (2005). Methods for modeling and supporting innovation processes in SMEs. *European Journal of Innovation Management*, 8(1), 120–137. <https://doi.org/10.1108/14601060510578619>
- Sidaoui, K., Jaakkola, M., & Burton, J. (2020). AI feel you: customer experience assessment via chatbot interviews. *Journal of Service Management*, 31(4), 745–766. <https://doi.org/10.1108/JOSM-11-2019-0341>
- Steinhoff, F., & Breuer, H. (2009). *Customer-centric open R&D and innovation in the telecommunication industry*, 1–14. [https://www.researchgate.net/publication/268004075\\_Customer-Centric\\_Open\\_RD\\_and\\_Innovation\\_in\\_the\\_Telecommunication\\_Industry](https://www.researchgate.net/publication/268004075_Customer-Centric_Open_RD_and_Innovation_in_the_Telecommunication_Industry)
- Stich, V., Zeller, V., Hicking, J., & Kraut, A. (2020). Measures for a successful digital transformation of SMEs. *Procedia CIRP*, 93, 286–291. <https://doi.org/10.1016/j.procir.2020.03.023>
- Stoldt, J., Trapp, T. U., Toussaint, S., Süße, M., Schlegel, A., & Putz, M. (2018). Planning for digitalisation in SMEs using tools of the digital factory. In *51<sup>st</sup> CIRP Conference on Manufacturing Systems* (pp. 179–184). <https://doi.org/10.1016/j.procir.2018.03.100>
- Van de Vrande, V., De Jong, J. P. J., Vanhaverbeke, W., & De Rochemont, M. (2009). Open innovation in SMEs: Trends, motives and management challenges. *Technovation*, 29(6–7), 423–437. <https://doi.org/10.1016/j.technovation.2008.10.001>
- Väyrynen, H., Helander, N., & Vasell, T. (2017). Knowledge management for open Innovation: Comparing research results between SMEs and large companies. *International Journal of Innovation Management*, 21(5). <https://doi.org/10.1142/S1363919617400047>
- Von Hippel, E. (2005). *Democratizing Innovation*. The MIT Press. <https://doi.org/10.7551/mitpress/2333.001.0001>
- Wintermeier, N. (2020, June 8). 11 Customer-centricity examples for online retailers. *Omnichannel Marketing, Customer Experience*. <https://blog.crobox.com/article/customer-centricity-examples>
- Zahay, D., & Griffin, A. (2004). Customer learning processes, strategy selection, and performance in business-to-business service firms. *Decision Sciences*, 35(2), 169–203. <https://doi.org/10.1111/j.00117315.2004.02338.x>
- Zajkowska, M. (2017a). How to engage customer in co-creation of innovation? Implications for marketing activity. *Marketing i Zarządzanie*, 48(2), 265–274. <https://doi.org/10.18276/miz.2017.48-25>
- Zajkowska, M. (2017b). Open models of innovation processes as a future management challenge for small and medium-sized enterprises in Poland. *Central European Management Journal*, 25(4), 193–208. <https://doi.org/10.7206/jmba.ce.2450-7814.214>
- Zimmermann, V. (2016). SMEs and digitalisation: The current position, recent developments and challenges. *KfW Research, Focus on Economics*, 138, 1–7. [https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Fokus-Volkswirtschaft/Fokus-englische-Dateien/Fokus-2016-EN/Fokus-Nr.-138-August-2016-Digitalisierung\\_EN.pdf](https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Fokus-Volkswirtschaft/Fokus-englische-Dateien/Fokus-2016-EN/Fokus-Nr.-138-August-2016-Digitalisierung_EN.pdf)
- Zimmermann, V. (2018). Determinants of digitalisation and innovation behaviour in the SME sector. *KfW Research, Focus on Economics*, 236, 1–7. <https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Fokus-Volkswirtschaft/Fokus-englische-Dateien/Fokus-2018-EN/Fokus-No.-236-December-2018-Determinants-of-digitalisation-and-innovation.pdf>