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MANAGEMENT | RESEARCH ARTICLE

Antecedents of entrepreneurial intentions in smart city of Neom Saudi Arabia: Does the entrepreneurial education on artificial intelligence matter?

Mohammed T. Nuseir¹, Muhammad Farhan Basheer^{2*} and Ahmad Aljumah³

Abstract: The main purpose of this empirical study is to explore the entrepreneurial self-efficacy, and entrepreneurial competency as antecedents to the entrepreneurial intentions in smart city of Neom Saudi Arabia. Additionally, the study has also examined the mediating role of entrepreneurial education on artificial intelligence in the relationship between the entrepreneurial self-efficacy, entrepreneurial competency, and the entrepreneurial intentions in smart city of Neom Saudi Arabia. The study has employed the SEM-PLS for the data analysis. A sample based on 550 students from private (n = 291, 52.9 %) and public universities (n = 259, 47.1 %) of KSA were randomly selected. The entrepreneurial self-efficacy, and entrepreneurial competency are reported to have a positive and significant influence on entrepreneurial intentions. The entrepreneurial education on artificial intelligence, mediate the relationship between the entrepreneurial competency, entrepreneurial self-efficacy, and entrepreneurial intentions The model is contextually suitable for motivating individuals to become self-sufficient and for enabling them to harness

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PUBLIC INTEREST STATEMENT

This article is based on an academic study. The authors do not have the financial interest of this research. The main purpose of this empirical study is to explore the entrepreneurial self-efficacy, and entrepreneurial competency as antecedents to the entrepreneurial intentions in smart city of Neom Saudi Arabia. Drawing inferences from the empirical findings and discussions, this present study has made appreciable theoretical contributions to the existing body of literature, specifically, in the area of entrepreneurial intentions in smart city.

their creativity through entrepreneurial and profit-driven endeavors in smart cities. This study has significant implications for entrepreneurs, practitioners, and governments alike. The findings provide a guideline for governments in establishing an environment that supports the individual drive to embark on entrepreneurial endeavors. Among the stimulus for encouraging entrepreneurship include the provision of loans with reasonable interest rates and knowledge sharing sessions by prominent entrepreneurs. Drawing inferences from the empirical findings and discussions, this present study has made appreciable theoretical contributions to the existing body of literature, specifically, in the area of entrepreneurial intentions in smart city.

Subjects: Business, Management and Accounting; Entrepreneurship; Small Business Management; Social Entrepreneurship

Keywords: Entrepreneurship; education; smart city; artificial intelligence; KSA

1. Background

The massive growth of artificial intelligence (AI) has affected the economy and society in general and could potentially transform the way products and services are produced and characterized. This in turn would impact overall productivity, employment, and competition. On top of that, AI could also potentially transform the process of innovation with equally significant implications or even beyond.

Ingenuity has become a key element in entrepreneurship due to rising global competition that is driven by innovativeness and originality. In the past three decades, entrepreneurial studies had mainly focused on exploring the factors influencing individuals to become entrepreneurs, prompted by the trailblazing works of Shapero (Rai et al., 2017). In grasping the complex dynamics of entrepreneurial intention (ENINT), the ESE of individuals has been identified as the key predictor. Many studies have made valuable contributions to this body of knowledge (Maluk, 2018; Sitaridis & Kitsios, 2017; Sukardi, 2017). Nonetheless, attempts are still being carried out to extend the EI field by associating it with various mechanisms (Urban & Kujinga, 2017).

Beginning with Google's inaugural fiber-to-the-home (FTTH) gigabit network, Kansas City became the recipient of several strategic endeavors that led to its partnership with Cisco's Smart Connected Communities Framework thus positioning it as potentially the largest smart city in North America in the future. Despite offering solutions for the rising economic, social, and ecological issues caused by globalization, this developing concept is still not well-defined and lacks a proper framework. The concept of a smart city is described by the Institute of Electrical and Electronics Engineers (IEEE) as one that integrates society, government, and technology whilst the Smart City Council delineates it as a city of which functions are embedded with digital technology (Seta et al., 2015).

Saudi Arabia is conveniently located at the juncture of the Asian, African and European continents which allows access to 70% of the world population separated only by an eight-hour flight. The Kingdom serves as a key trade center within the MENA region. Its stock market i.e., Tadawul leads the GCC market with a US\$466 billion capitalization. On top of the economic advantages, the nation also harbors a generation of tech-savvy population aged under 25.s. The Kingdom recently went public with a US\$500 billion smart city mega-project known as "Neom" or "New Future" in Arabic. The massive smart city will be built on a highly strategic location. The new King Salman Bridge will also directly connect Saudi Arabia and Egypt. Today's global population is now growing at unprecedented rates. The World Bank reported that the world population had increased as much as 146% in the course of 56 years. Saudi Arabia recorded the most alarming rise i.e. 689%

over the span of 56 years. With such sharp increase, the Kingdom inevitably needs more food, water, energy and air supplies. The aim of its Vision 2030 is to improve the country's overall living conditions with the goal to build three smart cities that can potentially be ranked as among the top 100 cities globally. The country also has plans to build another 10 smart cities in the area.

Koe (2016) defined ENINT as a mental coordination consisting of one's desires, wishes and hopes which drives his/her choice of entrepreneurship. Meanwhile, ENINT is one's belief in one's ability and skills to start and develop a business (Maresch et al., 2016). Tsai et al. (2016) incorporated the constructs of perceived entrepreneurial control and ATE as the mediators in the correlation between ESE and ENINT as well as examining subjective norms and their mediating role. To derive better findings, the authors proposed the incorporation of other variables related to entrepreneurship. An individual's intention to become an entrepreneur can be influenced by various factors including personal traits, backgrounds, experiences, and dispositions. According to Karimi et al. (2016), the ability to identify a business opportunity is the first step in an entrepreneurial process, and the ability to exploit it demonstrates the capability and skills of the enterprising individual. The authors further argue that innovative entrepreneurs can better exploit lucrative business opportunities. Such innovativeness is referred to as EC in the field of entrepreneurship. Entrepreneurial competency (ECOMP) is defined by Lee and Chau (2019) as the development and deployment of novel, one-of-a-kind and viable ideas for launching a new endeavor. The author added that EC is crucial in light of the obstacles present in the process of entrepreneurship. Individuals with ESE are argued to have the ability to develop and deploy innovative ideas (ECOMP) which in turn will drive their entrepreneurial inclinations. Based on the Theory of Planned Behaviour (TPB) introduced by Miller (2017), one's belief that one can perform certain behaviors will influence the attitudes towards those behaviors and the desire for innovative ideas, which in turn will influence the intent to carry out those behaviors.

Entrepreneurial education (EE) is a crucial element in differentiating between an entrepreneur and a non-entrepreneur, and those with greater EE have higher intentions to become entrepreneurs (Frunzaru & Cismaru, 2018). Several past studies (Frunzaru & Cismaru, 2018; Ndala, 2019) had explored the direct relationship between EE and ENINT. Several others (Piperopoulos & Dimov, 2015) had incorporated EE as a mediator in the relationship between ESE and ENINT. This current study takes it one step further by exploring the mediating effect of EE the mediators in the relationship between ESE and ENINT, and between EC and ENINT. With proper entrepreneurship know-how, individuals can generate innovative ideas and capitalize on them using ECOM. This study proposes that EE-equipped individuals have higher self-confidence which leads to greater ESE. This in turn will lead to higher EI thus creating the mediating effect of EE on the correlation between ESE and ENINT (Piperopoulos & Dimov, 2015). Shahab et al. (2019) outlined the importance of EE in instigating entrepreneurial intentions. In current transformative and scientific technology era, businesses are simultaneously offering new services and products and at the same time fading geographical boundaries, challenging regulatory frameworks, and reshaping the industries. Nowadays, industries are empowered and characterized by advanced technologies, such as, robotics, IoT, artificial intelligence, and the blockchain, which are developing at a faster pace and is making it even difficult for experts to perform industry analysis and keep pace with these technologies. Thus, the study has breached that entrepreneur education on artificial intelligence (EEOAI) is one of desired area of research.

This present study hence suggests the significance of EEOAI in determining the precursors of ENINT and in mediating the relationship between ESE and ENINT, which has yet been explored to date. This study contributes to the body of knowledge on entrepreneurship by firstly clarifying the link between ESE and ENINT via a mediator which is in contrast to other studies (Hoque et al., 2017; Nabi et al., 2017) which had examined the direct relationship between ESI and ENINT.

Secondly, this study incorporates the mediating effect of EEOAI on the artificial inelegance on the relationship between ESE and ENINT. It clarifies the role of the TPB and the self-efficacy theory

in driving entrepreneurship. The TPB had been widely used in past studies, integrating ATE, ECOMP and EEOAI to explain the various facets of ENINT (Liñán & Fayolle, 2015; Tsai et al., 2016). In contrast, this current study suggests that the facets exhibit mediating effects on the relationship between ESE and ENINT. Thirdly, this study offers empirical support in the context of Saudi Arabia. Very few studies had employed the method of a two-country data in investigating ENINT (Chung et al., 2018; Shahab et al., 2019). Saudi Arabia is currently one of the most rapidly growing global economies and has become the preferred market for entrepreneurial endeavors. Investigating the relationship between ENINT and ESE in the context of Saudi Arabian smart business will add further understanding on the literatures on TPB and self-efficacy. Finally, in broadening the scope of past studies (Shahab et al., 2019; Tsai et al., 2016), this current study investigates the mediation model by employing more vigorous statistical analysis methods namely the structural equation modeling (SEM)

2. Literature review

2.1. Entrepreneurial competencies

In the field of management, competency is not a novel concept. A number of management scholars have examined the role of competencies in achieving better organizational performance and also reported ten key manager roles in his study. A few researchers have acknowledged that developing understanding about role of work is important to determine efficiency of each of the individuals (Schaefer et al., 2016). Currently, understanding the role of an entrepreneur provides those individual competencies that are required to establish successful SMEs. There is a general consensus among researchers that SME entrepreneurs have been operating in complex and challenging business environment and are required to take different roles to accomplish certain tasks. Entrepreneurship is considered as one of the challenging and important roles for the entrepreneurs, besides, role of functioning is another important role of the management. Literature review has revealed that various aspects of entrepreneur's personal abilities, their common knowledge, psychological factors, and personality characteristics will be observed through human capital of an entrepreneur (J. Li et al., 2018). The entrepreneurial competencies analysis reveal that entrepreneurial competencies arise from two origins and consist of two components (Gümüşay & Bohné, 2018), which are, (1) internalized elements or competencies which are generally learned through practical learning, or from the workplace, or part of individual's character such as, attitudes, personality traits, self-image, and social roles, such competencies can be refined but are not easy to be altered; and (2) externalized elements or deep-rooted competencies, which are associated to the entrepreneur's background, such as, skills, experience, and knowledge. However, unlike internalized elements, externalized competencies can easily be made effective through education programs, trainings, and continuous practice.

2.2. Entrepreneurial self-efficacy (ESE)

In order to develop understanding about entrepreneurial self-efficacy, general self-efficacy must be defined. The concept of self-efficacy was derived from social learning theory and is now considered as one of the significant variables in the area of social psychology (Panadero et al., 2017). Although, this concept has been adopted by different areas of research, like cognitive and behavioral theories, identity theory, human resource theory, and organization theory. Moreover, a number of studies have integrated entrepreneurial self-efficacy (ESE) to test different variables, for instance, performance, commitment, business start-ups, and innovation (Panadero et al., 2017). defined self-efficacy as 'the ability or belief of an individual to control, regulate, and motivate his/her behavior to achieve certain goals' and is linked to an individual's personality traits.

In another definition, self-efficacy refers to "the cognitive resources of an individual" and is also deemed as a situation-specific variable. In addition, this concept facilitates in explaining individuals' behavior, since it tends to discover an individual's determination, strength, and persistence in surpassing the potential obstacles and challenges while materializing his/her ideas (Bartuch, 2018; Gümüşay & Bohné, 2018; Panadero et al., 2017). According to, self-efficacy identifies the ability of

an individual to perform multiple tasks under different circumstances. Thus, describe self-efficacy as personal judgment, which indicates whether an individual is capable of executing the required action under prospective situations. A number of studies have established the impact of self-efficacy on behavior and cognition (Bartuch, 2018). There is a general consensus among researchers that self-efficacy and actual ability are highly linked, and self-efficacy can be improved through experience, therefore, the greater the experience of an individual the higher will be the self-efficacy level. Hence, it has been stated that self-efficacy affects a person's ability to think in a certain manner (positive or negative), i.e., regarding a set goal or target, and also determines the individual's commitment towards the goal and expected outcome and whether he/she can face the prospective challenges.

2.3. Entrepreneurship education in an era of artificial intelligence

Though entrepreneurship education (EE) is a relatively new concept but has gained considerable attention among researchers and scholars, as it significantly contributes in developing entrepreneurial skills, competencies, attitudes, and culture among new entrepreneurs (Anggadwita et al., 2017). As a result, remarkable efforts have been made by researchers in recent years to examine EE and to offer helping to this area to gain momentum and progress in coming years. Therefore, EE is viewed as an array of activities for empowering individuals to embrace new skills and enhance the existing knowledge, skills, values as well as tolerance which permits to define, inspect, and resolve various issues. In addition, EE revitalizes entrepreneurial awareness and skills and supports entrepreneurial intentions that may prove to be useful in discoursing resource constraints and subjective norms associated with entrepreneurial activities (Boateng, 2019) argued that EE improves behaviors, mindsets, capabilities, and skills of the students, and consequently helps in creating future entrepreneurs. described that EE consists of three main objectives for the education system: these include, (1) establish an entrepreneurial culture for the learners; (2) infuse entrepreneurial behavior and mindset; and (3) educate about effectively starting and operating an independent enterprise.

In Industry 4.0, Artificial intelligence (AI) has been significantly affecting new technologies. Thus, to achieve economic growth and entrepreneurship, innovation, ideas, knowledge, and technological advancements are considered as the important factors (Makridakis, 2017). Most firms strive to adopt Robotics and AI to generate enormous innovations for lifting their entrepreneurial potential and stimulating economic and social change to achieve higher living standard. In addition, organizations, societies, and governments also seem to be highly impressed by Dresang (2017). Dresang (2017) is presently becoming an instigator and a facilitator for establishing higher entrepreneurial recognition. Moreover, the robotic industry has transformed artificial intelligence into an entirely new robot, which is fully autonomous and is equipped with AI (J.J. Li et al., 2019). These AI Robots will affect human lives way more than other technological effects, since AI robots are assumed to be intelligent than human beings. It thus implies that AI robots will enhance human skills and will take over humans and assist them at their workplace.

2.4. Entrepreneurial intention

Entrepreneurship takes place in consequence to the cognitive process, which is a widely accepted process. Various researchers have emphasized and accepted the complexity of making self-employed decision. According to the literature, various scholars have used the theory of planned behavior to explicate cognitive approach to entrepreneurship (Aloulou, 2016; Gorgievski et al., 2018). Various empirical research reveals that decision to start a new business and become self-employed mainly depends upon thinking process and individual's belief and attitudes and arises from effective and intentional planning. It has been confirmed by various researchers that intentions act as a strong predicting variable for individual behavior, especially when the underlying behavior is hard to predict, rare, and involves time lags. Moreover, studies such as reported that entrepreneurial intention is one of robust predictors to predict future entrepreneurial behavior and is also termed as planned intentional behavior. Define intention as 'a motivation of an individual to take deliberate actions upon conscious decisions or plans. According to some other definitions, entrepreneurial intention refers to "the intentions for starting up a new venture" or

“the intention to possess one’s own business.” In this study, entrepreneurial intention is assumed to be the intention of an individual to become an entrepreneur (Ozaralli & Rivenburgh, 2016). Different intentional models have been used by researchers in the past to examine entrepreneurial intentions and also defined entrepreneurial intention as the intentions of a person to own a business; while defined it as the intention to become self-employed. The intention to start a new business or become self-employed is considered to be the first step of a new organizational emergence process. Several prior research also reported initial occupational aspirations as one of the strong predictors for individuals’ future professional choices, since students who are inclined towards entrepreneurship at their post-secondary level will likely to choose self-employment in future (T. Ahmed et al., 2017; Aloulou, 2016; Gorgievski et al., 2018; Ozaralli & Rivenburgh, 2016).

3. Entrepreneur intention in smart city

In recent years, there is a new breed of technology-driven businesspersons called urban entrepreneurs. They participate in local and civic markets as consumers as well as user-producers that leverage on access to technological know-how, tools and competencies for managing civic projects and steering in revolutions (Dougherty, 2016; Hagel et al., 2014) that aim to combine various established frameworks and tackle trade-offs. Based on the trade-off perspective, the civic initiative provides social goods via organizations that utilize business to fund their service-based programs such as government and non-profit services. Conventional profit-oriented projects with a secondary concern on social impacts are also involved for delivering city services as well as hybrid-functioning cross-sector organizations that focus on solving urban issues. These entrepreneurs identify business prospects in parallel ways emphasizing on past or distinct knowledge; however, local civic entrepreneurs tend to identify such prospects with the intent to solve social issues particularly if the issues are being prioritized for them by the smart city. In the aspect of resource leverage, capital is accessed by providing financial returns for certain extents of financial risks; however, the entrepreneurs in smart cities provide opportunities for solving social problems instead with no clear provisions of financial returns or guarantees of sustainable solutions. This is exacerbated by problematical social and environmental impacts and the lack of performance measurements (Parhankangas & Renko, 2017). These therefore pose challenges for the operations and scaling of social ventures in the effort to balance social and financial objective particularly in cases where the city is both the customer and development partner. This raises the question of whether the main goal entails achieving location-based social impact or short-term economic benefits. This causes doubt among the entrepreneurs (Jenner, 2016), which can be partly solved using the theoretical entrepreneurial ecosystem where entrepreneurs can create value by leveraging on systemic relations for numerous public stakeholders with different goals that would affect urban civic activities.

3.1. Neom—the reflection of smart KSA

The world population of today is growing at a record rate. According to the World Bank, the world population had recorded a 146% increase in the span of 56 years, i.e., from 3 billion in the 1960s to 7.44 billion in 2016. The most startling rate was recorded by Saudi Arabia with a rise of 689% over the course of 56 years. From a population of 4.09 million in the 1960s, the country now has a population of 34 million.

With such an incredible rise in population, the country’s need for more food, water, energy, and air supplies also increases. The country’s Vision 2030 aims to improve the Kingdom’s overall living conditions with the construction of three smart cities that are targeted to be among the top 100 cities in the world. The construction of another 10 smart cities in the area is also in the pipeline. It sits along the path of the Asian, African, and European continents, granting access to 70% of the world population within only an eight-hour flight. Within the MENA region, Saudi Arabia serves as the dominating trade center. The GCC market is led, the country’s stock market with a total capitalization of US\$466 billion. Besides these economic pluses, Saudi Arabia also has a population of under-25s that are highly tech-savvy.

A US\$500 billion smart city mega-project known as “Neom” or “New Future” in Arabic was recently revealed by the Kingdom. Sitting on a 26,500 sq km plot encompassing Saudi Arabia, Jordan and Egypt, the construction is about 33 times larger than the city of New York. The project is headed, the former Chief Executive of Siemens. Construction works are already in progress with the first phase scheduled to be completed by 2025. The Saudi Arabian Public Investment Fund serves as the financier of the project incorporating the sales profits of Aramco, the state-owned oil company. The project is set at an economically strategic location i.e. linked by the new King Salman Bridge.

4. Conceptual framework

According to Lee and Chau (2019), ECOMP entails the development and deployment of novel and innovative ideas for new endeavors. The author also suggests the pertinence of EC in well-established businesses as well as new ones. Nonetheless, creativity is not merely performing tasks that are distinct from others (Lee & Chau, 2019). Literatures on entrepreneurship often cite opportunity identification as the first step in the entrepreneurial process whilst identifying and choosing the right business opportunities are the more advanced capability of a competent entrepreneur (Karimi et al., 2016). Highly creative individuals can improve business innovativeness and ingenuity as they can identify opportunities for new product ideas or efficient usage of present equipment or methods on top of guaranteeing the availability of problem-solving approaches and employment of ground-breaking ideas (Ma et al., 2017). Despite being the initial signs of innovativeness, creativity on its own merely provides an outlook of unique and creative ideas which is insufficient. The authors paved a new path in social creativity studies and argued that several integral dynamics drive people to showcase greater levels of innovation. Intention has been identified as an antecedent of planned behavior (Ali et al., 2019). This present study explores the three key ENINT models namely: (i) the entrepreneurial ideas and plans employment model (Shirokova et al., 2016), (ii) the entrepreneurial happening model (Khursheed et al., 2018), and (iii) the TPB by Miller (2017). Based on the literature review, all three models involve individual contexts such as personality traits, capabilities, self-efficacy, and personal history. According to Biraglia and Kadile (2017), self-efficacy determines the distinctiveness and value of certain tasks. The level of self-efficacy can differ according to situations. People with high ESE may relate complex situations with beneficial outcomes such as high revenues, appreciation, and mental achievement (Maresch et al., 2016). Scholar pointed out that creative thinking can facilitate an individual in overcoming challenging circumstances such as starting a business. A high ENINT and entrepreneurs who perform tasks properly will create a positive relationship between environmental concern and awareness (Campos, 2017). The same author added that highly self-efficient and creative entrepreneurs are more observant of new opportunities. High ECOMP facilitates the success of start-ups.

H1: Entrepreneurial competency (ECOMP) has significant impact on the entrepreneurial intention (ENINT).

The TPB argues that an individual’s belief has an effect on his/her behavioral conduct, which in turn influences his/her desires and intentions (Miller, 2017). The measurement of entrepreneurship entails people’s attitudes towards it. Miller (2017) added that an individual’s belief about certain behavior affects his/her attitude towards that behavior. A person who highly believes in his/her abilities and talents will have the self-confidence to start a business. Such belief drives the individual’s entrepreneurial behavior and attitude. ESI and ENINT from these logics, ESE clearly affects EI by driving a positive entrepreneurial attitude. In support of this view are Liñán and Fayolle (2015) who outlined self-belief and self-confidence as precursors to entrepreneurial ventures. Tsai et al. (2016) examined the mediating role of ATE in the relationship between ESE and ENINT. Based on all these findings, there is strong evidence that attitude influences the relationship between ESE and ENINT. A high ESI level builds the belief within an individual that he/she can start a business which leads to the formation of a positive entrepreneurial attitude. Hence, this study proposes the second hypothesis:

H2: Entrepreneurial self-efficacy (ESE) has significant impact on the entrepreneurial intention (ENINT).

Based on the examples provided by Atomwise, there are two ways in which AI education can affect ENINT. Firstly, although AI mainly originates from the domain of computer science and its initial commercial applications were limited to robotics, recent developments on its learning algorithms indicate that AI could be applied in other domains. In terms of the economics of AI, researchers such as Teece (2018) had outlined a critical discrepancy in providing ENINT incentives for developing technologies that have limited applications versus technologies with wide and limitless applications as demonstrated by the developments in neural networks and machine learning or also known as *deep learning*. Hence, the focus should be on determining the extent to which AI developments are not merely models of novel technologies, but instead general-purpose technologies (GPTs) that have long been proven as effective drivers of longstanding technological advancement.

Secondly, while some AI applications will inevitably inject low-cost or high-quality inputs into numerous prevailing production processes hence raising fears of job displacements, others like deep learning may not only boost productivity across sectors but also transform the nature of those ENINT processes. Capello (2017) famously stated that by integrating ENINT applications-wide, the “invention of a method of invention” could potentially pose a more significant economic impact than the development of any new product. Hence, the ability of machine learning and neural networks in improving end-use technology performance and the nature of ENINT process could have a substantial effect on ENINT and its growth. As far as economic research is concerned, the pros and cons of the development and deployment of these technologies are worth investigating. Policy-wise, understanding the conditions that enable the access to and usage of these tools is crucial.

In the context of learning, EEOAI is commonly referred to as higher education, ongoing education, school educational programs or technical training courses (Mitcham & Englehardt, 2019). The significance of EEOAI is emphasized by Shahab et al. (2019) who stated that entrepreneurial know-how and skills can motivate an individual to start a business. Shahab et al. (2019) further suggested that EEOAI would be irrelevant if entrepreneurial aptitude was innate and cannot be learned. Jarmužek and Cytlak (2018) outlined that EEOAI should inject the quality of self-belief in an individual which would improve his/her ability to make decisions and identify mistakes as an integral part of learning. Mitcham and Englehardt (2019) suggested that there is a positive relationship between entrepreneurial know-how and the decision to become an entrepreneur. Hence, all the aforementioned studies argue that entrepreneurial capacity is not essentially an inborn quality. Based on that, this current study proposes that EEOAI is a driving factor for entrepreneurship. It prompts self-belief and the required competences for initiating a business. EEOAI can help prospective entrepreneurs through the showcase of autonomy. Based on this argument, this study proposes the third hypothesis below:

H3: Entrepreneurial education on artificial intelligence (EEOAIN) has significant impact on the entrepreneurial intention (ENINT).

T. Ahmed et al. (2017) indicated that people with MBA degrees have higher EIs compared to those without. Pragmatically, EE has been indicated to be instrumental in improving entrepreneurial characteristics and qualities (Frunzaru & Cismaru, 2018).

Value creation in smart cities are only possible by the Internet of Things (IoT) in various realms including healthcare, advertising, brand management, transportation, and environmental sustainability. These initiatives are aimed at the provision of public infrastructure and services thus allowing the city administrators to solve their city's problems. To achieve this, smart cities typically imitate technological platforms by embracing open data channels i.e. allowing local entrepreneurs to access

their data and generate solutions that bring about urban transformations derived from the cooperation of various local ecosystem participants (Almirall et al., 2016). User-based design practices using such data are engaged in living labs. In 2013, the Kansas City Living Lab was established in partnership with Cisco and Think Big Partners i.e. well-known technology drivers and co-working spaces in the city. Thus, the study has broached an argument that it is mandatory to educate the young entrepreneurs about the entrepreneurial opportunities in smart cities, via entrepreneurial education on artificial intelligence (EEOAIN).Based on this argument, this study proposes the fourth hypothesis below:

H4: Entrepreneurial education on artificial intelligence (EEOAIN) mediates between entrepreneurial self-efficacy (ESE) and the entrepreneurial intention (ENINT).

EEOAI has been deemed as a basic element in enhancing entrepreneurial attitude in a smart city (Cano & Tabares, 2017). Shahab et al. (2019) agrees that EE drives entrepreneurial intent because entrepreneurial know-how and skills can motivate an individual to start a business. As such, EE transforms individual attitude towards entrepreneurship. Educational initiatives are hence argued to encourage more people to delve into entrepreneurship due to higher awareness. Thus, this study proposes the final hypothesis below:

H5: Entrepreneurial education on artificial intelligence (EEOAIN) mediates between entrepreneurial competency (ECOMP) and the entrepreneurial intention (ENINT).

5. Method and measurement

The Entrepreneurial Intention Questionnaire (EIQ) was used to measure this construct similar to that of past studies (Chung et al., 2018; Tsai et al., 2016). Based on the modified EIQ scale, six items were used to measure ENINT. Meanwhile, ESE was measured using another six items adapted from past studies (Hoque et al., 2017; Maluk, 2018). Finally, EEOAI was measured using six items taken from Ndala (2019) and Lorz and Volery (2011). This current study employs a 7-point Likert scale for measuring all the items. The revised EIQ (as previously deliberated) had five items for measuring the ATE. ECOMP was measured using two items adapted from Hills et al. (1997) . The data obtained from the survey was entered and encoded using the SPSS, which was then further used to carry out basic and preliminary analyses. For instance, in replacing or deleting missing values, detection and treatment for any outliers, and performing normality test. Specifically, the descriptive analysis was also done for obtaining demographic information, and the variables. A sample based on 550 students from private (n = 291, 52.9 %) and public universities (n = 259, 47.1 %) of KSA were randomly selected. Most of the students were aged between 15–26 years (69.9 %). About 17.7% were aged between 27 and 30 years, 7.2% were between 31 and 40 years and rest 5.2% were aged 41 above. Most of the respondents in sample were male 277 and 223 were female. Majority of the students were enrolled in Bachelor programs (n = 341, 62 %). Every student had different educational background. Some were from informational technology (n = 97, 17%), agriculture science (n = 58, 10.5%), and accounting and

Figure 1. Outer Model. Source: Hair et al. (2017), Basheer et al. (2019)

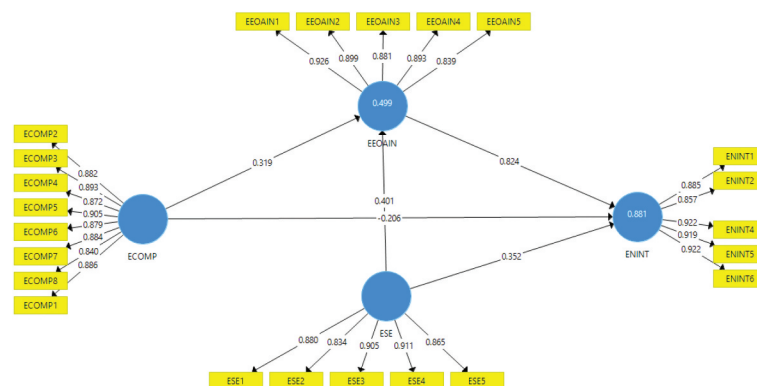


Table 1. Outer loadings

	ECOMP	EEOAIN	ENINT	ESE
ECOMP1	0.886			
ECOMP2	0.882			
ECOMP3	0.893			
ECOMP4	0.872			
ECOMP5	0.905			
ECOMP6	0.879			
ECOMP7	0.884			
ECOMP8	0.840			
EEOAIN1		0.926		
EEOAIN2		0.899		
EEOAIN3		0.881		
EEOAIN4		0.893		
EEOAIN5		0.839		
ENINT1			0.885	
ENINT2			0.857	
ENINT4			0.922	
ENINT5			0.919	
ENINT6			0.922	
ESE1				0.880
ESE2				0.834
ESE3				0.905
ESE4				0.911
ESE5				0.865

finance (n = 101, 19%). Rest belonged to other different programs (n = 294, 54%). Most of the students had no previous experience of doing business (n = 365, 67%) and never taken any course on entrepreneurship. According to Dilman (1991), it is assumed that obtaining a higher response rate will lower the chances of non-response error, thereby resulting in better research survey.

6. Data analysis

Data analysis was carried out using the Partial Least Square (PLS) technique together with the Smart PLS 3.0 software (Ringle et al., 2014). After conducting the two-stage analytical procedure, the measurement model was tested for validity and reliability and the structural model for hypotheses testing as suggested by Hair et al. (2017).

The latent constructs of the measurement model must first be tested for dimensionality, validity, and reliability. Being quantitative in nature, the reliability of the study is tested using Cronbach's (α). Hence, Composite Reliability (CR) is also employed following the recommendations of Henseler et al. (2016). Two types of validity were convergent validity and DV.

Convergent validity is determined by testing the factor loadings, AVE and CR Hair et al. (2017). Figure 2 shows that all the factor loadings are above the threshold value of 0.6 as recommended by Henseler (2017), thus indicating convergent validity.

Convergent validity can also be tested by estimating the AVE which should be larger than 0.5 as suggested by Tzempelikos and Gounaris (2017). The AVE which shows the total variance in the indicators represents the latent construct. The measurement model should also be tested for

Figure 2. Inner Model. Source: Hair et al. (2017), Basheer et al. (2019)

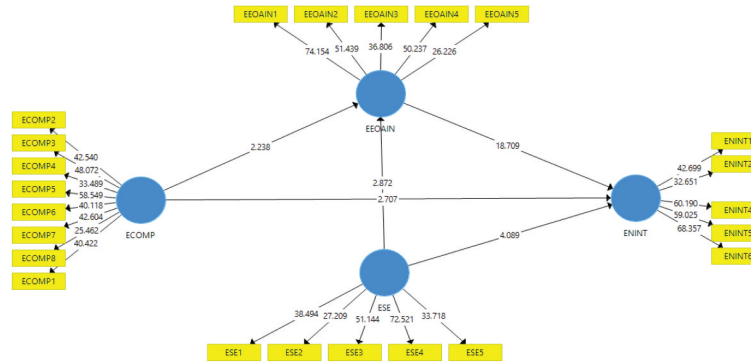


Table 2. Reliability

	Cronbach's Alpha	rho_A	CR	(AVE)
ECOMP	0.958	0.960	0.965	0.775
EEOAIN	0.933	0.934	0.949	0.789
ENINT	0.942	0.943	0.956	0.812
ESE	0.926	0.930	0.944	0.773

Table 3. Discriminant Validity

	ECOMP	EEOAIN	ENINT	ESE
ECOMP	0.880			
EEOAIN	0.690	0.888		
ENINT	0.689	0.827	0.891	
ESE	0.626	0.696	0.735	0.879

Table 4. Direct Results

	(O)	(M)	(STDEV)	(O/STDEV)	P Values
ECOMP -> EEOAIN	0.319	0.324	0.143	2.238	0.013
ECOMP -> ENINT	0.057	0.060	0.132	2.707	0.023
EEOAIN -> ENINT	0.824	0.817	0.044	18.709	0.000
ESE -> EEOAIN	0.401	0.399	0.139	2.872	0.002
ESE -> ENINT	0.682	0.682	0.128	5.312	0.000

composite reliability. Table 2 shows that the CR value is greater than the threshold value of 0.7 as suggested by Hair et al. (2017).

Discriminant validity entails the extent to which the items differentiate the constructs and measure different concepts; it is measured by testing the relationship between the measures of the potentially intersecting constructs (Tzempelikos & Gounaris, 2017). The average variance shared among the other constructs. Table 3 shows that the AVE square root values (bolded on diagonals) are higher than the values on the matching row and columns. Discriminant validity is measured by testing all the indicators' cross loadings (Hair et al., 2016). The indicators' outer

Figure 3. R-square. Source: Hair et al. (2017), Basheer et al. (2019)

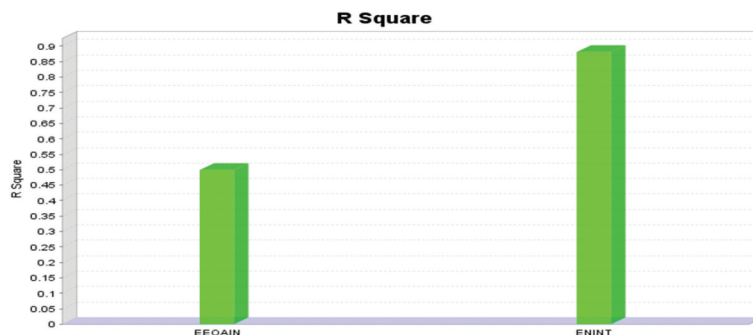


Table 5. Medication

	(O)	(M)	(STDEV)	(O/STDEV)	P Values
ECOMP -> EEOAIN -> ENINT	0.263	0.263	0.115	2.291	0.011
ESE -> EEOAIN -> ENINT	0.330	0.325	0.114	2.903	0.002

Table 6. R-square

	R Square
EEOAIN	0.499
ENINT	0.881

loadings were compared with that of the corresponding constructs and they should be higher than all of the other constructs' loadings (Ngah et al., 2015). Table 3 confirms discriminant validity.

Following the validity and reliability tests, the Structural Model Evaluation Measurement model was attained. The study hypotheses were then tested via bootstrapping using a re-sample of 5000 following the suggestions of (Hair et al., 2016).

Table 5 shows each construct's path coefficient and the corresponding significance level. All five hypotheses were supported as significant relationships with the endogenous variables were proven.

Thus, entrepreneurial self-efficacy is reported to have a positive and significant influence on entrepreneurial intentions. Similar findings were reported in studies like, and. Several scholars have also confirmed that there exists a significant positive association among entrepreneurial intention and entrepreneurial self-efficacy of college students (T. Ahmed et al., 2017; Aloulou, 2016; Dougherty, 2016; Gorgievski et al., 2018; Hagel et al., 2014). The study also found positive and significant effects of entrepreneurial self-efficacy of students on their entrepreneurial intention. During entrepreneurship, higher entrepreneurial self-efficacy increases confidence among students and allow them to effectively use entrepreneurial knowledge, explore their entrepreneurship path, improve competence level, and initiate entrepreneurial practices, which would ultimately lead to enhancement in students' entrepreneurial intention.

The mediating role of the entrepreneurial education on artificial intelligence is shown in Table 5 . The findings show that the EEOAIN mediate the relationship between the ECOMP, ESE, and EMINT. The results revealed that students' entrepreneurial self-efficacy has the most significant and positive impact on their intention to become an entrepreneur. More specifically, entrepreneurial self-efficacy highly affects students' entrepreneurial intention both directly and indirectly.

The items of **EEOAIN, and ENINT** acceptable R2 values of 0.499 and 0.881, respectively, which are within the threshold values recommended by Henseler (2018). In terms of effect size (f^2), the p value can demonstrate the existence of an effect but not its size (Henseler, 2018).

7. Conclusion

Past studies had used samples of students in examining the relationship between ESI and EIs (Hoque et al., 2017; Nabi et al., 2017). This current study also derived a similar outcome for the said relationship. In terms of theory, this study diverges from that of Tsai et al. (2016). Instead of agreeing with the author's argument that entrepreneurs are driven solely by intrinsic factors. This study emphasizes that both intrinsic (ECOMP) and extrinsic (EEOAIN) factors are responsible for doing so. The proposed model incorporates a more wide-ranging view when it comes to critical additional precursors, i.e., ECOMP and education.

The model is contextually suitable for motivating individuals to become self-sufficient and for enabling them to harness their creativity through entrepreneurial and profit-driven endeavors. This study has significant implications for entrepreneurs, practitioners, and governments alike. The findings provide a guideline for governments in establishing an environment that supports the individual drive to embark on entrepreneurial endeavors. Among the stimulus for encouraging entrepreneurship include the provision of loans with reasonable interest rates and knowledge sharing sessions by prominent entrepreneurs.

The findings of the study highlights that the Entrepreneurship education can stimulate EC in people, bringing out their creative side that could prove to be viable for starting a business. People with EE can use ECOMP to successfully start a business. Thus, Neom actively seeks the best evolving technological solutions that can be jointly validated for commercial deployment across-the-board. The technological innovations are not limited to only local or national endeavors, but also international firms and technologies. Thus, the study has broached an argument that it is mandatory to educate the young entrepreneurs about the entrepreneurial opportunities in smart cities, via entrepreneurial education on artificial intelligence (EEOAIN). The study concludes that the entrepreneurial competency and entrepreneurial self-efficacy has significant impact on the entrepreneurial intentions in smart city of Neom Saudi Arabia, and entrepreneurial education on artificial intelligence mediates the relationship between entrepreneurial competency and entrepreneurial self-efficacy and the entrepreneurial intentions in smart city of Neom Saudi Arabia.

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Author's contribution

To start with, the conceptual framework adopted in this study was developed in line with the identified gaps in literature, which were drawn from empirical evidence identified from the previous research and supported by the two underpinning theories. Specifically, the

hypothesized model has been supported and explained from two theoretical perspectives, namely the micro-foundation perspective of the resource-based theory and from the perspective of contingency theory. This study then incorporates EEOAI as a mediator to better explain how entrepreneurial competencies and entrepreneurial self-efficacy influences entrepreneurial intention. Drawing inferences from the above empirical findings and discussions, this present study has made appreciable theoretical contributions to the existing body of literature, specifically, in the area of entrepreneurial intentions in smart city.

Declaration

The authors have no competing interest, nor any conflict of interest, and the data is available on demand. The research is self-financed.

correction

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