

A Systematic Review on Augmented Reality and Entrepreneurship

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Abstract-- Augmented reality interactive technology has been studied widely over the last decade, with a growing number of organizations and users in conjunction. Augmented reality technology is based on computer-generated images on a user's view of the real world. Keeping in view, augmented reality in the context of entrepreneurship is still scarce that needs to be explored to know the necessities in the study. This study aims to contribute empirically and theoretically to presenting the broader landscape of augmented reality trends in entrepreneurship studies. It summarizes the contributions from each category of studies and discusses the most influential studies. A systematic literature review was conducted on augmented reality in entrepreneurial studies from 1970 to 2020. A total of 28 papers have been reviewed. Twelve papers were selected that were classified based on users' intention toward an innovative business model with the support of theoretical underpinning. It organizes research areas with a few augmented reality studies and future research opportunities in creative entrepreneurial activities. There is a growing trend of augmented reality toward new ventures as most users feel motivated to interact with virtual objectives in the real world. This study would be helpful for entrepreneurs and academicians to understand the practices of augmented reality in designing new business ventures.

Index Terms—Augmented reality, entrepreneurship, innovation, intention, technology

1 INTRODUCTION

AUGMENTED reality is a new concept of the digital medium as it is not popular with customers. Still, the increasing trend of augmented reality resulted in the likeness and attraction of customers. People are more interested in visualizing the products before making a purchase decision. Therefore, augmented reality advances technology and increases competition among innovators, entrepreneurs, marketers, and advertisers. The adoption of augmented reality for businesses is broadly covered in management literature from a competitive edge and increasing customers' buying intention (Haumer et al., 2020). Researchers have studied augmented reality in conjunction with innovation (Assante et al., 2019), information technology (Gotow et al., 2020), and marketing (Scholz and Smith, 2016). However, augmented reality's role in executing entrepreneurial activity is a relatively new area of research. The researchers suggest future research lines to increase the understanding of augmented reality under entrepreneurship. Indeed, the theoretical works on augmented reality are scattered. Researchers pay more attention to ideas rather than theorizing the adoption of augmented reality as a business tool for entrepreneurs. It changes the whole concept of marketing to visualization before purchase intention. Augmented reality relates to entrepreneurship in many fields of daily routine life. Like it occupies the education, automotive, defense, travel and tourism, and healthcare departments. The text, images, tutorial videos, and context are scanned to get the curriculum lessons in education. Besides this curriculum, the entrepreneur also focuses on co-curricular activities like sports, gaming, travel, and tourism to be embedded in the emerging technology. By scanning them, real-time information about specific places, buildings, or locations can be found in travel and tourism. This development made the

tourists find new sites and get information about the new places to explore. Thus, gaining and retaining customers has changed, bringing more difficulty for innovators. The use of automotive augmented reality helps the customer have a real-time test drive of the luxurious cars they will purchase.

In the previous era, technology needs enhancement in the digital system. The industrial revolution brought many changes to businesses, marketing, advertising, and entrepreneurship. It completely changed the concept of technology and innovation into digitalization. Digitalization plays a vital role in the advancement of this era. Augmented reality (AR) is the most focused part of this era as the fourth generation of industrialization moves towards it. Augmented reality enforces the new learning mechanism trends in technology, education, innovation, construction, marketing, advertisement, entrepreneurship, or space technology. Augmented reality visualizes the things in the real world with computer-generated images and perception. It is the real-time interaction with the actual things without having them through 3D visualization. Mauroner and Best (2016) defined communication among the customers. The brand has been increased by advancing the technology in which augmented reality beneficially enhances integrated marketing and provides various ways to experience marketing tools to improve this communication. In this sense, augmented reality completely changes the whole concept of the world's perception in the customer's mind. According to Kim et al. (2009) and Bakar et al. (2015), companies are trying to attract customers through the content that stands out in advertising the message about the product, thus facing competitive advantage problems. Due to this technological advancement, the competition among the marketing channels and entrepreneurs increased. Yaoyuneyong et al. (2016) defined advancement in technology brings many changes in marketing, and new

ways are introduced to target the audience through augmented reality. Thus, augmented reality has become a significant part of advertising techniques.

The startups have a massive effect on the economy. The failure boosts the level of confidence in the entrepreneur. The entrepreneurs come out with different and innovative ideas to be obsessed with the economy. Innovation and entrepreneurship remain not as simple as before after technological advancement. In the early days, entrepreneurship is not as simple as that. Time and money management, marketing tools, and survey are tough to get and retain customers. The customers preferred choosing the product as beneficial for more extended use. The competition among the entrepreneurs exceeded to an extent by bringing awareness among the customers with the technology. A part added that augmented reality could grab potential customers (Baratali et al., 2016) over other marketing brands and appeal to consumer buying behavior.

Notably, augmented reality and entrepreneurship studies are still few and fragmented, especially in the management sciences. The empirical investigation of the relationship between augmented reality and entrepreneurship remains eclipsed in academic literature. Hence, the systematic review of the literature presents the value and significance of augmented reality in entrepreneurship. Thus, the dearth of literature discussed the extent to which budding and experienced entrepreneurs consider the augmented reality field a new opportunity for a startup. This study provides direction to researchers from the entrepreneurship field to study the augmented reality construct as an antecedent, mediator, and moderator.

This study sought the following questions on augmented reality and entrepreneurship. (1) Which areas of augmented reality as a tool for entrepreneurship research have been conducted? (2) What research methodologies are being adopted to research augmented reality in various entrepreneurship fields? (3) What theories, construct, and dimensions are used to research augmented reality across multiple entrepreneurship fields? (4) What are the theoretical and empirical research gaps in augmented reality in various entrepreneurship fields?

This paper contributes in the following way: First, by conducting desk research on the Web of Science (WoS) to study published work on augmented reality and entrepreneurship; second, by identifying the factors discussed in scholarly work related to augmented reality and entrepreneurship. In this sense, this paper presents a more in-depth view of augmented reality and entrepreneurship studies. The subsequent section provides the research methodology used for systematic review, results extracted from literature analysis, and depicts frequency-related findings, discussion, and future research lines. The last section presents a brief conclusion.

2 OVERVIEW OF AUGMENTED REALITY

Azuma (1997) defined augmented reality as a combination of real and virtual objects that interact directly with the viewer in the real environment and covers all the real features of the experience. Zhou et al. (2008) defined augmented reality as technological advancements that showcase images designed by digital devices to be obsessed over real situations in actual time-space. As augmented reality is becoming the most popular and innovative way of conveying the message to customers, the social acceptance of augmented reality is also increased. The issues facing old-age marketing also raise the social acceptance of augmented reality. Augmented reality enhances the new way of living by actual interaction with the things in the real world. This augmented reality experience is taken through digital apps like mobile devices, laptops, and even smart glasses.

Wafa and Hashim (2016) mentioned two major types of augmented reality: marker-based and marker-less augmented reality. Imbert et al. (2013) suggest that marker-based augmented reality needs an actual and specific place to present the image of 3D objects favorably in an existing world time frame, while Baratali et al. (2016) suggest that marker-less augmented reality uses a GPS location finder to point out the objects in the real world to convey the information of 3D object through smart devices. Indeed, augmented reality is the progression in technology that imposes virtual objects over real images that can be watched through smart digital devices in real-time (Ludwig and Reimann, 2005).

In addition to this progression in technologies, Behzadan and Kamat (2009) argued that augmented reality covers different channels and domains like building or construction, engineering, medication industry, military intelligence, automobile industry, space sciences, and animation field for the enhancement of virtual objects with the real world. Woodward et al. (2010) stated that "at some advanced construction sites, 3D/4D Building Information Models (BIMs) are starting to replace paper drawings as reference media for construction workers". By remaining in the real or actual world, technology's digitalization brings so much comfort to customers' lives to get in touch with virtual objects through visual images or videos. Augmented reality is accessed in various ways. Initially, it is used through QR codes and a webcam. Later, digital technology, 3D graphics, and animated videos take advantage of a better user experience. Altogether, advanced mobile applications have taken over the technology and made usage more comfortable and user-friendly. Schall et al. (2008) described smart devices augmented reality system for seeking the outdoors security checking and basement framework following advanced technology use in security checking and tracing. Augmented reality aims to simplify the customers' life by using virtual images, sounds, texts, and videos in real-world experience.

Augmented reality is uplifted to the next level in the field of marketing. It has faced challenges in the last few decades but

has taken over traditional advertising due to social acceptance. Marketers are now considering augmented reality technologies more innovative than advertising on different platforms. It directly affects the customer buying and re-purchase intention. The augmented reality uplifted the buying intention of the customer. Yaoyuneyong et al. (2016) suggested that augmented reality technologies are very interactive to grab the customers' attention. Given the impressive feedback on customer retention, augmented reality techniques should be used to reach customers. According to Scholz and Smith (2016), augmented reality has a favorable combination of circumstances and has a distinct entity formed with integrated marketing communications programs that encourage the customer to share their ideas through posting on social media and word-of-mouth marketing of the product that delivers the interesting message by using augmented reality, hence achieving the goal of advertising in the competitive world. The integrated marketing techniques ensure that all the marketing tools are correctly linked to convey the message to the customer. All promotional tools like ads, brochures, billboards, above-the-line methods, digital, social, and print media are synchronized to deliver the same message to the customer. Augmented reality has taken charge of integrated marketing communication and collaborated to provide a cost-effective and memorable message for the customer. Augmented reality is in the transition phase, shifting from laboratory to consumer markets (Daponte et al., 2014). Indeed, mobile apps' usage expands the need to depict innovation and close customer interaction. However, this stance is supported by developers and companies due to the effective use of smart devices (Yussof et al., 2019). In conquering this, augmented reality brings opportunities for budding entrepreneurs to establish a startup in the marketing field.

2 OVERVIEW OF ENTREPRENEURSHIP

Entrepreneurship is the act of being your boss. It is the process of recognizing people's needs and wants and making them potential customers. This is done by creating a product that fulfils people's needs and wants and generating income. The entrepreneur is the person who initiates the process of earning income by becoming one's boss. Entrepreneurship is like administrative, opportunistic, product, technology, acquisitive, incubation, services, imitative, public, private, and mass entrepreneurship. Technological entrepreneurship is very advanced in this industrialization era. Nichols and Armstrong (2003) defined entrepreneurship as a business full of risks that require innovation in its management skills and organizational culture to enhance its technology.

Entrepreneurial activities are the driving force for the economy after the globalization of the world. The focus of entrepreneurial activities is technological advancements due to globalization and its impact on different socio-economic regions. How, why, and when globalization is affected and what are the reasons are under discussion. Garud and

Karnøe (2003) demonstrated that the technological amendment by innovators and entrepreneurial mindsets in technological pathways conceptually changes the whole technology concept and pops up with new and innovative extensions. Liu et al. (2005) contended that strategies make the most available resources and maximize the opportunities to improve the entrepreneur's technology. The entrepreneur thinks critically and differently. Looking at the options is far different for bringing technological improvements and creating new pathways for advancement. This kind of behavior brings a lot of technological expansion and leads to globalization. With time, the needs of the customers increase accordingly. The entrepreneurs have an in-depth look at these emerging needs and demands, so the improvement in technology to meet these customers' needs and demands. In conquering this, creating value for the product and capturing value from the market are two main ventures that help the growing entrepreneurs enhance the market via technological improvement.

3 ASSOCIATION BETWEEN AUGMENTED REALITY AND ENTREPRENEURSHIP

Augmented reality has a great demand in emerging globalization. Hence, this innovative technology requirement has been increasing daily in every field. Entrepreneurs are focusing on using such progressive technologies to gain a competitive advantage. Therefore, augmented reality marketing and ideas are effective for customer attraction and are highly in demand. Augmented reality significantly impacts situational activities as they expand, are systematically organized, and set fixed according to the requirement of the situation to attract customer attention (Hilken et al., 2018). The researchers have noted that augmented reality advertising is more effective than any other technique. It imparts an image on consumers' minds that enforces purchase intention. Educationists use augmented reality to make things easy and benefit from learning new concepts in this emerging era. According to Yamazaki and Kayes (2004), augmented reality is majorly used in cross-cultural studies to enhance the bookish approach to learning new competencies, thus enabling scholars to understand other cultures better. Therefore, the learning standards have been raised. In conquering this, augmented reality is a much-needed tool in managing the educational system. Kolb and Kolb (2009) demonstrated that augmented reality is a more desirable tool in training and workshops for better learning and practical hands-on experience of the real situation. Besides curriculum, augmented reality is playing its part in other co-curricular segments.

Technology plays a vital role in sports. With the globalization of the industry, video games have become so progressive that they demand customer engagement. Augmented reality is embedded in sports because users are addicted to games based on digitalization or augmented reality. Lee et al. (2011) and Kim et al. (2009) trace baseball

players' positions on the field through augmented reality. But their demand is not reported as much as expected.

Augmented reality is operated in the management and promotion of products and for serving customer needs. Smink et al. (2019) reported that the benefits of using augmented reality marketing techniques are not ignorable. They show impressive customer satisfaction and retention results, keeping the brand image high with low uncertainty. Teece et al. (1997) argued that a slight technological change brings remarkable progress in its abilities and increases competency. In this era of conversion, globalization, and digitalization, the firms' competition has risen to limitless boundaries. Every firm tried to win the race in technology. The more advanced the technology, the more attractive it is for the customers. That is why the demand for augmented reality in the entrepreneurial field is amplified. Gick (2002) contended that entrepreneurial innovation towards augmented reality is considered a debt that can be pay-off when resources and abilities combine to generate a handsome revenue in the upcoming future. The world is transforming toward technology. Due to this, the implementation of augmented reality is increased up to the mark.

4 METHODOLOGY

The explanation of the paper is given in the form of a systematic literature review (SLR). The descriptive study has many alterations in examining data, calculation of results, and data integration based on the narrative review (Green et al., 2001; Xiao and Watson, 2019). However, the authors' main target is scoping review to get relevant and absolute information and a complete overview of the literature review, discussion, methodology, findings, analysis, variables, and all other vital heads. Therefore, to ensure the quality of the research paper, the scoping review claimed to be completely relevant; otherwise, the paper's quality is not highlighted. Hence, despite the limitations and inadequacy in the association between augmented reality and entrepreneurship, scoping review is the most appropriate method that deeply meets the study's purpose.

The researcher focused on using the right data from the right paper to avoid excluding paper challenges. According to Irshad and Rambli (2014), research data is collected through the iterative assortment method; however, removing the blog posts and news reports to keep the literature review from realistic and most authentic resources helps in finding out the most relevant results that are further refined and analyzed by this method to maintain the best quality. To avoid uncertainty and doubt, keywords are used as filters to find relevant research. Articles containing augmented reality and entrepreneurship are selected based on increasing trends and issues.

4.1 The Process

The main intention is to establish an integral overview of increasing issues and augmented reality and entrepreneurship trends, claiming confirmation to fill research gaps. In the following subsections, the four steps describe the systematic literature review that is categorized as follows.

4.1.1 Step 1: Planning

First, to conduct a systematic literature review, planning is the most essential and critical step. Due to challenging research, Scopus and Web of Science databases are used for systematic literature review. The duration of the database review was committed within fifty years, from 1970 to 2020.

4.1.2 Step 2: Research Scope

In the second step, answerable research questions led to the research scope. The focusing medium and literature research has been outlined in the initial correspondence. Then the following questions on augmented reality and entrepreneurship are designed:

Q1: Which areas of augmented reality as a tool for entrepreneurship research have been conducted?

Q2: What research methodologies are being adopted to research augmented reality in various entrepreneurship fields?

Q3: What theories, construct, and dimensions are used to research augmented reality in various entrepreneurship fields?

Q4: What are the theoretical and empirical research gaps in augmented reality in various entrepreneurship fields?

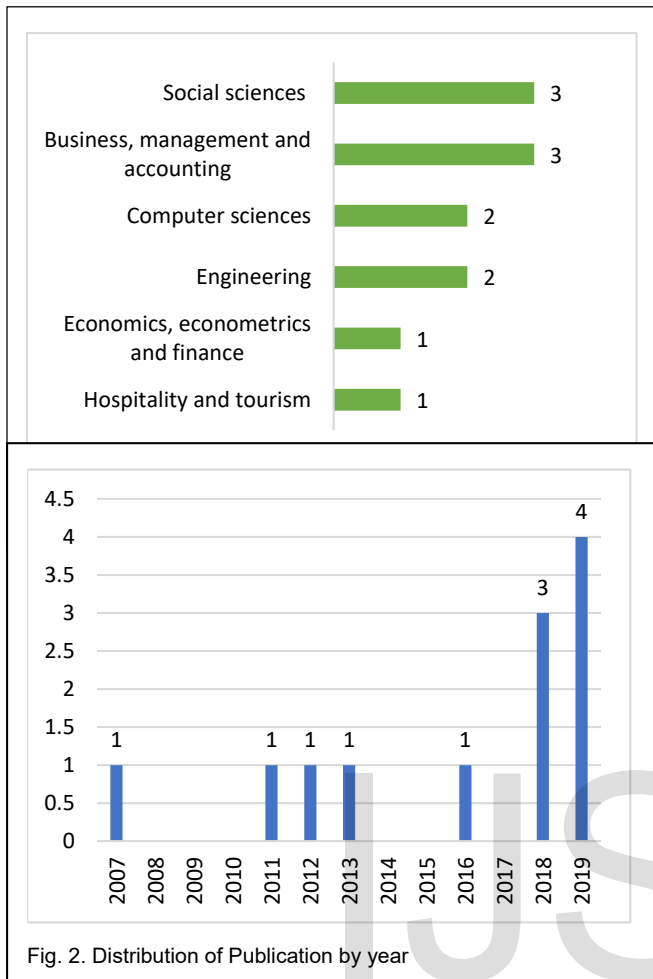
The research questions were set to help the researcher overview prospects in augmented reality and entrepreneurship.

4.1.3 Step 3: Searching

'Augmented Reality AND 'Entrepreneurship', 'Augmented Reality' AND 'Innovation', 'Augmented Reality' AND 'Marketing', 'Augmented Reality' AND 'Customer intention' are the keywords used for searching in the databases for research. The idea about the keywords was selected based on the stated questions in the research scope section. For authentic screening, the word 'AND' is used. Researchers found 28 articles on Web of Science and Scopus from this data.

4.1.4 Step 4: Assessing

In the assessing phase, the researchers recruit the articles by checking the documents and keeping the relevant articles to the study. The inclusion and exclusion criteria have been set up by searching the articles with 'Augmented Reality' AND 'Entrepreneurship' and 'Augmented Reality' AND 'Innovation'. Hence, at first, there were 28 articles found.



After scrutiny, 12 articles are considered relevant documents.

5 DATA ANALYSIS

5.1 Categorization of publications

Papers are distributed in figure 1 based on Web of Science (WoS) and Scopus. As previously described, the Scopus and WoS search engines are used for finding the specified papers. In figure 1, it shows that 3 of 12 articles are related to business, management, and accounting categories; three articles from social sciences; four covers the area of engineering and computer science; one paper is related to hospitality and tourism; and one article appears in the field of economics. These results show the scarcity of research on tourism and social issues and abundance in business and management publications. It allows future researchers to be focused on a lot of research that is not yet explored, like augmented reality with social issues, tourism, and entrepreneurship.

5.2 Year of Publication

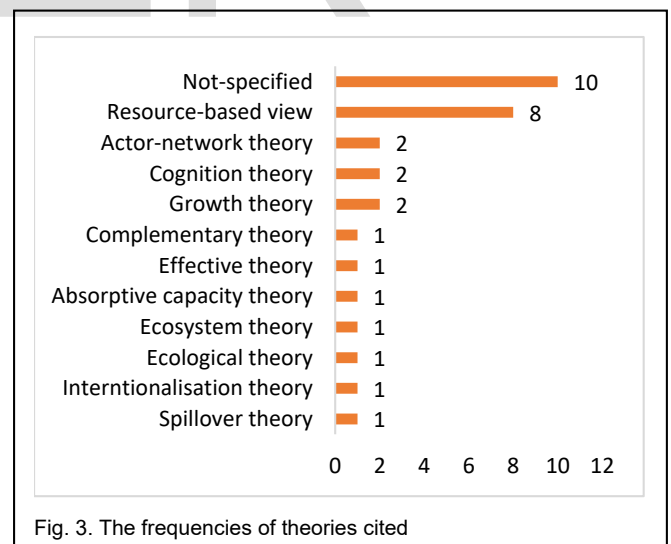
Figure 2 demonstrates the distribution of 12 recruited publications over a while. Topics related to augmented reality gained attention from researchers in 2018 and 2019,

as only five papers were published from 2007 to 2017. In the next few years, the research data in figure 2 illustrates that augmented reality and its impact on emerging technologies and entrepreneurship have an uplifting effect on publishing articles related to these topics by researchers as the demand for augmented reality is increased incredibly in the past few years. Still, more publications are required on augmented reality with social issues, tourism, and entrepreneurship.

5.3 Theory Focus

In conducting the study, complete literature and descriptive review are undertaken to develop in-depth knowledge about augmented reality and entrepreneurship. Twelve articles are selected based on their research and the theories discussed in them. Theory development is a process in which applicable and practical ideas are tested, and then based on these ideas, the theory is generated. In conjuring with this, the theory is a gateway for future researchers in different proposed technology revolution ideas, entrepreneurial startups, and innovation in the digital world to get more business and management results. Hence, considering this, the theory is the way to new research.

Figure 3 shows the number of times a theory is cited in publications. The resource-based theory has been majorly used in several publications over time. It was cited eight times in several publications. About ten papers are classified as not specified because no theory is mentioned in these publications. But these papers cover the research gap in augmented reality and entrepreneurship effectively.



5.4 Country Focus

To describe the country's focus distribution of the papers, the World Bank classification of countries is used to frame this research. This research shows that a major part of the research is taken from high-income economy countries. 6 out of 12 papers are administered in these countries due to the excessive availability of resources and early advancement in

technological reforms. This favors the researchers in their findings and removes barriers that hinder research in other lower and middle-income countries. Among 12 papers, two are categorized as not specified from any economic distribution of countries. The remaining papers are published from lower-middle and upper-middle economies (see figure 4).

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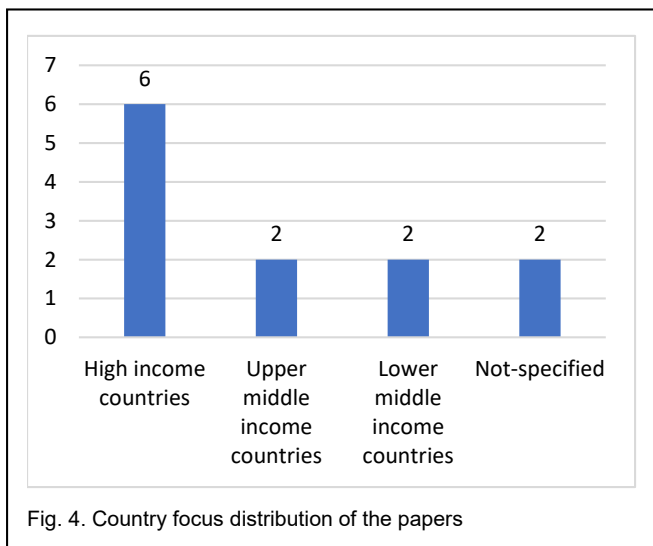


Fig. 4. Country focus distribution of the papers

Table 1 shows the number of papers published by each journal by year. Among the 12 articles, three were published in 2018, and the other four in 2019. This shows that researchers' focus on augmented reality-related research is not primarily focused in the early years. Two out of four papers were published in the International Journal of Innovative Technology and Exploring Engineering in 2019. Only a few articles were published in the early years of 2007 to 2017. One article in the Journal of International Management was published in 2007; the other was published in 2011 in the International Journal of Innovation Science. Two articles were published in Modern Entrepreneurship and E-Business Innovations in 2012 and 2013, respectively. In the journal of Technology in Society,

| Journal Name | Number of Publications per year | | | | | | | | | | | | Total | | |
|--|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|-------|------|---|
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | | 2019 | |
| International Journal of Innovative Technology and Exploring Engineering | | | | | | | | | | | | | 2 | 2 | |
| International Journal of Scientific and Technology Research | | | | | | | | | | | | | | 1 | 1 |
| Entrepreneurship and Sustainability Issues | | | | | | | | | | | | | 1 | 1 | |
| Tourism Management Perspectives | | | | | | | | | | | | | 1 | 1 | |
| Entrepreneurial Business and Economics Review | | | | | | | | | | | | | 1 | 1 | |
| Modern Entrepreneurship and E-Business Innovations | | | | | | 1 | 1 | | | | | | | 2 | |
| International Journal of Innovation Science | | | | | 1 | | | | | | | | | 1 | |
| Journal of International Management | 1 | | | | | | | | | | | | | 1 | |
| Technology in Society | | | | | | | | | | | | | 1 | 1 | |
| Technological Forecasting and Social Change | | | | | | | | | | | | | | 1 | 1 |
| Total per Year | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 3 | 4 | 12 | |

we observe that a paper was also published in 2016. This reveals that publications in the area of IT were not so frequent in the early years about this emerging technology,

| No. | Author | Title | Type | Year | Findings |
|-----|---|---|--------------|------|---|
| 1. | Lee, Jaeho; Slater, Jim | Dynamic capabilities, entrepreneurial rent-seeking, and the investment development path: The case of Samsung | Case study | 2007 | The extraordinary development, technology change, and capacity to purposefully create and modify the entrepreneurial resources of Samsung company in the country. |
| 2. | Hsu, Cathy, H. C. | Tourism education on and beyond the horizon | Conceptual | 2018 | The technological revolution, entrepreneurial innovation, and communication improvement mean uplifting the tourism education and learning environment. |
| 3. | Fox, Stephen | Open prosperity: How latent realities arising from virtual-social-physical convergence (VSP) increase opportunities for global prosperity | Conceptual | 2016 | The relation of connecting virtual, social, and physical technologies is resource-based, and convergence theories are studied. |
| 4. | Del Giudice, M.; Scuotto, V.; Garcia-Perez, A.; Petruzzelli, A. Messeni | Shifting Wealth II in the Chinese economy. The effect of the horizontal technology spillover for SMEs on international growth | Quantitative | 2019 | The upgrading of technology and digital advancements in small and medium enterprises brings local and international markets globally together. |
| 5. | Kusdiyanti, H., Febrianto, I., Wijaya, R. | Enhancing teacher competitiveness of entrepreneurship through the augmented reality module: Steam Approach | Mixed method | 2019 | The effect of technology advancement on students' and teachers' learning by entrepreneurial activities through augmented reality. |
| 6. | Rath, D., Satpathy, I, Patnaik, B.C.M. (a) | Industry 4.0-a new futuristic technological revolution, a catalyst of innovation & entre- | Descriptive | 2019 | The enhancement of businesses and innovations in technological products revolutionized entrepreneurial activities globally. |

| | | | | | |
|-----|--|--|-------------------------|------|---|
| 7. | Rath, D., Satpathy, I, Patnaik, B.C.M. (b) | Augmented reality (AR) & virtual reality (VR)-a channels for digital transformation in industrialization fostering innovation & entrepreneurship | Descriptive | 2019 | Education, sports and tourism, healthcare, engineering streams, trade, and commerce deformed industrialization towards virtual and augmented reality. |
| 8. | Veselovsky, M.Y., Pogodina, T.V., Ilyukhina, R.V., Sigunova, T.A., Kuzovleva, N.F. | Financial and economic mechanisms for promoting innovative activity in the context of the digital economy Formation | Descriptive, case study | 2018 | Due to the technological revolution, some changes in financial and tax reforms in the economy of Russia promoting digital activities are studied. |
| 9. | Tarabasz, A., Selaković, M., Abraham, C. | The classroom of the future: Disrupting the concept of contemporary business education | Descriptive | 2018 | The practical knowledge of curriculum and experiencing the job culture in classrooms through technology using virtual and augmented reality. |
| 10. | Montes, J.A.A., Fernández, E.M., Gutiérrez, A.C.M., Romeo, A. | Reality mining, location-based services, and E-business opportunities: The case of city analytics | Case study | 2013 | The effective use of available technological resources for business is joining the physical and internet world together. |
| 11. | Sood, S. | The death of social media in startup companies and the rise of s-commerce: Convergence of e-commerce, complexity and social media | Conceptual | 2012 | The transformation of social media and e-commerce into s-commerce launches new ideas in entrepreneurship and generates startup revenues. |
| 12. | Savetpanuvong, P., Tanlaimai, U., Lursinsap, C. | Sustaining innovation in information technology entrepreneurship with a sufficiency economy philosophy | Case study | 2011 | Supporting the advancement in entrepreneurship ideas and information business development following the economic effects. |

but we can see potential in the last two years in this field.
Table 2 depicts a review of the paper.

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6 DISCUSSION, CONCLUSION, AND FUTURE RESEARCH AREAS

This paper highlights the abstract of publications on augmented reality and startups through entrepreneurial activities with brief research of top articles related to this topic. These highly related articles are found by setting the predefined keywords in Web of Science (WoS) and Scopus databases. The articles recruited are based on titles, abstracts, literature reviews, objectives, and final notes with keywords. Others are excluded that cannot meet the induction criteria. At first, 28 articles were found. After scrutiny, data analysis, and literature review, 12 articles are considered the relevant document. The reviewed papers must have social sciences index, business management index, econometrics, tourism, and social issues index. Moreover, it relates to emerging technologies through entrepreneurial startups having augmented reality. With the help of these articles, we contribute to this paper that constantly improves its effectiveness in a sub-sequential manner.

In this modern time, the revolution of augmented reality in the new innovative business model wants to be more explored. The systematic literature review retrieved 12 augmented reality-based research papers that have been investigated in entrepreneurial activities. We found that augmented reality interactive technologies allow new and old business ventures to sort out novel business opportunities to speed up the innovative entrepreneurial model. Further, the authors explore users' spatial relationships and concepts towards innovative business models in this study, providing contextual, substantial, and situated learning experiences. Besides, augmented reality helps users develop authentic simulated experiences that increase a business's subjective attractiveness, enhance performance, discover opportunities, and become globalized.

However, this study describes the value of augmented reality as a possible addition to the entrepreneurs' development of innovative business models. In this modern era, digital strategies in the business model enabled the companies to lead a dynamic paradigm shift reflected in many business ventures. Virtual reality-based business models are used by several companies, i.e., gaming, entertainment, telecommunication, automotive, retail, real estate, etc., for potential performance in the competitive market. And that ultimately influence consumers' positive intention. Studies that evaluated simulation's influence have shown a noticeable increase in self-reported comfort and confidence, technical knowledge, and skill.

In most recent studies, the authors dissected augmented reality assumed as the most critical variable to note that rapidity is growing in new and old business ventures (Kipper and Rampolla, 2012; Vilkina and Klimovets, 2019). Therefore, the authors, sometimes mentioned as augmented reality, experience the virtual object in the real world that

leaves an uncontrolled impact on the users' minds; in this regard, this novel innovation creates a strong relationship between consumers and companies (Yaoyuneyong et al., 2016). Moreover, in its initial phase, several authors noticed that augmented reality was unfamiliar with the consumer market (Sumadio and Rambli, 2010). Still, it shows extreme potential to accelerate the innovative business model with a positive interaction with the consumers. Undoubtedly, an innovative business model significantly designed the new incline to adopt augmented reality.

As with dynamic innovation, it is more important to assess real place and value for results to generate curricula to sustain the international and domestic markets' operations. Sustainable entrepreneurship integrates social, environmental, and economic entrepreneurship and differs from traditional entrepreneurship (Cohen and Winn, 2007; Vuorio et al., 2018). Augmented reality is a sustainable resource for entrepreneurs with the involvement of several other businesses. A few companies have already developed augmented reality-based mobile applications and devices that show the real potential of augmented reality to bridge the gap between accomplishing the real-world environment's actual competence in a virtual context (Bathiche et al., 2014). Therefore, unchanging assessment strategies and a complete validation path are necessary to implement augmented reality in designing innovative business models' validly and reliably. By then, augmented reality innovation in entrepreneurial activities will become a big revolution in the global consumer industry. This revolution will lead to potential consumers as it involves the customers directly in deciding by visually knowing it. Thus, this sustainable technology will bring a new era in industrialization.

Recent studies show that the revolution of augmented reality in the industries was widely studied in social and physical convergence, entrepreneurial and digital advancement, small and medium enterprises, and e-commerce. Moreover, this will encourage future researchers, specifically computer science, management, social science, and tourism researchers, to determine the key points and categorize them in parallel and various studies related to augmented reality and entrepreneurship. This paper provides directions to the researchers from the systematic literature review, data analysis, implications, and future research. Further, table 3 depicts a future research recommendation in the published papers.

TABLE 3
RECOMMENDATIONS FOR FUTURE STUDY BY PREVIOUS SCHOLARS

| No. | Author | Recommendations |
|-----|--|--|
| 1. | Lee, Jaeho; Slater, Jim | The effect of external factors that amend, channel, and worsen entrepreneurial behavior needs to be examined. |
| 2. | Hsu, Cathy, H. C. | Students' co-curricular activities and the advancement in education technology help learn cultural understanding where tourism is a pioneer to future success. |
| 3. | Fox, Stephen | Virtual-social-physical convergence (VSP) opens opportunities to be explored, ranging from internet explorers to an individual's thinking and perceptions. |
| 4. | Del Giudice, M.; Scuotto, V.; Garcia-Perez, A.; Petruzzelli, A. Messeni | There is a space to refine qualitative findings compared to technology advancements and technology transfer about knowledge spillover. |
| 5. | Kusdiyanti, H., Febrianto, I., Wijaya, R. | This study helps future researchers find more entrepreneurial activities in education that promote students' and teachers' impact. |
| 6. | Rath, D., Satpathy, I., Patnaik, B.C.M. | The researchers will find ways to research and develop entrepreneurial advancement and innovation in many fields of daily life through the industrial revolution 4.0. |
| 7. | Rath, D., Satpathy, I., Patnaik, B.C.M. | Commix of digitalization and industrialization results in the elevation of augmented reality and entrepreneurial ideas in education. |
| 8. | Veselovsky, M.Y., Pogodina, T.V., Ilyukhina, R.V., Sigunova, T.A., Kuzovleva, N.F. | The economy's digital transformation concludes with modern routes to the current financial problems to be discussed, gaining a competitive advantage. |
| 9. | Tarabasz, A., Selaković, M., Abraham, C. | Consistent development and innovation from the digital learning system follow business and education issues, both at the rising and created markets primarily founded on the quantitative methodology. |
| 10. | Montes, J.A.A., Fernández, E.M., Gutiérrez, A.C.M., Romeo, A. | The internet world and expansion of technology enable researchers to search for more thresholds of opportunities in entrepreneurship ideas. |
| 11. | Sood, S. | Social and digital media complexity enhances more ways to discover access to the technological revolution in startup activities. |
| 12. | Savetpanuvong, P., Tanlaimai, U., Lursinsap, C. | Progression in information technology and entrepreneurial startups leads to profit maximization of economic crisis. |

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