Chapter 4
The "Transformative" Effect of Artificial Intelligence Systems (AIS) in Entrepreneurship

Umut Sanem Çitçi

Abstract In this chapter, one of the scholars working on entrepreneurship shares her ideas about how the field of entrepreneurship meets artificial intelligence systems and what this meeting can mean for the field of entrepreneurship today and in the future, with a supple wording as possible. Entrepreneurship is an important phenomenon that increases individuals' and countries' welfare and plays a role in social transformation. Its importance appeals to a large number of researchers. What makes these studies possible to stand out from the research crowd depends on their design as modern, contemporary, and preliminary studies. The author also wanted to reveal the possibilities of artificial intelligence systems, which offer the opportunity to conduct innovative research, in the field of entrepreneurship.

The chapter titled "The 'Transformative' Effect of Artificial Intelligence Systems (AIS) in Entrepreneurship" primarily targets researchers who are interested in entrepreneurship research and want to gain general information about the intersections with artificial intelligence. As it is known, artificial intelligence systems have highly specialized literature. This situation causes most researchers to develop a perception of the difficulty of the field. The author promises to transform this perception positively and discover artificial intelligence, which we inevitably have to dive into and learn, from the perspective of entrepreneurship, when the development of technology is considered. For this purpose, in the content design of the chapter, how artificial intelligence will affect the entrepreneurship classification and the way entrepreneurs do business; how artificial intelligence will transform the big picture through entrepreneurship; what can be the usage of artificial intelligence for entrepreneurs; how artificial intelligence will affect entrepreneurship education; how will artificial intelligence affect entrepreneurship research with the use of new technologies for data gathering and data analyzing are included. It can be said that the chapter has a guiding quality, especially for graduate students who want to do entrepreneurship research but have not yet determined the research subject. For example, the subject of postgraduate research may be how artificial intelligence

U. S. Çitçi (✉)
Department of Business Administration, Izmir Bakircay University, Izmir, Turkey
e-mail: umutsanem.citci@bakircay.edu.tr

S. Bozkuş Kahyaoğlu (ed.), *The Impact of Artificial Intelligence on Governance, Economics and Finance, Volume 2*, Accounting, Finance, Sustainability, Governance & Fraud: Theory and Application, https://doi.org/10.1007/978-981-16-8997-0_4

systems will transform the gender-based problems faced by women entrepreneurs. The steps in the literature regarding this subject can be found in the chapter.

This book, in which artificial intelligence is evaluated from various perspectives, could be said to be incomplete if it did not include a discussion in terms of entrepreneurship. With this awareness, the author endeavored to offer her readers a good reading and knowledge acquisition experience by referencing as many sources as possible and sharing different ideas.

Keywords Entrepreneurship · AIS · Entrepreneurship classification · Digital entrepreneurship · Social entrepreneurship · Business model · Entrepreneurial intention · Entrepreneurial opportunity · Entrepreneurial behavior · Entrepreneurship education · Entrepreneurship research

4.1 Introduction

Human beings make their decisions under "uncertainty" since they do not possess complete information on what is going around them. Furthermore, they are classified as a "bounded rational" creature due to their tendency to include their experiences, prejudices, and intuition in the decision-making process. Deciding on a situation by completing the missing information in multiple ways instead of starting from the data alone complicates matters, in effect saying "this is the best decision" for both the decision-maker and those affected by the decision. One of the main features that distinguish human beings from other living things is that they do not accept their situation as "given" yet they struggle for a solution. That is why human beings have long been pondering what kind of tools and techniques they need to make better decisions. AI studies, which began in the 1960s and started to achieve extremely successful results in the recent period, are perhaps the greatest step that human beings have taken to defeat the lack of bounded rationality. Still, it may be naive to believe that increasing the quality of decisions will create good results for humanity. Because the use of AIS, which includes machines that can think as if they were human, may create unexpected consequences, just like many studies that were sources of pride in human history and later turned into a source of shame, such as the fragmentation of the atom and the atomic bomb. So, what is AI?

Just as steam was the driving force behind Industry 1.0, the driving force of Industry 4.0 is accepted to be AIS (Schwab, 2017). The systems that are comprised of machine-based learning results from this learning process, techniques that involve solutions to problems. Fundamentally, what AISs do can be summed up as developing algorithms for circumstances in which human intelligence has trouble making decisions and processing large volumes of unformatted and diverse data that are not possible for human analysis with these algorithms (Choudhury et al., 2018; Kaplan & Haenlein, 2019).

John McCarthy, who initiated the work that formed his AIS' basis almost 60 years ago, describes AI as "the science and engineering of making intelligent machines."

Since then, AI studies have continued, and the scope of the definition has expanded with developments as "intelligence demonstrated by machines—or, in terms of an academic field (typically seen as a sub-discipline of computer science), the examination of how digital computers and algorithms perform tasks and solve complex problems that would normally require (or exceed) human intelligence, reasoning, and prediction power needed to adapt to changing circumstances" (Obschonka & Audretsch, 2019). Based on the literature's definitions, AIS stand on three pillars: The first pillar is the "domain structure," and it involves drawing the boundaries of the area produced by engineers and other relevant experts, almost determining the rules of the game. The second pillar involves "the identification and aggregation of data groups" that will feed the learning algorithms. The last pillar is "the substantiation of machine learning." The last pillar is the rationale for the need for AIS. At this stage, patterns in the research area make it possible to predict its emergence (Taddy, 2018). Regarding these three pillars, it is possible to see the AI as an umbrella concept since there is a relationship between them as summarized by Obschonka and Audretsch (2019) as "an often used categorization is that machine learning is a subset of AI and deep learning (e.g., deep neural networks) a subset of machine learning. Big data can mean a large volume of structured, semi-structured, or unstructured data, and a way to collect/produce, process, and analyze these data sets using non-traditional methods."

AI, which is a great tool to reshape the costs of acquiring information and estimating in the Industry 4.0 layout, is on the way to becoming an indispensable tool for companies in terms of making the identification, acquisition, sorting, and processing of information faster, cheaper, and more effective (Desai, 2019) and concerning these properties, it is considered the new type of intellectual capital of today's companies (Popkova & Sergi, 2020). Regarding the use of AI and its development potential, it can be claimed that its popularity as intellectual capital for companies will increase more in the future. Maybe what needs to be clarified here is why AI is considered the intellectual capital, not a technology owned by companies. According to Davenport & Ronanki's article published in HBR in 2018, AI is more of a business capability for companies than a technology. This is because companies have different success potentials in terms of automating business processes using AI, developing insight with data analysis, and establishing cognitive engagement with the customer/employee. Still, it should be remembered that what AI can do for a company depends on its managers and employees, that is, the capacity of the existing intellectual capital to use this tool. At least for now, this claim remains valid. According to Davenport & Ronanki, the areas expected to benefit from AI are to "enhance the features, functions, and performance of products," "make a better decision," "optimize internal business operations," and "free up workers to be more creative by automating tasks." In other words, the last benefit mentioned is that in the future, there is a possibility that predominantly human-based intellectual capital will turn into AI-based intellectual capital.

Indeed, what needs to be considered here is whether using AI in areas predicted to be beneficial will bring "guaranteed" success or not. Maybe success can be measured to some extent when speaking at the company level. Yet, when the success

in question is estimated at the company founder's level, that is, when considered at the individual level, it is not easy to evaluate it. Because success is the individual's evaluation according to the degree to which he/she reaches his/her goals determined within his/her context. In this case, it can be claimed that being a successful entrepreneur is contextual (Çitçi et al., 2018). According to Sternberg (2004), successful entrepreneurship is the result of the combination of "analytical, creative and practical intelligence." Sternberg calls it "successful intelligence." Successful intelligence makes it possible for entrepreneurs to accurately evaluate these ideas for products and services by identifying that all the ideas they confront are unequal and the right combination of triple intelligence (Sternberg, 1999). When studying AI types, it can be argued that significant progress has been made from past to present and that it facilitates a step-by-step approach to the right combination of successful intelligence required for entrepreneurship (Fig. 4.1).

When the AI development summarized by Kaplan and Haenlein (2019) above is examined, it is observed that AI can behave almost like a human and exhibit cognitive-emotional-social intelligence features. Thus, it can be said that entrepreneurs can receive AI support in the analytical intelligence and even partially creative and practical intelligence they need to be successful. It is partly because even though AI uses emotional and social intelligence, it still lacks artistic creativity.

This chapter precisely places the reason for its existence here while revealing whether AIS cause a transformation in the field of entrepreneurship. Particularly in recent years, special issues related to AI have been published in major journals in entrepreneurship, and conferences are organized. This situation motivated the author to research what kind of developments AI has generated and will lead to in entrepreneurship. In the chapter, firstly, the possible effect of AIS on entrepreneurship classifications and what developments can be experienced at the macro level within

	Expert Systems	Analytical AI	Human-Inspired AI	Humanized AI	Human Beings
Cognitive Intelligence	x	✓	✓	✓	✓
Emotional Intelligence	x	x	✓	✓	✓
Social Intelligence	x	x	x	✓	✓
Artistic Creativity	x	x	x	x	✓
		Supervised Learning, Unsupervised Learning, Reinforcement Learning			

Fig. 4.1 Types of AIS (Kaplan & Haenlein, 2019: 18)

entrepreneurship have been examined. Then, how entrepreneurs benefit from AIS in the entrepreneurial process, and the kind of a course entrepreneurship education will follow in the light of these developments have been evaluated. Eventually, the transformation points in entrepreneurship research and new research topics that bring the two fields together have been mentioned.

4.2 How Will AIS Affect the Entrepreneurship Classification and the Way Entrepreneurs Do Business?

With Industry 4.0, the digitalization trend that has spread to all areas of life also affects entrepreneurship. Today, the rapid increase in the number of entrepreneurs entering the market by developing digital business models has led to the emergence of a new entrepreneur class who are now defined as "digital entrepreneurs."

"Digital entrepreneurship" refers to entrepreneurship where the use of digital technologies creates the service. The word digital has been employed in the business model to cover entrepreneurs who have recently included AIS such as big data, machine learning, deep learning, and neural network. In other words, the term is used not only for the e-commerce entrepreneur who offers the product or service via the internet but also for those who manage to integrate their AIS into the business model. Digital entrepreneurs are quite different from entrepreneurs in the traditional sense. In their field research, Chae and Goh (2020) stated that digital entrepreneurs' characteristics such as being extroverted and open-minded and active and influential on social media platforms are more prominent, and they found that this particular group showed more effort to benefit from open innovation (Yoo et al., 2012). However, Chae and Goh's (2020) work has an assumption that will attract criticism. Their studies divided digital entrepreneurs into two groups as digital and non-digital in order to examine them in terms of personality, demographics, and social media presence. They also defined sectors such as construction and machine manufacturing as a group with relatively less digital potential. However, in the CB Insights 2020 data, it is seen that companies from the construction sector take first and second place in the list of top 100 AI-based startups. Furthermore, there are four companies from the manufacturing sector on the same list. It would then not be wrong to say that AIS use depends on the entrepreneur's openness to this and the business needs, and that the traditional sector-digitalized sector distinction is gradually becoming meaningless. In the National Venture Capital Association (2020) report, it was confirmed that 285 AI-based startups in the US collected $ 6.9 billion in the first quarter of 2020. While the world struggles with the COVID-19 epidemic and almost all economies are contracting, AI-based startups receive investment, which gives a clue that AI-based startups will gain increasing popularity in many varied sectors.

It would be wrong to say that the concept of "digital entrepreneurship" is the only one representing the industry 4.0 entrepreneur. A group calls the entrepreneurs of the current period "Information entrepreneurs" (Coulson-Thomas, 2003; Kabir,

2018). Entrepreneurs are viewed as the growth dynamics, social change catalyst, and triggers of personal wealth increase in the information economy. Based on this role, the information entrepreneur's primary goal is to create an economic and social value of existing information sources and information asymmetry (Kabir, 2018). When the purpose is defined so, indeed, the most potent tools of recent years are AIS. Primarily in innovation and business model testing, information entrepreneurs can avoid wasting resources by using AIS and can place themselves in a strong position against others through asymmetric power as long as they maintain their ability to use AI. It is stipulated that information entrepreneurs should be distinguished from other entrepreneurs with some features, as in digital entrepreneurs. Kabir (2018) classified the prominent features in his research as agility, flexibility, and the ability to cause disruption.

Another classification made for entrepreneurs in the current period is SMART entrepreneurs. SMART is used both in the literal meaning of the word and as an acronym for Specific, Measurable, Attainable, Relevant, and Time-based words. For instance, Sauer (2012) claims that Smart Cities will create Smart entrepreneurs, while Damian and Manea (2019) emphasizes that with Fintech developments, freelancers are transformed into smart entrepreneurs who spend smartly, save money and make use of venture opportunities. Whatever entrepreneurs of the era may be given, they differ contextually from traditional entrepreneurs. Therefore, a new type of entrepreneurship that emerges should be accepted.

Herein, AIS, the driving force of industry 4.0, will be instrumental in the emergence of a new type of entrepreneur. Besides, it is predicted that there will be many effects on existing entrepreneurship types such as commercial entrepreneurs, social entrepreneurs, women entrepreneurs, internal entrepreneurs, innovative entrepreneurs, etc. These include reducing process costs, expanding market share, and shortening the time to introduce new products. For instance, the impact of AIS will be evident in social entrepreneurship, a type of entrepreneurship that focuses on the social purpose and requires professional management understanding and strategies to survive such as non-profit organizations (Hoogendoorn et al., 2011).

AIS's topics that may affect social entrepreneurship can be summarized as follows: (i) Although social entrepreneurs do not seek profit, they attempt to create business models with low cost and high impact power to survive and perform sustainable impact. Since social entrepreneurs do not have a high income, they often need to find volunteers or low-paying staff. Thanks to AI, the number of personnel they require can be reduced or they benefit from existing personnel more efficiently. (ii) AI can mediate social entrepreneurs to identify their target audience and give them the service/product they want to deliver at a minimum cost. Traditionally, most social entrepreneurship activities focus on specific problems. The addressees of this problem are waiting for their similar needs to be met in various parts of the world. AI can identify these groups' deployment and the optimum solution for how they should receive the service. In another study, Muñoz and Kibler (2016) defined the configurations of local institutional elements that create social entrepreneurship with AI and determined under what conditions social entrepreneurship activities emerge.

Up to this point, the facilitating and productivity-enhancing effect of AI for social entrepreneurship has been mentioned. But AI is also the source of a new difficulty for social entrepreneurship that needs to be solved. The digitalization process, which has accelerated with Industry 4.0, may also cause mass unemployment (Korinek & Stiglitz, 2017) by the 2050s. The unemployed group that emerges in this condition will turn into a disadvantaged group that social entrepreneurs would want to find solutions for. Perhaps, the prospective social entrepreneurs will solve this difficulty with social innovations they will create using their AIS.

4.3 How Will AIS Transform the Big Picture Through Entrepreneurship?

Entrepreneurship is one of the rare areas desired to be developed in almost every sector globally in the world economy. How digitalization, which gained speed with Industry 4.0, caused entrepreneurship development in terms of entrepreneurship types has been discussed in the previous sub-heading. What happens at the macro level, that is, the big picture, will be discussed. Still, before going into detail on this subject, it should be emphasized what digital infrastructure means for today's entrepreneurship. Digital infrastructure involves digital technology tools and systems such as cloud computing, data analysis, online communities, social media, 3D printing, digital production areas that provide communication, collaboration, and/or computing. According to Aldrich (2014), digital infrastructure has led to the entrepreneurship process's democratization due to its capacity to support innovation and entrepreneurship. With the opportunities it offers, the participation of more and more diverse people with different backgrounds in the entrepreneurship process has been ensured. It has been possible to search for opportunities, test product–customer compatibility more efficiently and in a shorter time, and finance and announce initiatives (Hatch, 2013). The alleged democratization is based on assuming that implementing an entrepreneurial project is now much more comfortable and cheaper for everyone. So, is this really the case? So, what is intriguing is whether digital infrastructure opportunities create democratization and equality in entrepreneurship.

When you look at the list of CB Insights 2020 AI companies, it is noticed that although there are companies based in Europe and Asia, USA-based companies dominate the list and make up about 65% of them. This table alone shows that some of them have benefited more from digital infrastructure opportunities in this process.

Indeed, the widespread use of big data opportunities in a region and the increasing interest in taking advantage of these opportunities will transform into a business culture. Thus, new entrepreneurs in that region will have the opportunity to differentiate as a more successful generation than previous entrepreneurs, namely with the uncertainty and relatively increasing rationality that is partially eliminated compared to other generations (Obschonka & Audretsch, 2019). Such advancement can make

it possible to be competitive at the meso and macro level in matters of not wasting country resources, applying them in priority areas, creating clusters, and developing dynamic capabilities. In fact, disrupted entrepreneurship, which expresses a model stemming from the entrepreneurial business system, has started to bring about more comprehensive partnerships with digitization and AIS that develop accordingly. Disrupted entrepreneurship is a model highlighting that the entrepreneurial process is not built on a single person or company and that this process takes place with a natural division of labor among many institutions. Briefly, it emphasizes the distributed dimension of entrepreneurship by citing the role of formal alliances, informal relations, and public institutions surrounding and assisting the entrepreneur. Still, there is no precise decision on this concept to describe the circumstance. It is known that more than one concept is used to reinforce the conceptual contradiction (such as distributed, dispersed, collective, or diffused entrepreneurship) (Bureth et al., 2006).

In summary, it can be assumed that thanks to tools such as AI, entrepreneurship with various suppliers and infrastructure elements conveys a new turn and takes a very different form by shifting from the isolated or one-man-oriented perspective. Indeed, in order to talk about real democratization in a distributed operation, the parts of the whole should not consist of the same actors, but the actors suitable for the context and which even have managed to develop in that context. Nevertheless, it is known that there are major world countries and companies in the construction of domain structures that AIS focus on, and the preparation of algorithms that enable the recording, classification, and processing of big data. Then, although AIS allow positive results at the micro-level, it is not known whether it will increase the development level of countries in the big picture in the long term, but an increase in dependency levels can be predicted. Davenport and Ronanki (2018) argue that the technology used in AI also determines which supplier and infrastructure will be used. Countries that started the first studies on AI and continue their progress systematically in this field and these countries' companies thus gain an essential competitive advantage. It can be claimed that an injustice caused by AI will develop in this direction and will encourage dependency relationships unilaterally (Cheng, 2018).

Indeed, the problem that AIS can cause in the big picture is not only the asymmetric dependency relationships between countries. Another problematic area is ethics. For instance, AI applications are known to make predictions regarding the solution to a problem. So, whose interest is optimized by trying to solve this problem? If entrepreneurs do this to create a business, offer products, and gain customers, the data they use belong to potential and existing customers. Does the use of these data solve the problem by optimizing what customers or governments will gain at least as much as the gains of entrepreneurs? This point raises a major ethical debate (Agrawal et al., 2017). Another ethical problem is that AI can be employed as a pressure and social control tool (Whittaker et al., 2018). Entrepreneurs who develop and apply this technology can take social engineering initiatives and transform from "anticipating behavior to an engineering understanding that holds power to create a mass that moves as desired" (Morozov, 2019). The robust capabilities and potential for abuse of AI technologies that are continually being improved should be considered and their use should be ethically regulated. There are some initiatives in this respect. In

2018, Montréal University announced a statement recommended to be followed in the development of its AIS. While preparing the announced declaration, care was taken to bring together all the influencers and affected stakeholders, and ten basic principles to be followed were accepted (Montréal Declaration for Responsible Development of Artificial Intelligence, 2018).[1] The drafters of the declaration also developed eight recommendations. The proposal that directly concerns entrepreneurship and is directly related to the troubling developments mentioned for the big picture is presented as follows: "*International development of AI*: A non-predatory model of international development should be adopted that aims to include the various regions of the globe without abusing low- and middle-income countries (LMICs)."

Another difficulty AIS will cause is mass unemployment, as mentioned earlier. In their study, Davenport and Ronanki (2018) argued that AIS are useful in three steps, and each step will have varying outcomes in terms of employment. They claim that AI will have adverse consequences for employment by automating processes by designing robotic processes, mainly in industries where offshore outsourcing is widespread, but administrative workers will not be unemployed. But matters not provided for or overlooked is that some of the entrepreneurial activities of developing and less developed countries are based on offshore-based B2B businesses. Then, it can be predicted that these countries will be deprived of not only in terms of employment but also the initiatives that will increase welfare of these countries. The second claim is related to cognitive insights, which is the other usage area of AI, and it is claimed that employment will not be affected negatively since, at this stage, in practice, something beyond human capabilities is already performed by computers. The last claim is cognitive engagement. The requirement to cooperate with humans is evident since it is emphasized that AI's meeting the expectations is very low in interactive decisions. Consequently, according to Davenport and Ronanki, there will be no significant employment loss, and those affected do not need to be taken into account.

Eventually, the problem is that firm-level exit strategies are likely to miss out on macro-level returns. Traditionally, startups appear before investors on the world scale

[1] (1) *Well-being*: The development and use of artificial intelligence systems (AIS) must permit the growth of the well-being of all sentient beings. (2) *Respect for autonomy*: AIS must be developed and used with respect for people's autonomy, and with the goal of increasing people's control over their lives and their surroundings. (3) *Protection of privacy and intimacy*: Privacy and intimacy must be protected from intrusion by AIS and by data-acquisition and archiving systems. (4) *Solidarity*: The development of AIS must be compatible with maintaining the bonds of solidarity among people and generations. (5). *Democratic participation*: AIS must meet intelligibility, justifiability and accessibility criteria, and must be subjected to democratic scrutiny, debate and control. (6) *Equity*: The development and use of AIS must contribute to the creation of a just and equitable society. (7) *Diversity inclusion*: The development and use of AIS must be compatible with maintaining social and cultural diversity, and must not restrict the scope of lifestyle choices and personal experience. (8) *Prudence*: Every person involved in AIS development must exercise caution by anticipating, as far as possible, the potential adverse consequences of AIS use, and by taking appropriate measures to avoid them. (9) *Responsibility*: The development and use of AIS must not contribute to diminishing the responsibility of human beings when decisions must be made. (10) *Sustainable development*: The development and use of AIS must be carried out so as to ensure strong environmental sustainability of the planet.

as they enter the growth phase. A company's valuation increase is a source of income and prestige for both the entrepreneur and the host country. With the use of qualified data sets and AI, investors can have basic patterns concerning the futures of startups to buy startups before they reach high valuations and push entrepreneurs out of the game in a short time. Thus, firm-level strategies may have negative consequences at the macro level.

But for the humanity—AIS relationship, these unfortunate scenarios can be put aside, and "not running out of hope" may be an option. With the measures to be taken, AI and humanity can meet at a common ground that will make it possible to benefit more efficiently from what the world and its institutions offer. For instance, it can be in a country itself or in a region that involves different countries; macro policies can be produced at the country's level and the region with research on entrepreneurial opportunity potential. Sustainable development can be encouraged by using world resources effectively.

4.4 What Can Be the Usage Areas of AIS for Entrepreneurs?

Entrepreneurship's three crucial research issues can be stated as entrepreneurial opportunity, entrepreneurial intention, and entrepreneurial behavior. *Entrepreneurial intention* is described as the belief or wish of a potential entrepreneur candidate to engage in entrepreneurial behavior one day. On the other hand, entrepreneurial opportunity is the driving or attractive force that transforms entrepreneurial intention into behavior. *Entrepreneurial opportunity* mainly refers to more attractive and sustainable business opportunities favorable to entrepreneurship. It relates to circumstances where new products, new services, new raw materials, and new organizational methods can be sold at a higher price than the cost (Miao, 2020). In addition to the view that the entrepreneurial opportunity is related to the entrepreneur's perception and arises depending on it, it is also understood that its existence is considered ontologically independent of the entrepreneur, waiting to be discovered at some point (Araslanov & Zelinskaya, 2018). Both perspectives nourish AI's instrumental power in entrepreneurship. From the first perspective, it can take part in the entrepreneur's opportunity by applying AIS to solve a problem. In the second perspective, an existing opportunity is explored with AIS—e.g., trend analysis with AIS to reveal the opportunity—and the strength of the emerging patterns and the potential can be evaluated. For example, suppose there is an enthusiastic startup to open up to the world and be born global with product x. In that case, various trade data—which may be related to similar or complementary products—can be included in the analysis and provide an idea regarding the right place, time, and sustainability for product x. It will also reduce the risk of failure in entrepreneurial behavior. When increased success rates with AI are shared with the public, entrepreneurial intention development will also be indirectly positively influenced.

Behind the vital role that AI plays in the creation or discovery of entrepreneurial opportunities (Kabir, 2018) lies: i) its ability to be applied in any field from which systematic, standard, and analytical data are obtained, from automotive to the agricultural sector; ii) the fact that most of the machine learning algorithms and many of the source codes of AI agents are open-source; iii) that some AI agents and tools developed for one industry can apply to other areas as well.

Entrepreneurial behavior, one of the entrepreneurship issues mentioned above, emerges when entrepreneurial intent meets entrepreneurial opportunity and enters the market as an active player. AIS are effective not only in terms of entrepreneurial intent and opportunity but also in the creation of entrepreneurial behavior. Davidsson et al. (2018) therefore qualify AIS as "external enablement" for entrepreneurship.

With the realization of entrepreneurial behavior, that is, from the startup stage, entrepreneurs have to struggle with uncertainty and move between stages of the process under conditions of uncertainty (McKelvie et al., 2011). In the process in question, the organization's appropriate organizational form, the business model, being agile, the customers' reaction to existing and new products, the establishment of the price-product feature balance, etc. require focus and all data-based steps in the works on this subject can be more effective with AIS (Chalmers et al., 2020). For example, ensuring product–customer balance is essential to entrepreneurial success (Barringer & Ireland, 2019). Based on this claim, an entrepreneur following his/her sales activities with AI-powered automation can identify customers with hot potential, identify them, and then connect them with the right salespeople as soon as they are ready to purchase goods or services (Chalmers et al., 2020). Yet another example can be given for enterprises with more than one customer segment. AI can identify thousands of customers (Kosinski et al., 2013) and create thousands of message/ad variations that emphasize things that meet their expectations. Of course, what AI can do is not limited to the startup phase, which is the first stop of entrepreneurial behavior. It can also be used at the scale-up stage. For example, AI-based solutions are used for the legal regulations and requirements in financial accounting, which are needed for growth, production and delivery of products in large capacities, providing expanding customer services with growth, recruiting personnel, etc. And these have a mitigating effect on the difficulties entrepreneurs encounter in capturing economies of scale and scope (Chalmers et al., 2020) (Fig. 4.2).

Maybe at this point, giving a more specific example of how AIS are applied in the entrepreneurial process can facilitate understanding of the subject. For this purpose, the business model Ng modeled as above can be examined. The business model explains "how to make money" in the entrepreneurial process. The business model adjusts to the changing nature of the business, depending on the growth stages. According to Ng, if you desire to develop an AI-based business model, you should start with an area that can be successful with AI. Proving that successful results can be achieved with the pilot application instead of making the whole business model based on AI positively affects the stakeholders' acceptance. At this stage, the requirements of AIS can be met by outsourcing, but as the number of works done will increase, and the strategic significance will change over time, an AI team should be established within the company.

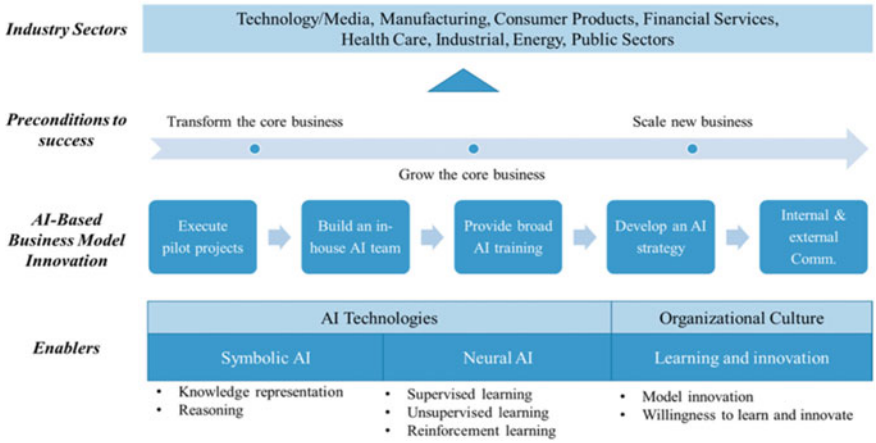

Fig. 4.2 Developing an AI-Based Business Model (Lee et al., 2019: 7)

In the AI-based way of working, organizing training, and raising awareness to increase the alignment of those within the organization with AI should be done as things related to AI will be too important to be left to the AI department alone. From this point on, an organization-inclusive AI strategy is developed. According to some, this should happen much earlier. However, which point of the business model will have strategic importance at what stage may vary from one organization to another. Therefore, time should be given to identify strategic points and develop strategies that can make a difference with AI. Eventually, when an AI-based business model is applied, potential changes and development areas should be distinguished and notified for each stakeholder group that will be affected. Following such a path in developing an AI-based business model will also serve the robust data infrastructure that AIS will require because individuals will comprehend the data's outcomes in the big picture and more readily accept it as a part of the system. In particular, the areas where stakeholders will remain legally and ethically reserved should be disclosed and revealed individually for each stakeholder (Lee et al., 2019; Ng, 2018).

4.5 How Will AISs Affect Entrepreneurship Education?

Entrepreneurship education is one of the other discussion topics in the entrepreneurship literature. While a group of researchers examined personality traits' effects on being an entrepreneur and the entrepreneurial process, assuming that personality traits are determinants in becoming an entrepreneur, some other researchers claim that talents and skills gained later are as essential as personality traits. This second group claim prompted entrepreneurship lessons to start almost at the primary school level and made entrepreneurship education one of the countries' macro policies. The

debate whether one is born an entrepreneur, or it is an acquired skill has not lost its heat until today. The fact that entrepreneurship transformed by AIS, which are a product of Industry 4.0, requires expert knowledge can be interpreted as the second camp will gain power.

At this stage, the curriculum should be revised to increase the ability to use AIS in almost all areas, especially in business/management schools. However, the curriculum change in question depends on the preparation of the academic staff for AIS. University management should encourage entrepreneurship research with AI and allow them to develop themselves in this field (Lévesque et al., 2020).

As it is known, companies have intellectual capital. Intellectual capital increases the potential to be creative, but those who increase intellectual capital power are also a group with managerial costs—workforce motivation and promotion, time for leisure, etc. It is claimed that firms will utilize AI opportunities instead of individuals soon to reduce their costs (Daugherty et al., 2019). Indeed, some researchers make their claims to the point that, over time, AI can completely deduct human intelligence from all equations (Popkova & Sergi, 2020). Looking at the event from a slightly more optimistic perspective, it can be predicted that at least the startup founders will come together as a team, but will build adaptive processes using their AIS in routine work. Potential and existing entrepreneurs' ability to evaluate AI integration's appropriateness with the nature of their business depends on their knowledge and experience in this area. It should be ensured that AI's most preferred application areas, process automation, cognitive insights, and engagement, must be accepted as dynamic capabilities (Davenport & Ronanki, 2018), and which one should be focused on within the scope of the business model must also be decided. Nevertheless, as mentioned earlier, this adaptation depends on the innovation process, business model, and the "AI-based entrepreneurship education" that can combine AI in the operation process.

4.6 How Will AIS Affect Entrepreneurship Research?

Investigations that show how entrepreneurs benefit from AIS in practice:

The transformation of entrepreneurship practices with AI is, of course, a new beginning for researchers in this field. Researchers have started to include "AI usage" and AI variables in their models while searching the entrepreneurial events. In studies on AI and entrepreneurship, it has been questioned how AI plays a role in solving the uncertainty problem (Dubey et al., 2020; Park et al., 2020). As it is known, making decisions and taking risks under uncertainty is the basic assumption for entrepreneurship. Thus, the tools utilized by entrepreneurs to overcome uncertainty and reduce risks have always attracted attention. It is also impressive how AI is applied to overcome uncertainty in financing and innovation processes (Corea, 2019; Montull, 2020). It is envisaged that this interest will continue in the upcoming periods, and other AI effects in the entrepreneurial process will be researched. These studies not only concern academics interested in entrepreneurship, but at the same time, it can

be assumed that entrepreneurs will benefit from the before-mentioned studies' results. For instance, researches are carried out on what venture capitalists and crowdfunding campaigns pay attention to most (Kaminski & Hopp, 2019; Liebregts et al., 2019) and which areas they are directed through the social media footprint, and the conclusions of these studies are of a nature to attract entrepreneurs.

Researchers' use of AIS to understand and explain entrepreneurs and entrepreneurship practices:

As in all social science fields, understanding or explaining a phenomenon/case in entrepreneurship is unfortunately not straightforward due to several causes and consequences. Researchers, accordingly, often need to diversify data while working on a phenomenon/case. At this point, AI enables a researcher to access many data sources and types of data that cannot be obtained due to his/her limited nature. Hence, it can be assumed that AI enables more reliable assumptions concerning entrepreneurship (Maula & Stam, 2019). Besides, the inclusion of AIS in the research processes will make it possible to understand entrepreneurship practices across the country, region, and the world and lead entrepreneurship research with relatively strong explanatory power (Fig. 4.3).

For instance, in their study, Bloh et al. (2020) established a relationship between entrepreneurial activities and media with rich data generation features as in the model given above. According to the model, it is aimed to measure entrepreneurial activities by utilizing techniques such as sample-based surveys, case studies, and process-based data.

The most logical point to benefit from AI in entrepreneurial research is the instrumentalization of AI in ensuring the balance of the research subject and research design emphasized by Maula and Stam (2019). As it is known, in the research concerning entrepreneurship, it is observed that researchers generally start with quite ambitious research questions, except those published in journals that are accepted as "good" in the field, but that over time they tend to be oriented toward a research design from which they can obtain data. This situation has evolved into a chronic problem, especially for researchers in developing countries experiencing serious problems in obtaining data. Researchers can overcome the question-design discord by using AI's feature of using a large amount and variety of data. It also enables us to fulfill the triangulation requirement, which provides a factual basis for explaining claims and contributes to the research's validity and reliability (Lévesque et al., 2020).

For the reasons outlined above, AI can increase the number of quality research, but it can also plague entrepreneurship research. This situation manifests itself as a question mark, mainly in terms of theoretical discussions. It is questioned whether we will demand the theories put forward to generalize based on a small or limited number of observations and increase predictability about the unknown after AI (Lévesque et al., 2020). This is because AI stipulates a solution based on data for a specific domain structure. In this situation, it is more sensible to evaluate the "unique" situation as much as possible instead of making generalizations. Furthermore, developing theories to predict another area may be a futile effort, since unique patterns can be revealed for each situation. In the future, theories will be developed for areas that are perhaps only inherently impossible to obtain data. Haveman et al. (2019) argue that

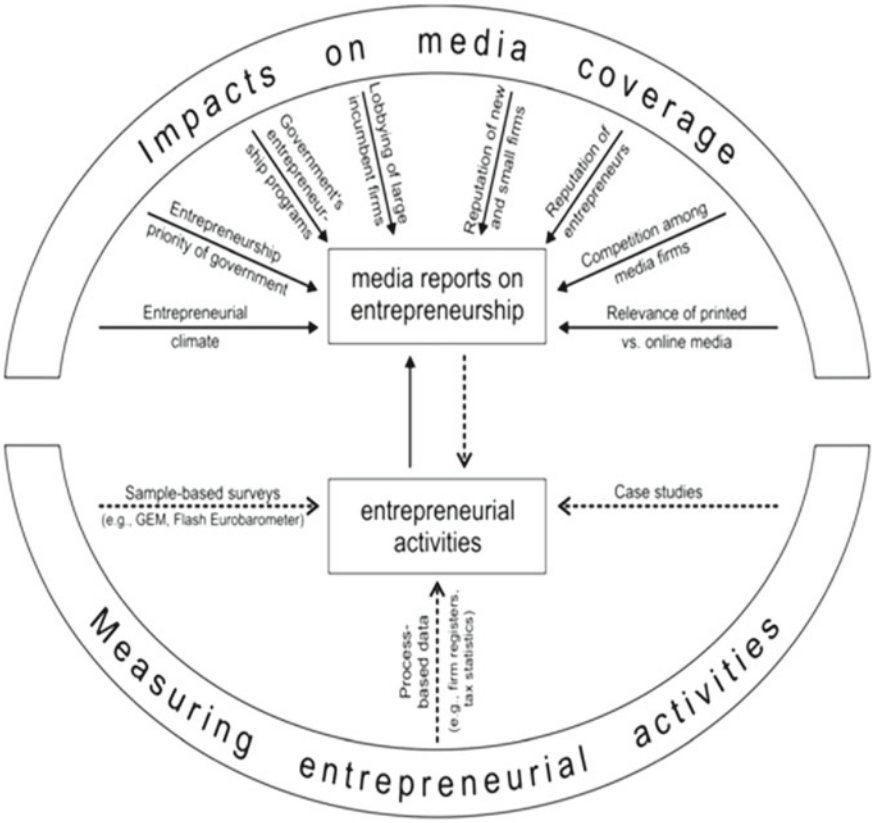

Fig. 4.3 The relationship between media coverage and entrepreneurial activities (Bloh et al., 2020: 676)

even though we have had the opportunity to carry out serious experiments, models, and empirical researches thanks to AI, advancing without theory is not attractive in terms of science; hence, acceptance of AI at the scientific level will be a little slower than in practice. Indeed, these should be considered speculative opinions for now, and step by step, what the time will bring should be followed.

Entrepreneurship researchers can also benefit from AI for their own benefit (Lévesque et al., 2020). Patterns can be determined by analyzing which subjects primarily "good" journals focus on from time to time, what is on the agenda in entrepreneurship, and publications with a higher probability of publication can be produced.

In brief, two main contributions of the research made using AIS to the field can be mentioned: (i) The use of new information and data sources emerging with AI and thus *advancing the data frontier*, (ii) Applying new techniques to existing data

and/or problems thanks to AI and thus *advancing the knowledge frontier* (Prüfer & Prüfer, 2019). In other words, smart machines and algorithms will not only transform the entrepreneurial phenomenon but also affect both the research subjects and the way they are studied.

4.7 What Will AIS and Entrepreneurship-Based Research Questions Be? Curious Topics…

Entrepreneurship is one of the most popular fields in the social sciences. Lately, journals in entrepreneurship have been publishing special issues and cover studies where AIS and entrepreneurship meet. It is not difficult to guess that the studies, which have never lost their popularity with AIS, the popular subject of today, and where entrepreneurship intersects the leading actor institution of capitalism, will be on the agenda for a long time. Considering the points of curiosity, the research topics of the immediate future can be predicted as follows:

- Women entrepreneurship and AIS: There is curiosity regarding how Industry 4.0, digitalization, and use of AIS will change the position of "women" in entrepreneurship. As it is known, the concept of "entrepreneur" is masculine in the field of traditional entrepreneurship. When women tackle this job, they are subjected to a particular classification as "woman entrepreneur" (Çitçi & Sağır, 2017). Several positive discrimination policies are applied to women entrepreneurs worldwide for them to attain a place in the system, and thus an effort is made to "lead the way for women." Still, it is hard to say that expected development in women's entrepreneurship has been achieved. One of the critical reasons for this is that women's role in social culture has not changed. Thus, it is a matter of curiosity about whether industry 4.0 and its tools will lead to a change in entrepreneurship in terms of gender. In their research, Chae and Goh (2020) found no transformation in digital entrepreneurship in favor of women yet. Perhaps, when a similar study is repeated 5–10 years later, the indicator may change in favor of women.
- Entrepreneurial process and AIS: As mentioned above, there are determinations and predictions that AIS can be used in various fields of entrepreneurship. Although it is claimed that AIS have serious potential in achieving efficiency in entrepreneurship, the number of studies revealing at what level and stage entrepreneurs use their AIS in reality/practice is relatively low. For instance, what AIS practices are used and effective in creating/exploring entrepreneurial opportunities in the product, technical, and market innovation (Miao, 2020) can be investigated.
- Scaling and AIS: Could the inadequate or high cost of the expert labor force in AI make startup and scaling activities challenging? Or can the cost incurred in this regard be considered a bearable one since it increases the possibility of opening to large markets with big data analyses? Field studies can be performed to get the answers to these questions and contribute to the entrepreneurship literature.

- Entrepreneurial potential and AIS: It is suggested in the literature that AI can be used as a tool to determine entrepreneurial potential (Lévesque et al., 2020). By analyzing data sets across the country, region, and the world, entrepreneurship areas can be determined, and the probability of success can be increased by producing appropriate resource policies. However, questions like "How can the characteristics, background and contextual data of individuals be determined completely and comprehensively," "Even if determined, is it possible to access them as a regular data set," and "Does the high entrepreneurial potential constitute a guarantee that the individual will be a successful entrepreneur?" still exist. Yet, the reality is that if robust entrepreneurship data from around the world are compiled, efficient use of macro-level resources and the simultaneous evolution of economies may be possible.
- Entrepreneurial context and AIS: What kind of contexts AI is suitable for can also be one of the research topics. Context includes industry, size and age of the firm, and many elements that shape the venture. Research may be conducted to identify contexts in which it is advantageous to meet with AI as early as possible. In this way, it will be possible to develop more consistent and result-producing intra-organizational and macro policies.
- Entrepreneurial ecosystem and AIS: It is predicted that the digital infrastructures that entered our lives with Industry 4.0 and the new socio-technical processes developing with them will create new practices and institutional arrangements in the field of entrepreneurship (Nambisan, 2017). The increase in the number of digital entrepreneurs and the increased use of AI as a result of the big data in the digital economy order will transform the existing entrepreneurship ecosystem and generate new concepts that explain its context and new actors of the context. In the future, institutions that are included in the ecosystem based on institutional theory can be scrutinized. Sussan and Acs (2017) took the first step in this matter. In their study, in which they investigated the digital ecosystem and the intersection cluster of the entrepreneurial ecosystem, they suggested that the digital entrepreneurial ecosystem can now be mentioned. They stated that the four important actors of this ecosystem are digital user citizenship, digital marketplace, digital infrastructure governance, and digital entrepreneurship. This study can be accepted as an introductory study, and other actors and institutions of the digital entrepreneurial ecosystem can be determined.
- The relationship between uncertainty and entrepreneurship and AIS: Depending on the use of AIS, the uncertainty becomes specific (Obschonka & Audretsch, 2019). In this case, the definition of the concept of entrepreneurship, which has been defined as "taking risks and entering the market under uncertainty conditions" for more than a hundred years, may change. It will be beneficial for researchers to conduct interviews with entrepreneurs to investigate the uncertainty dynamics and effects after AIS in order for the theory meets the practice.
- Disruptive creative entrepreneurs and AIS: This section focuses on how AIS transform entrepreneurship. However, entrepreneurs who are valued as one of society's transformative forces and even described as destructive creators (Schumpeter, 1934) can create a similar effect in the field of AI over time. In the coming years,

entrepreneurs' transformative activities on this subject may also be the subject of research.

- Entrepreneurship research and AIS: What types of AIS can be developed to be used in studies investigating the entrepreneurs of the future, how inductive and deductive entrepreneurship research will be affected by AIS can also be the subject of the research (Obschonka & Audretsch, 2019).

4.8 Should We Call It the End or the Beginning…?

As a result of the studies that could and could not find a place for themselves above, what can be said about AI is that AI can be the magic mirror as stated in the studies of Kaplan and Haenlein (2019). When the evil queen in the fairy tale of Snow White and the Seven Dwarfs asks, "Mirror, mirror on the wall, who is the fairest of them all?", what the mirror does is no more than scan a distant data set according to the beauty criteria coded for it (i.e., white skin like cotton, red lips like cherry and black hair like ebony according to the beauty understanding of the period). The mirror does not do anything wrong in this tale; what is done is a detailed scan in line with the commands entered into it. But what matters here is who has the mirror. Likewise, the outcomes of using AI in entrepreneurship depend on who uses it for what purpose. Since AI-supported applications will not create equal opportunities and results for all parties, the power balance between developed-developing countries, business entrepreneurs-investors, women entrepreneurs, social entrepreneurs, and commercial entrepreneurs should be monitored. In cases where the same side continually wins, progresses, and writes the tale's continuation, asymmetric power relations will be permanent, and even AIS will be the source of new inequalities.

References

Agrawal, A., Gans, J., & Goldfarb, A. (2017). How AI will change the way we make decisions. *Harvard Business Review*.

Aldrich, H. (2014). *The democratization of entrepreneurship? Hackers, makerspaces, and crowdfunding*. Annual Meeting of the Academy of Management, Philadelphia, August 2014.

Araslanov, R. K., & Zelinskaya, A. B. (2018). Government support of social entrepreneurship development: Institutional and methodological aspect. *Amazonia Investiga, 7*, 121–129. https://doi.org/10.4337/9781781004432.00018

Barringer & Ireland. (2019) *Entrepreneurship*. Pearson.

Bloh, J., Broekel, T., Özgun, B., & Sternberg, R. (2020). New(s) data for entrepreneurship research? An innovative approach to use big data on media coverage. *Small Business Economics, 55*(3), 673–694.

Bureth, A., Pénin, J., & Wolff, S. (2006). *Entrepreneurship in biotechnology: The case of four start-ups in the Upper-Rhine Biovalley* (WP2006-21). University Louis Pasteur, Strasbourg.

CB Insights 2020. https://www.cbinsights.com/research/artificial-intelligence-top-startups/. Accessed on 26 July 2020.

Chae, B. K., & Goh, G. (2020). Digital entrepreneurs in artificial intelligence and data analytics: Who are they? *Journal of Open Innovation: Technology, Market, and Complexity, 6*(3), 56.

Chalmers, D., MacKenzie, N. G., & Carter, S. (2020). Artificial intelligence and entrepreneurship: Implications for venture creation in the fourth industrial revolution. *Entrepreneurship Theory and Practice*. https://doi.org/10.1177/1042258720934581.

Cheng, M. (2018). *How startups are grappling with the artificial intelligence talent hiring frenzy*. https://www.inc.com/michelle-cheng/how-startups-are-grappling-with-artificial-intelligence-talent-hiring-frenzy.html

Choudhury, P., Starr, E., & Agarwal, R. (2018). *Machine learning and human capital: Experimental evidence on productivity complementarities*. Harvard Business School.

Çitçi, U. S., & Sağır, P. M. (2017). Potansiyel erkek girişimcilerin perspektifinden kadın girişimciliği. *Kadın/Woman 2000, 18*(1), 41–62.

Çitçi, U. S., Öztürk, O., & Dinçer, M. M. (2018). Girişimcinin perspektifinden kendi girişimsel başarı değerlendirmesi ve bağlam tartışması. *İşletme Bilimi Dergisi, 6*(3), 153–174.

Corea, F. (2019). AI and venture capital. In *An introduction to data* (pp. 101–110). Springer.

Coulson-Thomas, C. (2003). *The knowledge entrepreneur: How your business can create, manage and profit from intellectual capital*. Kogan Page Publishers.

Damian, D., & Manea, C. (2019). Causal recipes for turning fin-tech freelancers into smart entrepreneurs. *Journal of Innovation & Knowledge, 4*(3), 196–201.

Daugherty, P. R., Wilson, H. J., & Chowdhury, R. (2019). Using artificial intelligence to promote diversity. *MIT Sloan Management Review, 60*(2), 1.

Davenport, T. H., & Ronanki, R. (2018). Artificial intelligence for the real world. *Harvard Business Review, 96*(1), 108–116.

Davidsson, P., Recker, J., & von Briel, F. (2018). External enablement of new venture creation: A framework. *Academy of Management Perspectives*.

Desai, S. (2019). *Artificial intelligence and entrepreneurship: Some thoughts for entrepreneurship researchers*. Edward Elgar.

Dubey, R., Gunasekaran, A., Childe, S. J., Bryde, D. J., Giannakis, M., Foropon, C., … & Hazen, B. T. (2020). Big data analytics and artificial intelligence pathway to operational performance under the effects of entrepreneurial orientation and environmental dynamism: A study of manufacturing organisations. *International Journal of Production Economics, 226*, 107599.

Hatch, M. (2013). *The maker movement manifesto: Rules for innovation in the new world of crafters, hackers, and tinkerers*. McGraw-Hill.

Haveman, H. A., Mahoney, J. T., & Mannix, E. (2019). Editors' comments: The role of theory in management research. *Academy of Management Review, 44*(2), 241–243. https://doi.org/10.5465/amr.2019.0034

Hoogendoorn, B., Pennings, E., & Thurik, R. (2011). *A conceptual overview of what we know about social entrepreneurship* (EIM Research Reports). The Netherlands. Retrieved May 24, 2015, from http://www.entrepreneurship-sme.eu/pdf-ez/H201114.pdf

Kabir, N. (2018). Entrepreneurship process in the era of artificial intelligence. In *Conference: 6th International Conference on Innovation and Entrepreneurship*: ICIE 2018. Washington, DC.

Kaminski, J. C., & Hopp, C. (2019). Predicting outcomes in crowdfunding campaigns with textual, visual, and linguistic signals. *Small Business Economics, 55*, 627–649.

Kaplan, A., & Haenlein, M. (2019). Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. *Business Horizons, 62*(1), 15–25. https://doi.org/10.1016/j.bushor.2018.08.004

Korinek, A., & Stiglitz, J. E. (2017). *Artificial intelligence and its implications for income distribution and unemployment*. National Bureau of Economic Research.

Kosinski, M., Stillwell, D., & Graepel, T. (2013). Private traits and attributes are predictable from digital records of human behavior. *Proceedings of the National Academy of Sciences of the United States of America (PNAS), 110*(15), 5802–5805.

Lee, J., Suh, T., Roy, D., & Baucus, M. (2019). Emerging technology and business model innovation: The case of artificial intelligence. *Journal of Open Innovation: Technology, Market, and Complexity, 5*(3), 44.

Lévesque, M., Obschonka, M., & Nambisan, S. (2020 (in press). Pursuing impactful entrepreneurship research using artificial intelligence. *Entrepreneurship Theory and Practice.* https://doi.org/10.1177/1042258720927369.

Liebregts, W., Darnihamedani, P., Postma, E., & Atzmueller, M. (2019). The promise of social signal processing for research on decision-making in entrepreneurial contexts. *Small Business Economics, 55*, 589–605.

Maula, M., & Stam, W. (2019). Enhancing rigor in quantitative entrepreneurship research. *Entrepreneurship Theory and Practice, 44*(6), 1059–1090. https://doi.org/10.1177/1042258719891388

McKelvie, A., Haynie, J. M., & Gustavsson, V. (2011). Unpacking the uncertainty construct: Implications for entrepreneurial action. *Journal of Business Venturing, 26*(3), 273–292.

Miao, Z. (2020). The influence factors of psychological understanding and behavior choice for legal industry entrepreneurs based on artificial intelligence technology. *Frontiers in Psychology, 11*, 1615. https://doi.org/10.3389/fpsyg.2020.01615

Montréal Declaration for Responsible Development of Artificial Intelligence. (2018). https://ai.quebec/wp-content/uploads/sites/2/2018/12/News-release_Launch_Montreal_Declaration_AI-04_12_18.pdf. Accessed on 6 September 2020.

Montull, L. (2020). Artificial intelligence based decision making for venture capital platform. In *Decision support systems X: Cognitive decision support systems and technologies: 6th International Conference on Decision Support System Technology, ICDSST 2020, Zaragoza, Spain, May 27–29, Proceedings* (p. 136). Springer Nature.

Morozov, E. (2019). Capitalism's new clothes. *The Baffler*.

Muñoz, P., & Kibler, E. (2016). Institutional complexity and social entrepreneurship: A fuzzy-set approach. *Journal of Business Research, 69*(4), 1314–1318. https://doi.org/10.1016/j.jbusres.2015.10.098

Nambisan, S. (2017). Digital entrepreneurship: Toward a digital technology perspective of entrepreneurship. *Entrepreneurship Theory and Practice, 41*(6), 1029–1055.

National Venture Capital Association. (2020). http://enterprisetalk.ondot.media/featured/ai-startups-break-all-records-during-the-q1-of-2020/. Accessed on 1 September 2020.

Ng, Y. (2018). *AI transformation playbook*. https://landing.ai/ai-transformation-playbook/. Accessed on 2 September 2020.

Obschonka, M., & Audretsch, D. B. (2019). Artificial intelligence and big data in entrepreneurship: A new era has begun. *Small Business Economics, 55*, 529–539.

Park, H. Y., Cho, I. H., & Keum, B. (2020). Entrepreneurship and foresight in AI and Big Data: Strategies and policies for shaping the future of the AI market. In *International Conference on Technology and Business Management June* (Vol. 12, p. 14).

Popkova, E. G., & Sergi, B. S. (2020). Human capital and AI in industry 4.0. Convergence and divergence in social entrepreneurship in Russia. *Journal of Intellectual Capital, 21*(4), 565–581.

Prüfer, J., & Prüfer, P. (2019). Data science for entrepreneurship research: Studying demand dynamics for entrepreneurial skills in the Netherlands. *Small Business Economics, 55*, 651–672.

Sauer, S. (2012). Do smart cities produce smart entrepreneurs? *Journal of Theoretical and Applied Electronic Commerce Research, 7*(3), 63–73.

Schumpeter, J. (1934). *Capitalism, socialism, and democracy*. Harper & Row.

Schwab, K. (2017). *The fourth industrial revolution*. Crown Business.

Sternberg, R. J. (1999). A propulsion model of types of creative contributions. *Review of General Psychology, 3*(2), 83–100.

Sternberg, R. J. (2004). Successful intelligence as a basis for entrepreneurship. *Journal of Business Venturing, 19*(2), 189–201.

Sussan, F., & Acs, Z. J. (2017). The digital entrepreneurial ecosystem. *Small Business Economics, 49*(1), 55–73.

Taddy, M. (2018). *The technological elements of artificial intelligence*. National Bureau of Economic Researcho.

Whittaker, M., Crawford, K., Dobbe, R., Fried, G., Kaziunas, E., Mathur, V., Myers, S., Richardson, S., Schultz, J., & Schwartz, O. (2018). *AI now report 2018*. AI Now Institute at New York University.

Yoo, Y., Boland, R., Lyytinen, K., & Majchrzak, A. (2012). Organizing for innovation in the digitized world. *Organization Science, 23*, 1398–1408.

Umut Sanem Çitçi associate professor of management and strategy at Izmir Bakircay University. She is the Vice President of the Department of Business Administration and the Head of the Department of Management-Organization at Izmir Bakircay University. Çitçi's research areas are entrepreneurship, women entrepreneurship, and social entrepreneurship, and her major field of study is the effect of social networks on entrepreneurship. Her master's thesis subject is "The effects of social network on entrepreneurial success: A Research Based on the Views of Weber, Schumpeter and Knight"; Ph.D. dissertation topic is "Social Networks as An Instrument for Repositioning the Manager in the Organizational Theories." Recently her published articles: "Internationalization option as a growth strategy in family businesses: a qualitative research" (2020); "The impact of social capital and self-efficacy on international career intention" (2020); "Can the solution of fragility be 'innovation'? Fragile five analysis" (2020). She is also coauthor of books titled "Globalization and International Business" and "Case Studies in Health". ÇİTÇİ received her doctorate degree from Sakarya University. After working as an Assistant Professor at Sakarya University for 5 years, she started to work as an associate professor at Izmir Bakircay University. She currently teaches entrepreneurship, social entrepreneurship, and management courses in undergraduate and graduate curricula.