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Strategıc Innovatıon Management And Sustaınable Entrepreneurshıp Of Saudı Arabıa In 2021-2022-2023: Regression Analysis Of Entrepreneurship Conditions (Efcs) On Gem Database

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ABSTRACT:
Entrepreneurship has a vital effects on society, wealth, economy and human well-being. An entrepreneur is an important driver of economic development. Entrepreneurship not only take advantage of opportunities and advantages but also stimulate productivity and increase employment rates, develop the fundamental innovation required to find solutions to social and environmental global problems and necessities determined as UN Sustainable Development Goals (SDGs).
Due to increasing problems and needs, governments and all stakeholders in the ecosystem need a structure that encourages more sustainable entrepreneurial innovations and regulates entrepreneurial ecosystems around the world. In order to perfectly structure this structure and the systems connected to this structure on earth, more and more realistic, error-free and reliable data is needed. In order to achieve successful sustainable innovations, the dynamics, deficiencies, etc. of the entrepreneurship ecosystem. The entire picture containing the information must be drawn correctly and will correct the deficiencies and fill in the deficiencies in the picture; In short, every detail, flow, etc. in the entrepreneurship ecosystem. Strategies that will take it to the optimum level should be developed. Support and incentive mechanisms should be planned to motivate new entrepreneurs who act in line with these strategies.
In this regard, in this study, the Global Entrepreneurship Monitor (GEM), which provides access to every basic information about the entrepreneurship ecosystem of each actor in the entrepreneurship ecosystem in the most accurate way and has been publishing annual reports containing information about the entrepreneurship ecosystems of countries around the world for 25 years and collecting its data directly from entrepreneurs and experts, is based on its data. has been used. The study used data for the years 2021-2022-2023 from Saudi Arabia, the country that gained the most remarkable rapid development momentum in the report in question and managed to be among the top three countries in the report with all its advanced entrepreneurship factors.
In this study, these four different independent variables are; It was determined as entrepreneurial motivation, advanced technological resource supply, access to technical experts and cooperation with stakeholders. These independent variables, which are thought to affect the dependent variable "the tendency of new entrepreneurs to develop sustainable innovation"; "Do entrepreneur motivation, advanced technological sourcing, access to technical experts and collaboration with stakeholders contribute to the tendency of startup entrepreneurs to develop sustainable innovation?" tested with the research question.
KEY WORDS: *Sustainability, Sustainable Strategic Management, Sustainable Innovation, Sustainable Entrepreneurship, Sustainable Innovative Management*

INTRODUCTION

In the past; innovation and sustainability strategies were perceived as competing strategies within companies. Today researchs prove that many companies now see these strategies as friendly and mutually reinforcing. Further, sustainability has now become a must for innovation.
In order to overcome the negativities that pose obstacles to sustainability, such as climate change, social injustice and unconscious consumption of resources (Adams, 2021), it is vital to have an innovative perspective. Because this perspective brings the innovations. For sustainable solutions, it is necessary to follow new high technologies and benefit from the advantages of these technologies without ignoring economic goals (Javaid et. al., 2022). Sustainability is an crucial source of motivation for the development of innovative solutions and the invention of advanced technology integrated applications. Without innovation and innovative approaches, achieving sustainability goals in the long term is unimaginable. Although sustainability is a motivation for innovations, innovations are also a respectable driving force for sustainability (Shahzad et. al., 2022).

In order to achieve accomplished innovations, effective business models must be developed and realistic business plans must be prepared. The reason for this is quite clear. Defining wrong business models leads to unnecessary expenses, waste of resources and time (Snihur and Bocken, 2022). Call to action: The impact of sustainable innovation management on ecosystem, society and planet. A business model that cannot use time and resources effectively cannot be expected to be sustainable. According to clasical management approaches, management systems have carried out their activities by setting more immediate or short-term goals (Haessler, 2020). However, today, setting long-term managerial goals and continue operating these goals for many years are the only criterion of success for companies.

When evaluated in terms of sustainability, it can be seen that some companies are making unnecessary expenditures by allocating excessive resources to R&D expenses (Ko, Chung and Woo, 2021). Besides some companies' business models have been supported in a way that does not reflect reality and cannot adequately adapt to the requirements of the information age. Companies that produce innovations do not attract demand from customers, and implement useless unsustainable practices with business models that causes environmental and social problems (Bocken and Short, 2021). First of all these problems have mainly increased the carbon emissions on the atmosphere. Today, unsustainable market giants have become the biggest consumers of the world's limited natural resources such as water and have given the biggest harm to the environment and the future of humanity, let alone environmentally friendly practices, by consuming limited resources in the most inefficient way.

The situation is different for companies known for their sustainable innovations. Although companies that innovate products for customers' sensitivity to green and continue their activities with environmentally friendly and innovative approaches may seem to be penalized in the short term with the extra costs they incur (Andries and Hünermund, 2020). In fact they are actually rewarded in the long term with both the high customer loyalty and sales revenues they achieve. They can easily achieve their goal of staying at the top of the market with their environmentally friendly brands for long periods of time.

On the other hand, leaders of large corporate companies with unsustainable practices may sometimes be subject to serious reactions from their stakeholders. For example, Waste Pro USA, a traditional waste management company, has incorporated advanced technologies into its own structure while ignoring the damage that it causes to the environment (Alexander and O'Hare, 2023). This transformation journey, which will increase the profitability of the company, has attracted the reaction of the company's stakeholders. There were many stakeholders who were suspicious of the potential damage that could be caused by the sustainable transition of the company and aimed to prevent these damages and opposed the transformation. These stakeholders managed to create a significant public opinion by resisting the transformation of the company, and this caused the company's sales revenues to decrease significantly and the company to lose customers (Salvia et. al., 2021). A significant public reaction occurred due to the hypocrisy in the activities and efforts said to be made to make HORIZON ORGANIC, a milk producer, more environmentally friendly, and as a result, the CEO was dismissed. As seen in these examples, it highlights the tension that can arise between sustainability initiatives and old expectations (Jauernig and Valentinov, 2021).

Sustainable innovations, customers, employees, suppliers, etc. focus on the continuous improvement of the products or services offered and the processes of developing these products and services in order to support the sustainable future for all internal and external stakeholders. Sustainable innovations also ensure the growth of nature and society. Sustainable innovation developers do not ignore employees who take an active role in the processes, make continuous improvements within the organization by organizing trainings to increase the social sensitivity and environmental awareness of their workforce (Piwowar-Sulej, 2021).

Sustainable innovations encourage the reuse of products through recycling or upcycling activities (Tarabashkina, Devine and Quester, 2022). Sustainable innovators who adopt the philosophy of zero waste management support the circularity of products and eliminate redundant processes in the workflow by process renovation, manage the entire organizational functions and operations efficiently. Sustainable innovators, the pioneers of stable growth and development, ensure the safe growth of enterprises and increase their profitability (Edwards, 2021).

The main driving force in increasing the number of successful sustainable innovations day by day is process optimizations and renovations (Passoni et. al., 2021), which also concern existing businesses. For a new entrepreneur, making a new discovery and developing an innovation from the very beginning is a very arduous and costly process. It is extremely enigmatic whether the discovery or invention that is successfully developed at

the end of this process finds a buyer in the market. In this regard, steps to be taken to improve existing products or services are preferred by both new entrepreneurs and existing small, medium or large-scale businesses. When improving products and processes through renovations and optimizations, less R&D is spent, more time is saved, and most importantly, less investment risk is incurred. Therefore, the main motivation for the rapid increase in successful innovations is based on the popularity of renovations and optimizations by many entrepreneurs and businesses. This is why DAF, a major engine manufacturer, has recently implemented many successful sustainable innovations (Çelik and Divanoğlu, 2023;Berge, 2015). It is the positive outcome of the optimization efforts of DAF's design engineers to develop a more productive design in order to reduce the amount of materials used for engine production. By changing the design, reducing the amount of materials used in DAF engines and reducing the engine volume, DAF has both reduced purchasing costs and achieved a more ergonomic engine innovation. With the developed engine, CO2 emissions have also been reduced and a significant contribution has been made to preventing air pollution by reducing carbon emissions.

1.1.1.Sustainable Innovations and Startups

Developed social awareness supports sustainable activities blended with innovations. As a result of social awareness, sustainability and innovation become inevitable and intertwined for today's business world. In recent years, businesses have been taking critical steps for a more livable future with sustainable innovations. Most businesses have to face risky preparation processes for the successful sustainable innovations they achieve. After all, achieving success depends on defining major threats as opportunities and taking advantage of these opportunities as much as possible.

Every individual with the determination to transform threats and environmental negativities into serious opportunities is actually a successful entrepreneur candidate. Being a successful sustainable entrepreneur requires unconditional commitment to sustainable innovation, dedication, perseverance, courage, passion, patience, optimism, innovation and most importantly has a visionary attitude (Weidinger, 2014). When entrepreneurs bravely embrace this interaction between sustainability and innovation, they gain the key to a unique sustainable development, transformation, recovery and growth. Considering the impact of sustainable innovations on promoting social progress, it would be a reasonable inference to argue that the entrepreneurs who create these innovations are actually important agents of social change in society. Entrepreneurs are the architects of the future, and especially innovative entrepreneurs are important actors in the construction of a sustainable future.

When entrepreneurship is evaluated in the context of innovation, two basic approaches emerge: behavioral and resource dependence approaches (Autio et. al., 2014). The most well-known and accepted distinguishing feature of entrepreneurship from business management is innovation. However, it is possible for entrepreneurs who internalize all innovative approaches and processes to compete successfully in saturated markets with tough competitive conditions and to have sustainable success.

Entrepreneurs today embrace all innovative elements and by internalizing them, they can gain a competitive advantage for their products and services in the market (Carayannis, Samara and Bakouros, 2015). Entrepreneurs participate in communication networks where they can follow advanced technologies and digital developments and receive all trainings, workshops, etc. where they can gain innovation management skills. They show up at events. Entrepreneurs develop various collaborations to gain access to advanced technology, innovative methods and skills, and advanced technological expertise, and also take as active stakeholders as possible when starting a new initiative (Ketchen, Ireland and Snow, 2007). In this way, they reduce the risks they undertake when starting their venture and can continue their work to realize new investment ideas by sharing their expenses.

Collaboration between the entrepreneur, production team and design engineers is also critical when creating sustainable production processes. With the availability of digital infrastructure for design engineering, entrepreneurs can improve product and process quality by adapting qualified data to product designs and create more auditable, controllable and traceable production road maps with data (Bergholz, et.al., 2024).

Entrepreneurs who are successful in constantly implementing new and different entrepreneurial ideas are called serial entrepreneurs, and with serial entrepreneurship, which is one of the most popular types of entrepreneurship today (Plehn-Dujowich, 2010), entrepreneurs can easily acquire knowledge and experience in a wide range of specializations. For example, serial entrepreneurs are interested in various industries and the markets that these industries address, suppliers whose customers exist in the markets, etc. They have information about all details. Serial entrepreneurs, who are even knowledgeable about government policies that determine

market conditions, make significant contributions to the global economy and act as important actors in improving industry standards (O'Connor, 2013).

The most critical success criterion of sustainable innovations; In a startup, the entire project team and in a corporate company, all employees from the highest level to the lowest level have the initiative and authority to make decisions regarding the innovation process. Successful sustainable innovations are born in business environments where ideas can be expressed freely. Such environments only emerge in open organizational systems with a horizontal hierarchy. Whoever the decision makers are, their innovative approaches have a great impact on the successful progress of the innovation process. Therefore, every effort that will contribute to the development of human resources and to gaining an innovative perspective and exhibiting innovative attitudes is extremely important in achieving the success of the enterprise and maintaining its success for many years (Santos, et.al., 2018; Çelik, 2024).

At the initial stage, startups are focused on progress and development rather than research and analysis, unlike large corporate companies. Entrepreneurs achieve many innovations with the consultancy and support they receive. These consultancies are technical consultancies because entrepreneurs cannot find sufficient capital to purchase machinery that will enable them to do research and development (Lerner, 2002). The centers or companies from which technical consultancy is received provide entrepreneurs with laboratory analysis, prototype development, design preparation, experimentation, etc. It offers a lot of support. Supporting entrepreneurs who have difficulty in accessing advanced technologies and resources due to lack of financial capital in operational processes helps their development. After a process in which financial constraints are reduced and eliminated over time, entrepreneurs will be able to carry out R&D activities focused solely on research and analysis, like large corporate companies, and achieve successful permanent innovations.

2.CONCEPTUAL FRAMEWORK AND HYPOTHESES

It is observed in the literature that newly emerging initiatives have deficiencies in measuring sustainable business performance and sustainability in financial reporting systems (Tencati ve Pogutz, 2015). Due to the scarcity of data and resources in this field, realistic scales have not yet been developed. Since realistic reporting cannot be made until the data tracking, data collection and database creation stages are fully completed, an effective and comprehensive scale model to measure sustainability has still not been developed (Singh, et.al., 2012).

In order to develop a scale model that can measure the sustainable innovation performance of startups, the motivation of the entrepreneur for sustainability, the supply of advanced technological resources required for innovation development, access to technical experts and lack or scarcity, if any; (Halme and Korpela, 2014) to resolve these, it is necessary to collect and analyze collaboration data with stakeholders.

In this study, it is thought that it is possible to develop an effective sustainable innovation scale to measure the tendency of new entrepreneurs to develop sustainable innovation by accessing these 4 different data (entrepreneur motivation, advanced technological resource supply, access to technical experts and cooperation with stakeholders). In this regard, the research question of the study is determined as "Do entrepreneur motivation, advanced technological resource provision, access to technical experts and cooperation with stakeholders contribute to the tendency of startup entrepreneurs to develop sustainable innovation?".

2.1.Hypotheses

There are 4 main hypotheses in the study. In order to test the relationships between the independent variables between the dependent variable 4 main Hypotheses have been hypothesized. These hypotheses are mentioned below:

Hypothesis 1: *As the motivation of the entrepreneur in a country increases, the tendency to develop sustainable innovation increases in that country.*

In order to increase tendency to develop sustainable innovation in one country; The government could take some precautious and by them they could support and motivate entrepreneurs who intend to start new business ventures.

Hypothesis 2: *As the supply of advanced technological resources increases in a country, the tendency to develop sustainable innovation increases in that country.*

To motivate entrepreneurs being a part of entrepreneurship ecosystems and to increase tendency to develop sustainable innovation in one country, the advanced technological sourcing should be increased.

Hypothesis 3: *As access to technical expertise increases in a country, the tendency to develop sustainable innovation increases in that country.*
In order to increase tendency to develop sustainable innovation in one country, the access of the technical experts should be improved.
Hypothesis 4: *As cooperation with stakeholders increases in a country, the tendency to develop sustainable innovation increases in that country.*
If cooperation with stakeholders in a country's entrepreneurship ecosystem increases, sustainable innovation development education increases in that country.

3.METHODOLOGY

3.1.Data set

GEM is an international report that was started to be created with a joint project signed between the USA and the UK in 1999. Published annually, GEM "Global Report" provides information about the current status of entrepreneurship and entrepreneurship ecosystems globally.

While GEM's first report included data on approximately 10 countries, today this report includes data on approximately 120 countries. The GEM report is the most sustainable and reliable source of information published about entrepreneurship dynamics in the world. When GEM shares data about the entrepreneurship ecosystem in participating economies, it actually enables people to discover the opportunities available in the environment and make some realistic predictions to start a business. GEM, which has a 25-year-old database, has created this database by interviewing more than 170,000 people, including experts and entrepreneurs of all ages. Entrepreneurship research has been conducted in cooperation with more than 370 experts to date for the database data containing data from 120 countries on 5 different continents.
National Entrepreneurship Context Index (NECI) included in GEM report called NECI evaluates the entrepreneurship ecosystem of every economy and 13 entrepreneurship conditions called EFCs. NECI, included in the report, has attracted a lot of attention recently due to its connection with sustainability and the Sustainable Development Goals set by the UN. Aiming to strengthen local, national and international development plan strategies and sustainable development; Thus, the National Entrepreneurship Context Index NECI data, which supports economic, social and environmental development, will also be used in this study. The sample of this study includes the data between the years 2021 and 2023. In the GEM report in question, Saudi Arabia is the country that gained the most remarkable rapid development momentum in entrepreneurship activities and managed to be among the top three countries in the report with all its advanced entrepreneurship factors. -Data for the years 2022-2023 were used. The reason for using 2021-2022-2023 expert data in the study is that in these years, opinions from experts began to be received on new topics suitable for the research topic of the study. In the last four years, data has been collected by asking experts for additional opinions on entrepreneurship priorities regarding environmental and sustainable practices and entrepreneurship examples for young and female entrepreneurs in disadvantaged groups.
In the study, start-up entrepreneurs refer to the population aged 18-64 who is a start-up entrepreneur or business owner of a new enterprise who shows Total Early Stage Entrepreneurial Activity (TEA) as determined by the GEM Mature Population Survey. Total Early Stage Entrepreneurial Activity (TEA) is mentioned as the prevalence rate of entrepreneurs in the business people who are actively engaged in business start-up processes at the stage before the birth of the enterprise (emergence). It is the phase that covers 42 months after the start-up of the initiatives (Monitor, 2017).

Early aged enterprises are whose owners pay regularly up to 3 months maturity. Newborn enterprises have the payment period 3 to 42 months. Further, enterprises have more than 42 months payment period are called mature. Payment period represents that the time the owner gets revenue after break even point. The two types of enterprises represent two types of entrepreneurs. These entrepreneurs have been mentioned in the GEM data set as two separate variables. In the begining of the questionairre, participants have been asked about having an initiative or just being a partner of their own enterprises. If the answer is "yes", the variable of this question gets the value of number one. On the other hand, if the answer of the question is "no" the variable gets the value of

number zero. By doing this seperation, the ratio have been determined as newborn or mature entrepreneur including the 18-64 aged participants.

3.2.The dependent variable

The dependent variable is the tendency of startup entrepreneurs to develop sustainable innovation. Tha data was collected directly from GEM dataset. The dependent variable of this study is a binary (dichotomous) variable that takes one of the values 0 or 1. If the variable takes the value 1, there is a tendency for a country to develop sustainable innovation.

3.3.Independent variables

Table 1: Entrepreneurship Conditions (EFC)

Entrepreneurship Financing: Providing funding of new ventures
Fiscal Policy: Easiness of access to finance and funds
Government Policy – Compliance and Support: Incentives and supports for new initiatives
Government Policy – Bureaucracy and Taxes: Regulations suitable for the development of new enterprises
Government Entrepreneurship Programs: Existence of qualified and applicable support programs
Entrepreneurship Education at School: Presence of entrepreneurship education in the curriculum
After-School Entrepreneurship Education: Existence of entrepreneurship training
Research and Development Transfers: Availability of qualified technical experts and research support
Technical and merketing infrastructure: Existence of qualified and professional infrastructure and services
Ease of Entry – Collaboration with stakeholders, relevance of market dynamics (transparent, free and growing market)
Entrance easiness- Regulations: Existence of incentive regulations
Physical Infrastructure: High-tech, available and affordable resources
Entrepreneurship Motivation: Environment, cultural norms that support entrepreneurship

Source: (GEM, 2024)

Among the 13 entrepreneurship conditions that regulate the entrepreneurship environment, known as Entrepreneurship Conditions (EFC), listed above, 4 conditions are used in this study. These; These are Research and Development expenditures, Entrance easiness, Physical Infrastructure and Entrepreneurial Motivation. The independent variables of the study determined by using the data of the 4 mentioned entrepreneurship conditions (EFC) are as follows: 1) entrepreneur motivation, 2) advanced technological resource supply, 3) access to technical experts and 4) cooperation with stakeholders. Data on independent variables covering a total of 3 years, 2021, 2022, 2023, were directly accessed from GEM 2021-2022-2023 reports.

The data regarding these conditions was obtained by using the findings of entrepreneurship research conducted by experts and the opinions received as a result of surveys. Each expert determined by GEM and approved to comply with certain criteria has knowledge and experience in the entrepreneurship ecosystem. The experts whose opinions were taken included entrepreneurs, business representatives, economic journalists, academics, finance experts, policy regulators, etc. is formed.

3.4.Analysis Method

Expert ratings are then combined to obtain scores for each EFC. By making comparisons with the information of national experts in different economies; The current situations of the countries are evaluated. If the statement about each entrepreneurial condition is completely false, it takes the value zero (0), if it is neither true nor false, it takes the value five (5), and if it is completely true, it takes the value ten (10). In this study, independent variables are evaluated with an 11-point Likert scale. Since the experts' answers contain non-parametric data, the Likert scale was preferred to collect opinions about the entrepreneurship ecosystem.

Regression Analysis was preferred as the method in the study. The reason why this analysis method is preferred is that the data can be grouped homogeneously. Data that can be grouped forms a meaningful whole and significant differences may occur between groups. Groups consist of sub-factors that allow detailed analysis. In other words, regression analysis allows examining the independent variables / sub-factors (motivation sources, reasons) that affect the dependent variable. It is expected that the findings will yield meaningful results after

analyzing the data of 4 separate factors that are thought to affect the motivation of new entrepreneurs in the sustainable innovation development processes in the entrepreneurship ecosystem of Saudi Arabia in 2021-2022 and 2023.

The dependent variable of this study is a binary (dichotomous) variable that takes one of the values 0 or 1. If the variable takes the value 1, there is a tendency for a country to develop sustainable innovation. Therefore, as a function of the independent variables considered in this study, the probability of this study's dependent variable is 1 which is attempted to be estimated. In this case, the logistic model given below can be used to test the hypotheses: $\Pr(yi = 1 \mid \boldsymbol{xi}') = e(\boldsymbol{xi}'\boldsymbol{\beta}) \, 1+e(\boldsymbol{xi}'\boldsymbol{\beta})$ (1) Here, the observation at the participant level is the dependent variable y, $\boldsymbol{x}'$shows the vector of independent variables and the parameters taken by the independent variables. This model is estimated by regression method.

The research model is as follows: $\Pr(yij = 1 \mid \boldsymbol{xij}', \boldsymbol{uj}) = e(\boldsymbol{xij}'\boldsymbol{\beta}+\boldsymbol{zij}\boldsymbol{uj}) \, 1+e(\boldsymbol{xij}'\boldsymbol{\beta}+\boldsymbol{zij}\boldsymbol{uj})$ (2)

Model (1) is different from Model (2). Model (2) examines the factors affecting the probability of observing the tendency to develop innovation in two ways: "fixed effects" and "random effects". In Model (2), subscripts i and j indicate the observation at the individual level and the country to which the individual belongs, y the dependent variable, $\boldsymbol{x}'$ the vector of all independent variables and the parameters taken by the independent variables, respectively. The $\boldsymbol{xij}'\boldsymbol{\beta}$ part of the model represents the fixed effects related with probability of the dependent variable taking the value 1. The other part represents the random effects related with probability that the dependent variable $\boldsymbol{zij}\boldsymbol{uj}$ takes 1 as a value. The $\boldsymbol{zij}$s in this section give the random effect variables that can be modeled as intercept and/or slope, and the $\boldsymbol{uj}$s give the random effect parameters.

4.RESEARCH FINDINGS AND DISCUSSION

Sustainable innovations initiated by new entrepreneurs pave the way for important innovations, even if they are not radical enough. Being able to develop sustainable innovation for entrepreneurial facilities that play an active role in sustainable development creates a significant increase in their profitability, which significantly helps the emergence of other potential innovations. In addition, sustainable innovations promote products that have both qualitative added value and are effective in terms of cost performance in the long term. Since it has these and many similar advantages, appropriate technological infrastructure should be provided to support R&D activities of entrepreneurs for sustainable innovations and social needs, if any, should be met as soon as possible.

Since 2020, Saudi Arabia's early stage entrepreneurial activities have rapidly improved. Age really matters considering the term entrepreneurship. In Saudi Arabia, youth concerns more new ideas , innovation and discoveries than old age people. Since young people tend to digital technologies and desire to update themselves more than old people, young people have received trainings about high technologies. When young people are well educated about Technologies, the entrepreneurial activities among the people 25-34 aged and 35-44 aged have reached the top.

While people who are aged 35-44 are at 11.9%, the TEA rate of youth living in Saudi Arabia still delay significantly, and the differences increase with people aged 35 and over. In comparison to other innovation-driven economies, the TEA rate for the 18-24 aged people have the lowest rate equals to 3.0% and this rate is clearly below average rate of 7.6%. The entrepreneurs aged 25-34 have the rate of 10.4% which is below the average rate of innovation-driven economies' rate of 11.9%. Although the present rate is higher than the rate in 2016.

Surprisingly the results for the 35-44 aged entrepreneurs are significant. The rate 11.9% is above the rate of Saudi Arabian average of 11.3%. Besides, people over the age of 45 have the rate of 9.3% and this rate is above the rate of innovation-oriented economies which ise 8.6%.

Saudi Arabia is making strong efforts to encourage young people to become entrepreneurs. Entrepreneurial efforts have increased by more than 7% compared to 2018, reaching 36% of the older people. Start-up activities have increased by almost 2% and new entrepreneurial activities have increased by 26%. To sum up, these two concludions represent that there is a significant increase in total entrepreneurial activities in Saudi Arabia recently. The rate has reached about 15%. In past years, Saudi Arabia had reported relatively low rates of entrepreneurial activities. By 2019, this rate has increased by 73% and the rate increased over 5%. Moreover, the work stoppage rate had decreased and had declined almost the rate of 14% in 2018 to 2% in 2019.

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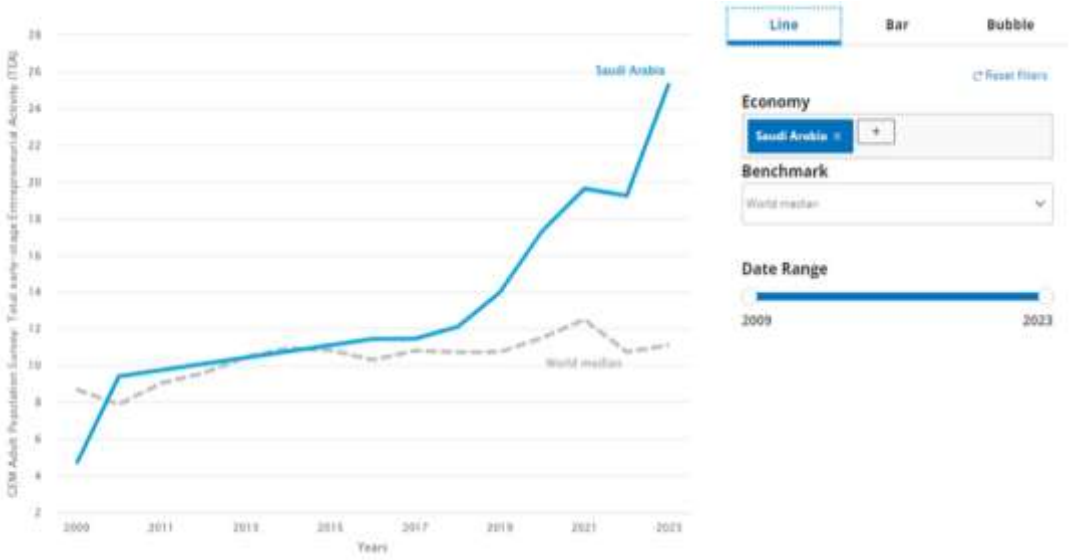
Table 2: 2021-2022-2023 Total Early-Stage Entrepreneurial Activity (TEA) Rate of Saudi Arabia

Economy	2021	2022	2023
Saudi Arabia	19,62	19,24	25,34

Source: (GEM,2024)

Entrepreneurial facilities in Saudi Arabia are primarily managed by individuals and small groups. Sole proprietorship accounted for approximately 57% of all entrepreneurial facilities and 70% of established their ownership. The owners' average is in both levels: 1.9 for TEA and 1.7 for mature entrepreneurial activity. The 2019 results of TEA illustrate there is a high new job opportunities among new Saudi Arabian entreprenurs. The current rate of entrepreneurial facilities by no employees is near to zero.
Besides nearly 75% of entrepreneurs dedicate that they have more than five employees (compared to 62% in 2018 data). Almost 25 percent of entrepreneurs have one to five employees. Saudi Arabian entrepreneurs are very optimistic about new job opportunities in the near future (about five years): 13% of entrepreneurs expect to establish 1-5 jobs, 51% expect to set 6-19 new jobs, and 36% of entrepreneurs plan to hire more than 20 new employees. Mature entrepreneurs' expectations are moderate and still positive: about 70% predict they will have 1-5 jobs, 23% predict they will have 6-19 jobs, and 7% predict they will create more than 20 jobs. In conclusion, this year's entrepreneurial activity showed that there are hopeful signs in the Kingdom.

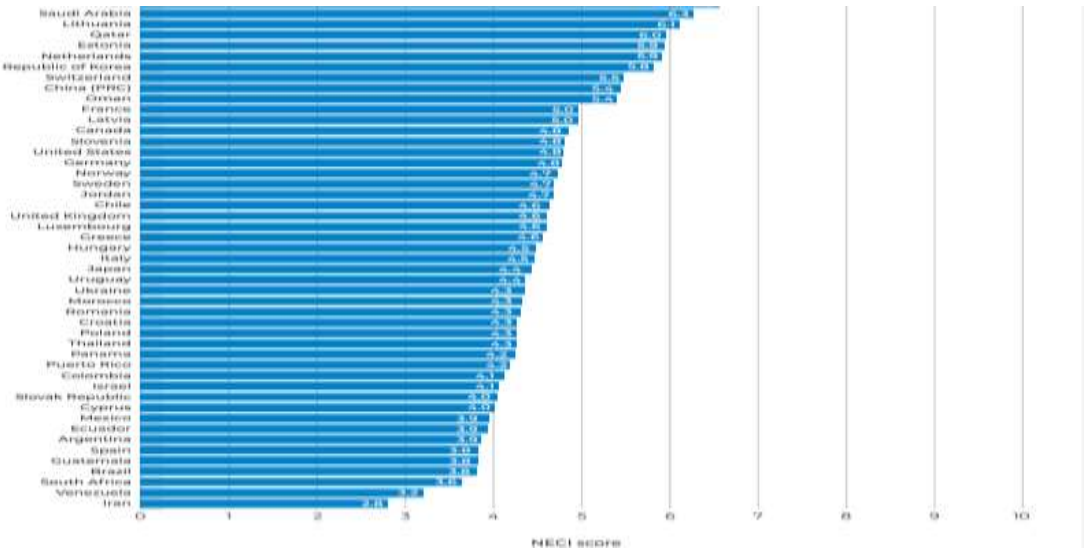


Graph 1: 2009 to 2023 Total Early-Stage Entrepreneurial Activity (TEA) Rate of Saudi Arabia
Source: (GEM,2024)

Many economies develop their certain EFCs and some economies on the contrary regress. It is quite difficult to observe how entrepreneurship factors change on a national scale every year and to make comparisons between economies in this context. In 2021, GEM made a decision to ease this difficulty. In this decision, a single common indicator was determined that shows the quality of the entrepreneurial environment of an economy. This indicator is the National Entrepreneurial Context Index or NECI. NECI is defined as the average EFC score of a particular economy. Graph 2 shows the NECI 2023 results. According to Graph 2, many economies with many EFCs received sufficient scores in NECI in 2023.
The 2022 GEM Report finds that in a fairly small number of countries (South Africa, Saudi Arabia and the UAE), there is a proof of improvemenst in EFCs since the year 2021. However almost all economies the case and conditions are sadly not the same and slower change is likely. It can be said that. EFC's Government Policy: Support and Compliance and State Entrepreneurship Programs scores decreased in most countries, and it could be observed that each EFC score decreased over the period when country data were examined one by one. For 9 out of 13 EFCs, it was observed that many more countries experienced a decrease in scores between 2021 and 2023, and although these changes were quite small, the decrease in EFC scores compared to 2021 caused pessimistic comments.

In 2023, on the contrary, there was an increase above expectations for the EFCs most directly related to the government, as expected, for both research and development activities, financial EFCs and commercial, technical, physical and professional infrastructure support. The ongoing Global Reports have published high score indicators for two education EFCs, particularly entrepreneurship education in school. It is pleasing that, unlike the 2021-2022 interval, there are more economies showing improvement rather than a decrease in these scores in the 2022-2023 interval. According to data, 7 countries have improved entrepreneurship education in schools by approximately 30%. In 2023, the score increase in economies was greater than the decrease in both market dynamics and social and cultural norms. This is evidence that many economies have recovered strongly after the pandemic and social support for entrepreneurship has improved. All in all, it is hard to explain the results as signs of developments in national entrepreneurship communities by the pandemic, especially as support packages for business have decreased.

In recent years, economies such as Saudi Arabia, whose EFC scores have increased significantly, have increased the rankings. Further, there is some uncommon relationship in terms of income; top 6 scores of 10 NECI are from Level A economies, and top 7 scores of 10 NECI are from Level C economies. High or low income levels are not guranteed to start a new business or venture. There are many factors that support or hinder achieving a high-quality environment for enterprise growth. However, Saudi Arabia is at Level A in the NECI Scoreboard and the positive development achieved in this short time is an indicator of success. Because the average NECI scores of common economies having 13 EFCs have changed to a lesser extent over time. To illustrate, a decrease was observed in the NECI scores of 25 of the 40 economies which participated in GEM NECI survey in both 2022 and 2023, the score of one remained unchanged, and 14 had an increase in their scores. When the radical change in the NECI score in 21 of the 40 countries in question is compared with the 2022 scores, it can be observed that the change has slowed down, which is a pessimistic picture in general.

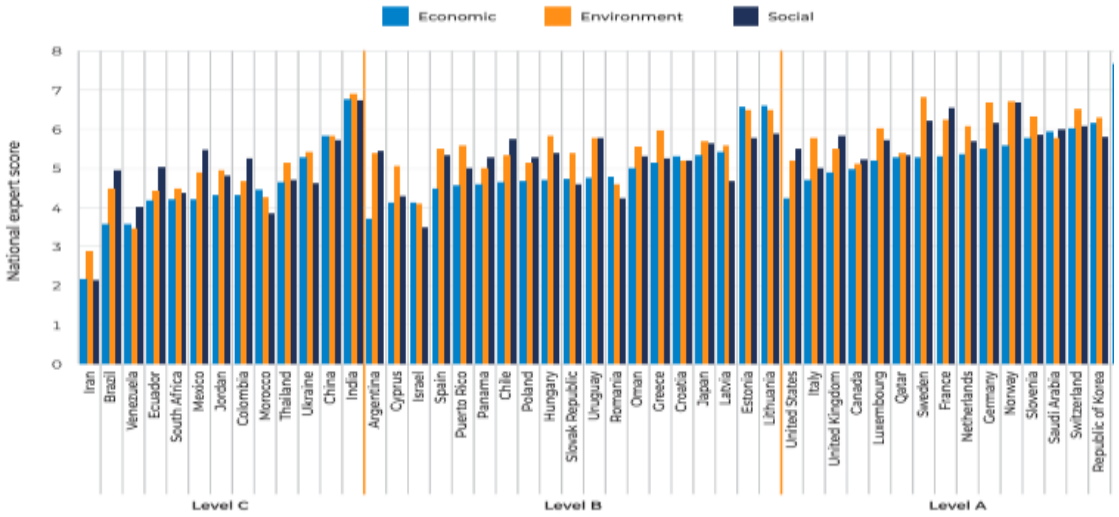


Graph 2: 2023 National Entrepreneurship Context Index (NECI)

Source: (GEM National Expert Research, 2023)

The EFC scores of economies have increased significantly over time. Thus the rankings of these economies also increase. Due to the imperfect income levels; top 6 NECI scores of 10 are from Level A economies, and top 7 NECI scores of 10 are from Level C economies. Yet, the two countries India and China are both at Level A. when the top ten list is examined India had top 4 in the list in 2022, and top 2 in 2023. On the other hand China hd top 1o in the list in 2023. Lithuania which listen in Level B countries list improved to top 6 in 2022 and top 4 in 2023. Estonia which listen in Level B countries list improved to top 10 in 2023. Therefore, having high income level has no guarantee of a positive business environment for starting a new venture; just as low income prevents access to a high-qualified business environment to start new venture and grow this venture as well. Although the most economies have the average NECI scores of 13 EFCs have changed over time, this change has happened very slowly. Of the 40 economies participating in GEM NECI survey in both years 2022 and 2023, 25 countires have oberved a decrease in their NECI scores, and just one of these countries remained unchanged,

and 15 countries' NECI scores have increased. In 20 of these 40 countries, the change in NECI score was less than 6% of the year 2022 NECI score. The most visible increases happened in Poland and Oman's NECI scores. O n the contrary, the biggest decreases happened in Israel and Iran's NECI scores. To sum, Israel and Oman's NECI scores are changed their places in the NECI list; Oman's NECI scores increades and Oman took place top 11 in the list and Israel's NECI scores decreased and took place 38 in the list.

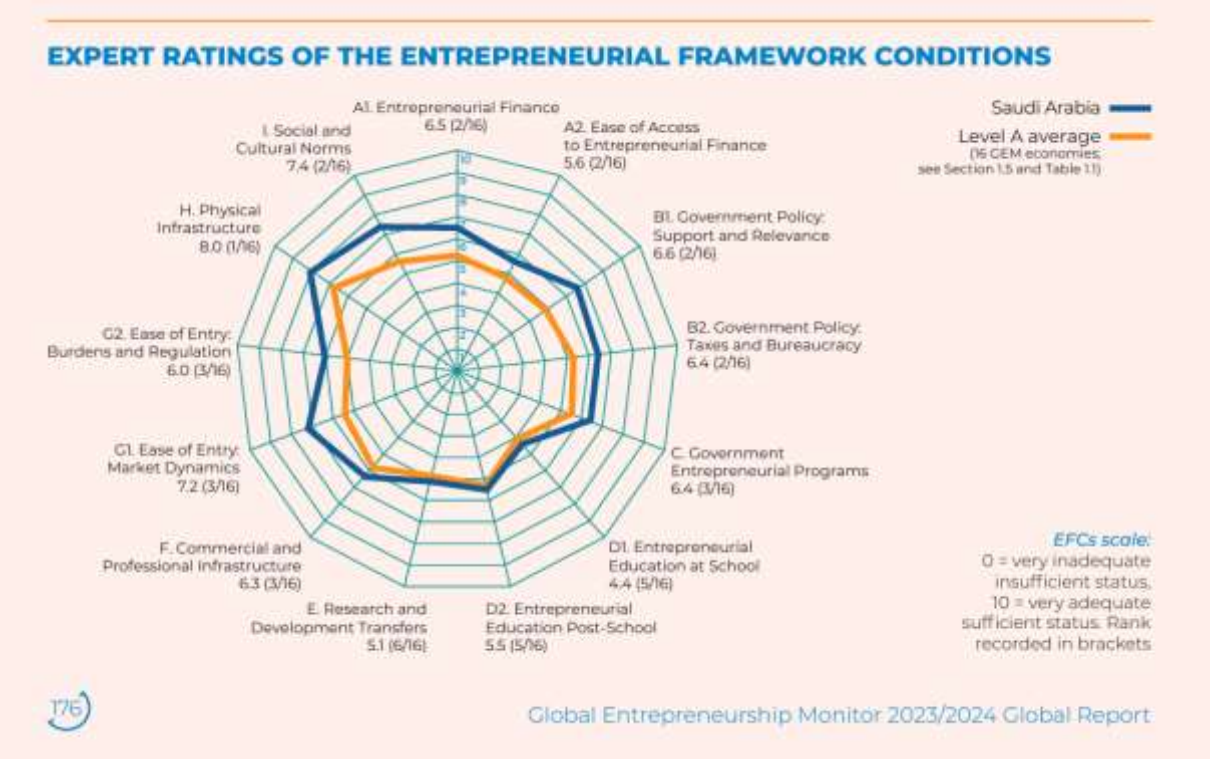


Graph 3: 2022- 2023 National Expert Scores on Perceived Prioritization of Economic Performance, Effective Environmental Practices and Effective Sustainability Practices

Source: (GEM National Expert Research, 2023)

National Expert Scores also requested expert evaluations in two more expertises. The first expertise is about the effects of between effective environmental and efficient sustainability practices on economic performance. The results of this first expertise are demonstrated in Graph 3. Graph 3 illustrates expertise scores of economic performance related to environment and sustainability practices. These results are supplementary therefore if the score of an economy is high, other 33 economies' scores are imitiating to high. Second, if the score of an economy is equal to 5 or higher than 5, 22 (3 countries at Level C, 6 countries at Level B and 13 countries at Level A) of the other economies rated as having satisfactory level of their economic performance. On the other hand 36 (4 countries at Level C, 17 countries at Level B and 15 countries at Level A) reached satisfactory level by the effective environmental practices. At last, 39 economies scored as reached to satisfactory level due to efficient sustainability practices. These economies incluedes 9 countries at Level C, 14 countries at Level B and 16 countries at Level A.

In summary, the change in scores of economies with satisfactory scores generally changes in direct proportion to income levels. Prioritizing effective environmental or effective sustainability practices is observed to produce significant results only for high-income Level A countries. Many Level C countries, on the other hand, can achieve significant results three times more than Level A countries because they prioritize economic performance. The first country to reach the highest score was the United Arab Emirates with a score of 23.6, the second country was India with a score of 20.6, and the third countries were Sweden and Estonia with a score of 19.9. The countries with the lowest scores were Iran with a score of 7.9, Venezuela (11.1) with a score of 11.1, and Israel with a score of 12.1.



Graph 4: 2023 Entrepreneurial Conditions of Expertise Ratings

Source: (GEM National Expert Research, 2023)

Saudi Arabia continues to transform the economy by diversifying its revenues accoding to its resources to reduce dependency on oil sources and increase its rivalry. In 2023, GDP originating from non-oil sources was expected to attain 5% and inflation to decline 2,8 %. Recent regulations aimed to support entrepreneurship, sustain private business investment and reduce the business costs. Private business investment was supported by the Saudi Public Investment Fund. In 2023, Saudi Arabia invested heavily on the new ventures and support their entrepreneurial approaches by improving conditions. This attitudes is the main diversification strategy of Saudi Arabia. Saudi Arabian business investment imroved the conditions of the new ventures' environment and this is proven by NES results. National Entrepreneurial Context Index, is commonly increasing and reached the score 5.0 in 2019, then reached the score 6.3 in 2022. In 2023, NECI score was the same as the year 2022. So that the 2023 NECI score was 6.3. Based on the NECI score Saudi Arabia is counted as 17 in NECI list. However, in 2019 Saudi Arabian economy is listed as number 2 in that list.

Nowadays, Saudi Arabia has a clear and effective entrepreneurial conditions that support new ventures. EFCs of Saudi Arabia have assessed compared to previous years. The conditions related to Entrepreneurship Trainings (stated as lowest EFCs) are not well enough but many precautions will taken The Individual EFCs of Saudi Arabia had changed a little in 2023 in comparison to the year 2022. National experts evaluated the social support for female entrepreneurs and the results show that women access to financial resources is enough. Compared to men sources; they have almost equal resources and support. Saudi Arabia results about EFCs are not expected. Social support for women starting their own businesses ranked third out of 49 GEM economies by these results. Women received an excellent score of 6.4, which is much better than adequate. This should not be a problem in such a rich country, which ranks 40th out of 49 economies with only 4.4 points. Saudi Arabia give more importance to sustainabilty practices to keep this reputation about supporting new women entrepreneurs. This will provide Saudi Arabian economy to generate an excellent perception that the country is wonderful place to start a new venture.

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Saudi Arabia

■ **Population** (2022): **36.4 million** (UN)
■ **GDP** per capita (2022; PPP, international $): **59.1 thousand** (World Bank)

Attitudes and perceptions

	% Adults	Rank/46
Know someone who has started a new business	87.9	1
Good opportunities to start a business in my area	93.2	1
It is easy to start a business	92.4	1
Personally have the skills and knowledge	90.8	1
Fear of failure (opportunity)	60.8	3
Entrepreneurial intentions	38.5	10

Entrepreneurship impact

	% Adults	Rank/45
Job expectations (expecting to employ six or more people in five years' time)	7.5	7
	% TEA	**Rank/45**
International (25%+ revenue)	5.3	28
Always consider social impact	85.3	9
Always consider environmental impact	78.7	18
Industry (% TEA in business services)	4.4	37=

An equals sign (=) indicates that the ranking position is tied with another economy or economies.
** Those reporting "somewhat decrease" or "strongly decrease"*

Motivational

(somewhat or strongly agree)

	% TEA	Rank/45
To make a difference in the world	70.6	4
To build great wealth or very high income	90.9	2
To continue a family tradition	72.2	2
To earn a living because jobs are scarce	90.9	3

Activity

	% Adults	Rank/46	% Female	% Male
TEA (Total early-stage Entrepreneurial Activity)	25.3	6	23.0	27.1
EBO (Established Business Ownership)	13.6	5	13.5	13.7

Recent changes

	% Adults	Rank/46
Household income has decreased in 2023*	19.5	41
	% TEA	**Rank/45**
Starting a business is more difficult than a year ago	12.3	45
Use more digital technology to sell products or services	77.6	3
Pursue new opportunities due to pandemic	64.0	4

Graph 5: 2022 Saudi Arabian Entrepreneurial Activities

Source: (GEM National Expert Research, 2023)

The year 2023 was an excellent year for Saudi Arabian entrepreneurial activities, despite some misfotunes. %20 of total households reported in 2023 that their income level decreased. Compared to the year 2022 this percentage is low. In 2022 %40 of total households in Saudi Arabia stated that their income level was decresing. Entrepreneurial facilities is very common in Saudi Arabia because each 9 person out of 10 identify that an entrepreneur recently began a new business in their near surrondings. Moreover these new entrepreneurs see convenient entrepreneurial opportunities while evaluating their environment both locally and nationally. Besides their skills and experiences these remarkable conditions also extremely effctive on the success of the entrepreneurial activities (GEM 2023). Altough the skills, experiences and enviromental conditions are very influential at the begining, still newcomers are afraid of begining a new business in Saudi Arabia. This is proven by the results of GEM 2023. Based on these results each 3 people out of 5 have a fear of start a new venture in Saudi Arabia. Furthermore, nearly each 2 out of 5 people do not consider to start a new venture until the end of three years in Saudi Arabia.

By 2023, almost 1 person out of 4 people in Saudi Arabia has started a new venture. This proves that Saudi Arabia has reached its scores to Level A and has ranked as number 6 in the list of GEM. Before pandemic era in 2019 Saudi Arabian scores were very low and the country was not counted in top ten list. But now Saudi Arabian conditions have changed smoothly and the aim of this economy is to reach top four of five at least in that list. Saudi Arabia is promoting this aim by improving consumer services beyond expectations.

Reflecting multi-year highs of new ventures, the level of business continues to rise to 5,5 % in the year 2021, to 10% in the year 2022, and reached to 14% in the year 2023. Many new ventures try to live many years. To increase the moral of new entrepreneurs to attain success on many years, they are suggested to use new approaches, reach scarce resources and do facilities in un explored and virgin areas. However, perhaps due to

having the large and highly growing domestic market, only a few Saudi Arabian ventures have foreign trade and these ventures have trade up to 17 countries. Nowadays, many new entrepreneurs all over the world take advantage of technology so Saudi Arabian economy has invested on the technology more and by doing this, the country aims to increase the export rates. There will be a very aware new entrepreneurs about digital technology in Saudi Arabia and this paves the way of accomplished high tech and increasingly established new business ventures. These technology investments and digital supports of course concern the new women entrepreneurs as well. Female entrepreneurs will have relative access to technological resources and exportation incitements.
The common perspective of startup entrepreneurs in the process of developing sustainable innovation is that they accept developing sustainable innovation as the only way to be competitive and survive in the long term. This common perspective is the common entrepreneurial motivation that directs them to engage in sustainable and innovative entrepreneurial activities. The table below includes common factors that motivate sustainability-motivated startup entrepreneurs operating in Saudi Arabia in 2021, 2022, 2023:

Table 3: Sustainability Motivation of Beginning Entrepreneurs in Saudi Arabia in 2021-2022-2023

Sustainable Innovation Development Motivation Factors	Number of Startup Entrepreneurs with Sustainability Motivation
Eco-efficiency (cost effectiveness)	19
Value creation (innovative entrepreneurial opportunity)	20
Sustainability Goals and Social Innovation Compliance Policies at Macro Level	20
Business Strategy and Environment	19

Recently, sustainable development goals and policies towards these goals have gained importance. Social innovation development processes, the source of sustainable innovations, have become the focus of most entrepreneurs. There has been increasing interest in these two issues in the academic literature. Factors that positively affect the motivation of startup entrepreneurs to develop sustainable innovation in the Saudi Arabian entrepreneurship ecosystem in 2021, 2022, 2023 are the environmental and sustainable policies organized by governments at the macro level as a result of the increasing trend in these issues recently. 20 startup entrepreneurs in the Saudi Arabian entrepreneurship ecosystem in 2021, 2022, 2023 are motivated to develop sustainable innovation, both because they are influenced by the Sustainability Goals and Social Innovation Compliance Policies at the macro level and because they find it valuable to create sustainable value as they see it as an innovative enterprise opportunity. In addition, 19 new eco-efficiency factors that started operating in the country these years; In other words, it gains motivation in the process of developing sustainable innovation with the idea that it will provide long-term cost effectiveness. It is expected that more and more new entrepreneurs will gain this motivation over time. Because technological improvements allow reducing production costs, and in many startups, the technological processes of sustainable innovation have begun to be improved thanks to their solid infrastructure.

Table 4: Technological Infrastructure in the Sustainable Innovation Development Process of Startup Entrepreneurs in Saudi Arabia in 2021-2022-2023

R&D Facilities	Number of Companies
Customer Oriented Companies	11
Service and Design	7
Having Strong Research and Development Infrastructure	5
Application of Patent	5
Innovation Managing Systems	5
Having R&D Teams	4
Active Participation of Shareholders	4
Regular R&D Sessions	4
Regular Process Renewals	4
Having Innovation and Inventions	3

Getting Customer Feedback	2
Having Strong Customer vs. Social Network	2
Bonuses and Rewards for Innovative Approaches of Employees	2
Financial Returns as a Results of Rational Investment Decisions	1
Strong Organizational Communication	1
Participatory Leadership Narrative	1
Having Strong Competitive Advantage among Competitors due to Innovativeness	1
Providing Privileges to Innovative Suppliers	1
Application for R&D Support and Incentives	1
Life Cycle Assessment of Products	1

There is no surprise that small companies don't have strict and defined innovation strategies. Yet, other than small companies have generally define sustainability goals and accorgind to these goals they certainly have a set of innovative strategies whic are attainable. In order to be attainable, these innovative strategies should regard cost first. As is known, R&D expenses are considerably higher than other company expenses. When a company makes an investment decision in R&D expenses for the R&D process, which usually has an innovation rate below 1%, it limits it to a bearable amount. Because when nothing goes well, the company still aims to have the capital it needs to save for the sustainability of its activities and thus to be able to survive even in the worst case scenario.

According to Table 4 eleven companies are customer oriented. This means that the companies have sustainability goals that focus on customer satisfaction. So that when companies do R&D facilities, thay should often get feedback on their innovative prototypes and then these companies must transform prototypes into products in line with customer demands, expectations and needs.

A prototype is a test model created before a product or service is finalized. This model is used to make the idea concrete and test it. Prototypes are an indispensable part of the design process and are developed to minimize errors that may occur in the final products. In meetings with customers, the needs and products' features are discussed and the solutions to the problem is often aimed on this meeting. The two companies state that they regularly organize discussion panels with their customers for this purpose.

On the other hand, based on Table 4 only seven companies have service and desing oriented. Being Service and Design Oriented means having service-oriented approaches. A company with these approaches develops customer-centered company policies and aims to provide users with more perfect service every time by determining customer-centered strategies. Considering that environmental conditions change every day and customer demands and needs do not remain stable and change; following technological developments closely and using these new technologies and providing customer satisfaction with a superior service approach should be the main goal of companies that want to achieve success. Today, following environmental changes closely and quickly adapting business activities in light of these changes depends on the ability to benefit from the opportunities offered by technology. Therefore, in order to develop innovative strategies for customer needs and expectations in the business world where companies that can give the right response to change survive, they should prevent resistance to innovation in the entire organizational culture. Company leaders should make their employees internalize why innovation is necessary, and by imposing technological updates on the company culture, they should ensure that new technologies are quickly integrated into activities.

Despite the fact that R&D infrastructure is strong in institutional companies in general, surprisingly five companies have stong Research and Development infrastructure, application of patents and innovaton managing systems. Four out of eleven companies have Research and Development teams and their shareholders participate on their innovative decisions in an active manner. Besides these four companies plan Research and Development sessions regularly and do process renewals regularly as well. Three out of eleven companies reach sucessful innovations and inventions. Two out of eleven companies get customer feedback and give importance to customer expectations. They also have strong customer relations and social network, while giving their innovative employees bonusses and rewards due to have innovative approaches.

Finally, only one out of eleven companies has Rational Investment decisions based on financial returns, strong organizational communication and participatory leadership in its organizational culture. This company has also

strong competitive advantage among its competitors due to its innovativenes, provides privileges to its innovative suppliers. Moreover, the compan applies for Research and Development supports and incentives which government and any other institutions offer. Life Cycle Assessment is also crucial fort his company to improve its products especially the new ones in a regular manner.

Today, many of the innovations reported are really innovative in service and design in a variety of sector. But based on this data only one company proved that it has real both sustainable and innovative products that use natural materials by paying attention to natural approaches. Process innovation focuses on either reducing costs or introducing new technologies. When a technology that is quite unique to the industry is included, it provides a significant competitive advantage by opening up opportunities that very few companies can achieve in the field of design and application.

Table 5 below summarizes the environmental activities mandated by the Government of Saudi Arabia, as well as other socially sensitive environmental activities carried out by startups having sustainable innovations:

Table 5: Presence of Technical Experts in Environmental Activities in Startups having Sustainable Innovations in Saudi Arabia in 2021-2022-2023

Administrative Activities Environmental Activities with Technical Experts	Number of Startups
Waste Management Waste separation system	20
Environmental Management Environmental policy	15
Energy Management Energy saving projects	11
Participation of employees in energy saving programs	9
Supply Management	12
Reducing consumables in packaging supply	19
Recycled resources	8
Increasing efficieny in production	7
Organic sources	7
Eliminating chemicals	4
Including environmental colorant	4
Low carbon emission production	3
Water saving production	9
Wastewater treatment system production	12
Logistics cost reduction system	4
Sea logistics instead of road logistics	4
Increasing efficiency in vehicle use	7
Use of forklifts having Clean Energy Systems	8
Efficient root planning in product delivery	3
Investigation of the use of biodegradable materials	4
Using energy-saving materials	5
Facilities focused on energy saving, zero waste management and recycling	4

Table 5 illustrates that the presence of technical experts in environmental activities in startups having sustainable innovations in Saudi Arabia in 2021-2022-2023. In the Saudi Arabian entrepreneurship ecosystem in 2021, 2022, 2023; considering their non-compulsory environmental activities, it is observed that twenty startup entrepreneurs benefit from waste separation systems and have waste management strategies. Fifteen new startups having sustainabla innovations have an environmental policy specific to their own enterprises. Eleven startups having sustainable innovations focus on energy management and so have energy saving strategies. Nine startups' employees participate on energy saving programs. Twelve stratups do supply management. Nineteen startups having sustainable innovations reduce consumables in packaging supply. Eight startups use recycled resources. Seven startups increase efficiency in production processes regularly. Seven startups use organic resources. Four startups eliminate chemicals in production processs and products. Four startups prefer organic colorants instead of nonorganic. Three of these startups have low carbon emmision product functions.

Furthermore, nine startups having sustainable innovations water saving production. Twelve startups apply wastewater treatment system production techniques on their organizational facilities. Four of them have logistics cost reduction systems. Four startups having sustainable innovations prefer sea logistics instead of road transport. Seven startups have optimum use of vehicle. Eight startups use forklifts having Clean Energy Systems and ERP systems. Considering distribution, three startups have efficient root planning in product delivery. Four startups investigate of the use of biodegradable materials on their production processes. Five startups having sustainable innovations use energy-saving materials. Lastly, four of all startups focus on facilities on energy saving, zero waste management, reducing carbon emission and recycling.

While examined the collaborations of startups with their stakeholders in the sustainable innovation development process in Saudi Arabia in 2021-2022-2023, in terms of innovative perspective many startups have the ability on sustainable issues but they compensate for a lack of resources. The resources they have support sustainable innovations and offer some abundant opportunities but it is not enough. Table 6 lists the shareholders of the sustainable innovative startups.

Table 6: Collaboration with Shareholders

The Colloborations with Shareholders	Number of Startups
Customers	20
Suppliers	17
Ministries	13
Government and Council	4
Unions	7
Social Networks	9
Designers	3
Fellows	4
Consultansy Companies	1
Consortium	2

Table 6 shows that twenty startups which cooperate with the consumers and by this cooperation the companies aim to ger feedback on their customers on their production processes, innovative prototypes of their future products. Aiming getting feedback of their customers increase the success of future products in the market and the companies reach sustainable innovations more easily and a practic manner. The life cycle of a new product could extend by getting customer feedback and adapting product features to this feedback.

Based on results showed on Table 6, seventeen startups are looking for cooperation with their suppliers. These startups having sustainable innovations propose new natural materials, use clean energy sources and adapt enviroment friendly technologies to their organizational processes. All these practices support sustainable and innovative performance of startups. Thirteen startups having sustainable innovations cooperate with related ministiries with their sectors. Since the ministries give right information about the sector in terms of the regulations, restrictions and policies as well. In this regard, the startups when at the begining have lack of useful information about a variety of concerns could complete these gaps easily. The most trustwhorty method to fulfill the lack of information is apply the consultancy of official institutions. In fact, four startups decided to cooperate with government and councils by considering that official information would be more accurate. Applying the knowledge of official institutions and governmental experts' informing enable startups to avoid wasting time with misdirection. Five startups have cooperation with councils and governments in order to profit from strong social relations and network. So that public and private information transmission is so crucial for startups to stand many years.

Seven startups having sustainable innovations have colloborations with unions and this unions commonly cooperate with startups on the purpose of resolving commercial disputes and strengthen and sustain commercial relations. Nine startups have cooperation with social networks. By developing strong relationships and useful network connections, startups could reach success sooner than they expected and also they could sustain this success many many years to make these connections stronger year after year. Thus social network is everything not just startups but almost all companies in today's business world.

Three startups colloborate with designers based on the feedback of their customers. By these colloborations they produce innovatiive design-oriented products and improve their production processes regarding innovative vision. Four startups having sustainable innovations have fellows. In order to complete an innovative product processes successfully fellows are so important.
Only one company has cooperation with consultancy companies. By applying consultancy startups, startups get helpful insights and advices, this obstructs them to make mistakes on innovative production process and leşsen errors. Finally two startups colloborate with contortium. Having stronf joint ventures are very beneficial to innovative production processesIf the startup choose this colloboration abroad, this would be more useful than the colloboration from its own country. This is because foreign companies have a vision, strategies, and sustainable operational goals different from local companies. Hence developing the colloboration with foreign companies almost educates the startups.

CONCLUSION

In this study, the sustainable innovation development processes of new entrepreneurs were examined and 4 factors that were thought to be effective in these processes were investigated. Sustainable innovation could be described as the development of products and services that not only provide improved economic performance especially in the long term; but also provide improved environmental and social performance through innovative processes. Sustainable innovations are different from other traditional innovations due to their long-term, holistic value creation and transformative nature, and they often lead to more radical changes in society.
On the other hand, although there are difficulties in monitoring and reporting sustainability performance, many new initiatives that will meet this need are being implemented day by day. One and effective way of communication with both external and internal shareholders is reporting, and the main purpose of reporting is to measure performance. The information contained in the reports must be obtained from measuring and monitoring the company's business performance regarding its sustainability activities. Therefore, the techniques of reporting prove the way of transforming companies' sustainability strategies into practices.
The leadership styles of these entrepreneurs, who set out with the mission of developing sustainable innovations, can be defined as informal, optimistic, passionate, determined, innovative and self-improved leadership style. Entrepreneurs with this leadership are more easily noticed in societies, and their work is adopted more quickly and makes more noise. These entrepreneurs, who do entrepreneurial facilities to helpful solutions for social needs and problems, can achieve success by creating a significant social impact in a short time with the participation of stakeholders in their ecosystem in entrepreneurial decisions. For such entrepreneurs, ethics is extremely important, and even if it is not an obligation, these entrepreneurs take it upon themselves to do good as a moral duty. Although new entrepreneurs are more disadvantaged in developing sustainable innovation and have difficulties in reporting etc. compared to other enterprises and corporate companies that have been operating for many years. Although it seems to have less adequate opportunities in areas, it can provide rapid feedback that can compensate for resource deficiencies, etc. They have advantages. Some of these advantages are as follows: Informal non-institutional organizational structure, horizontal hierarchy and management with an entrepreneurial, libertarian, fair and innovative leadership style, flexible organizational structure, open communication, highly motivated employees, high employee loyalty, trust-based communication, transparent structure. project teams etc.
New startups have a balancing act in integrating sustainability elements into innovations and this brings some economic advantages. New startups have an eco-efficiency orientation while developing value. New startups focus on two issues in the sustainable innovation development process: Innovative product development and developing innovative processes by integrating new technologies into processes. It is observed that bio-based organic materials are frequently used in the most advanced sustainable innovation activities and that efficiency is focused on in the function and design of the developed product.

RECOMMENDATIONS

Product quality is related to the quality policy of new startups and the management of product development and improvement processes. New startups provide quality service to niche markets and sell products with innovative designs in order to compete in the markets they are in. For new startups focusing on high-end, high-quality products, having an innovative perspective and personalized production are the primary factors to consider in achieving success. Because developing and selling niche products that another competitor cannot imitate takes the entrepreneur to the most unattainable point in the market- the top. To fulfill quality management system obligations, having an ISO 9001:2000 certified is a must for entrepreneurs who are just begining entrepreneurial facilities and aim to develop sustainable innovations. Then, the entrepreneur should focus on obtaining ISO 14001 certification and the certifications; OHSAS 18000 (one), KOMO (one), Ecolabel, QS 9000 (one), BRC/IOP (one) and UL. Because enterprises with these certificates increase their brand reputation and reliability in the eyes of their customers. Although the certification process of the entrepreneur is both costly and complicated when applying to receive these certificates, new entrepreneurs who manage to accredit the quality of their systems and products with these certificates will gain trust in their market in a short time and increase their awareness.

In short, having a certificate in order to reduce costs of stock and gain customer satisfaction is a subject that new entrepreneurs should give at least as much importance as criteria such as access to technical experts, advanced technology, cooperation with stakeholders, etc. Although there are many studies on corporate businesses among the studies on sustainable innovation management and sustainable entrepreneurship in the literature, there are almost no studies on sustainable innovations in small and medium-sized businesses. This study is the first sustainable innovation management research aimed at integrating the findings obtained on sustainable innovations in studies conducted on corporate businesses on corporate sustainability issues. It is suggested that future studies on sustainable innovations should again focus on SMEs and fill this gap in the literature. It would be appropriate for future studies to focus on different factors affecting the success of sustainable innovations and to explain new factors in depth. In addition, it should be observed which internal and external factors affecting sustainable innovations have a more serious effect. In addition, it would be appropriate to conduct new studies seeking an answer to the question of how these internal and external factors affect the success of sustainable innovations according to the differences in the sectors in which SMEs are located. In summary, evaluating how the success of sustainable innovations is affected by internal and external factors such as sectors, firm sizes, market conditions, etc. will make significant contributions to the literature. It is hoped that the number of studies in the fields of sustainable innovation management and sustainable entrepreneurship will increase in the future.

REFERENCES

1. Adams, M. (2021). Critical psychologies and climate change. *Current Opinion in Psychology*, *42*, 13-18.
2. Alexander, C., & O'Hare, P. (2023). Waste and its disguises: Technologies of (un) knowing. *Ethnos*, *88*(3), 419-443.
3. Andries, P., & Hünermund, P. (2020). Firm-level effects of staged investments in innovation: The moderating role of resource availability. *Research Policy*, *49*(7), 103994.
4. Autio, E., Kenney, M., Mustar, P., Siegel, D., & Wright, M. (2014). Entrepreneurial innovation: The importance of context. *Research policy*, *43*(7), 1097-1108.
5. Berge, N. (2015). *Sustainability and Supplier Involvement: A case study in the commercial automotive industry* (Doctoral dissertation, Technical University of Eindhoven).
6. Bergholz, C., Füner, L., Lubczyk, M., Sternberg, R., & Bersch, J. (2024). Infrastructure required, skill needed: Digital entrepreneurship in rural and urban areas. *Journal of Business Venturing Insights*, *22*, e00488.
7. Bocken, N. M., & Short, S. W. (2021). Unsustainable business models–Recognising and resolving institutionalised social and environmental harm. *Journal of Cleaner Production*, *312*, 127828.
8. Carayannis, E. G., Samara, E. T., & Bakouros, Y. L. (2015). Innovation and entrepreneurship. *Theory, policy and practice*, *218*. Edwards, M. G. (2021). The growth paradox, sustainable development, and business strategy. *Business Strategy and the Environment*, *30*(7), 3079-3094.
9. Çelik, R., (2024). İşletme ve Yönetim Alanlarına Yönelik Müşteri Memnuniyeti Kavramına İlişkin Bibliyometri/Sosyal Ağ Analizi,İşletme Araştırmaları Dergisi, 16 (4), 2092-2115.
10. Çelik, R. & Uslu Divanoğlu, S. (2023). Girişimciliğin Dijital Hali START UP, Mehmet Akif Çakırer (Ed.), Dijital girişimcilikte ödeme sistemleri, (ss.189-204), Ekin Yayınevi
11. Haessler, P. (2020). Strategic decisions between short-term profit and sustainability. *Administrative Sciences*, *10*(3), 63.
12. Halme, M., & Korpela, M. (2014). Responsible innovation toward sustainable development in small and medium-sized enterprises: A resource perspective. *Business Strategy and the Environment*, *23*(8), 547-566.

13. Javaid, M., Haleem, A., Singh, R. P., Suman, R., & Gonzalez, E. S. (2022). Understanding the adoption of Industry 4.0 technologies in improving environmental sustainability. *Sustainable Operations and Computers*, *3*, 203-217.
14. Ketchen Jr, D. J., Ireland, R. D., & Snow, C. C. (2007). Strategic entrepreneurship, collaborative innovation, and wealth creation. *Strategic entrepreneurship journal*, *1*(3-4), 371-385.
15. Ko, H., Chung, Y., & Woo, C. (2021). Choice of R&D strategy and asymmetric cost behaviour. *Technology Analysis & Strategic Management*, *33*(9), 1022-1035.
16. Lerner, J. (2002). When bureaucrats meet entrepreneurs: the design of effectivepublic venture capital'programmes. *The economic journal*, *112*(477), F73-F84.
17. Monitor, G. E. (2017). Total early-stage entrepreneurial activity (TEA). *Data retrieved August*, *20*, 2014.
18. O'Connor, A. (2013). A conceptual framework for entrepreneurship education policy: Meeting government and economic purposes. *Journal of business venturing*, *28*(4), 546-563.
19. Passoni, C., Marini, A., Belleri, A., & Menna, C. (2021). Redefining the concept of sustainable renovation of buildings: State of the art and an LCT-based design framework. *Sustainable Cities and Society*, *64*, 102519.
20. Piwowar-Sulej, K. (2021). Human resources development as an element of sustainable HRM–with the focus on production engineers. *Journal of cleaner production*, *278*, 124008.
21. Plehn-Dujowich, J. (2010). A theory of serial entrepreneurship. *Small Business Economics*, *35*, 377-398.
22. Salvia, G., Zimmermann, N., Willan, C., Hale, J., Gitau, H., Muindi, K., ... & Davies, M. (2021). The wicked problem of waste management: An attention-based analysis of stakeholder behaviours. *Journal of Cleaner Production*, *326*, 129200.
23. Santos, G., Afonseca, J., Lopes, N., Félix, M. J., & Murmura, F. (2018). Critical success factors in the management of ideas as an essential component of innovation and business excellence. *International Journal of Quality and Service Sciences*, *10*(3), 214-232.
24. Shahzad, M., Qu, Y., Rehman, S. U., & Zafar, A. U. (2022). Adoption of green innovation technology to accelerate sustainable development among manufacturing industry. *Journal of Innovation & Knowledge*, *7*(4), 100231.
25. Singh, R. K., Murty, H. R., Gupta, S. K., & Dikshit, A. K. (2012). An overview of sustainability assessment methodologies. *Ecological indicators*, *15*(1), 281-299.
26. Snihur, Y., & Bocken, N. (2022). A call for action: The impact of business model innovation on business ecosystems, society and planet. *Long Range Planning*, *55*(6), 102182.
27. Tarabashkina, L., Devine, A., & Quester, P. G. (2022). Encouraging product reuse and upcycling via creativity priming, imagination and inspiration. *European Journal of Marketing*, *56*(7), 1956-1984.
28. Tencati, A., & Pogutz, S. (2015). Recognizing the limits: Sustainable development, corporate sustainability and the need for innovative business paradigms. *Sinergie*, *33*(96), 37-55.
29. Weidinger, C. (2014). *Sustainable entrepreneurship business success through sustainability*. Springer.