Petroleum
Business
Review

A Model of Sustainable Internationalization in Technology-Based Businesses: Case Study of Oil, Gas, and Petrochemical Industry

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ARTICLE INFO

Keywords:

Internationalization

Sustainable internationalization

Sustainable business model

Oil, gas, and petrochemical industry

Received: 20 July. 2019
Revised: 22 August 2019
Accepted: 15 September 2019

ABSTRACT

Internationalization of businesses is considered as a key factor in economic development and growth of the economic entities. On the other hand, the ability of the system in terms of endurance and reliability is inevitably dependent on the success that the system gains in communicating with the external environment; in other words, the sustainability of the system entirely depends on the system capability in terms of adaptation and responsiveness to the environment. Furthermore, technology-based businesses are highly dynamic and use different internationalization patterns. A literature review shows that comprehensive studies have not been conducted despite the necessity of today's businesses to move toward sustainable internationalization. Therefore, this research examines the existing patterns by presenting a model of sustainable internationalization in technology-based businesses. In the present study, six technology-based businesses in oil and gas industry have been investigated using a multi-case interview method. The validity and reliability of the data collection tools have been confirmed. The results of the interviews performed during the two coding stages revealed that economic, environmental, social, and technological factors are among the factors influencing the adoption of sustainable business internationalization strategies along with a focus on a sustainable business model. This study also presents different types of sustainable internationalization strategies and classifies the sustainability index of internationalization under two categories of profitability and sustainability of the relationships in the network.

1. Introduction

Today, internationalization of small businesses is considered as a key factor in economic development and growth of the economic unit. Internationalization is beneficial for economic development (Jaffe and Pasternak, 1994), for the well-being of countries, and for gaining international reputation (Ruzzier et al., 2007); it is also a significant strategic option for the growth of small businesses. In fact, the internationalization of firms is a process in which companies gradually increase their presence in the global markets. This process relates to the companies that enter foreign markets for reasons such as saturated domestic markets, competitive domestic

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threats, supplying part of the required foreign exchange resources, and cheaper production factors in search of opportunities for growth and development (Skrt and Antoncic, 2004).

Sustainability in its broadest sense refers to the capability of a society, ecosystem, or any current system to function indefinitely in the unlimited future, without being forced to weaken due to the depletion of the system-dependent resources or the excessive load on them (Moldan et al., 2012). The sustainability of companies is not a one-dimensional concept but has three dimensions: economic, social, and environmental (Böhringer and Jochem, 2007). The relationship between social, environmental, and financial performance in businesses is a topic that has been widely discussed in the literature, but the results obtained to date have not been conclusive (Lassala et al., 2017).

In fact, the addition of the concept of sustainability to the concept of internationalization in the last three decades is due to the fact that the concept of development is largely in line with theories of economic growth and modernity and that the emphasis has been on the economy, while the other aspects such as the rights of future businesses, environmental issues, and social justice have been overlooked. Overall, it can be said that the sustainable international development of firms is the ability of the society to guide its development toward the desired international future (Kowalski et al., 2014).

Despite the large number of studies on internationalization of firms, research has shown that many open questions have remained unanswered. In this context, Senik et al. (2014) suggested that the subject of providing models and patterns of sustainable internationalization, especially in technology-based businesses, has received little attention in the literature. However, there are some works that point to some aspects of this phenomenon. On the one hand, Kowalski et al. (2014) reported that networking and clusters can contribute to the process of sustainable internationalization. On the other hand, it should be noted that most of the research in this area has been on businesses that are not technology-based (Chetty et al., 2014; Löfgren, 2014). Therefore, in light of these challenges, in-depth studies of sustainable internationalization in technology-based businesses are essential. Such studies can illustrate the benefits of internationalization and sustainability together (Békés, 2014).

The review of the related literature shows that previous studies often focused on dimensions such as the role of networking and clusters in the sustainable internationalization process (Kowalski et al., 2014) and little attention has been paid to the subject of sustainable internationalization in technology-based businesses (Chetty et al., 2014; Löfgren, 2014). In addition to identifying the factors influencing the adoption of sustainable internationalization strategies, the present study also defines the types of strategies as well as the implications of using such strategies in technology-based businesses.

The existing literature suggests that research into business sustainability integration should be still in a theoretical phase and/or should reveal certain aspects of corporate sustainability (Engert and Baumgartner, 2016). Therefore, there is a need for further empirical and theoretical studies on the different approaches, challenges, and partnerships of sustainable business models (Dentchev et al., 2016).

Considering the shortcomings in the concept of sustainable internationalization and the lack of a comprehensive model in this field, especially in the field of technology-based businesses, focusing on technology-based businesses can lead to the development of a pattern that may contribute to sustainable internationalization. Therefore, in this study, we have sought to offer such a framework for the development of these types of businesses in addition to removing the existing research gap.

2. Literature Review of the Theoretical Framework

2.1. Internationalization

International business partnerships occur when an organization enters into a transaction or partnership with a foreign organization (Ruzzier et al., 2007) and internationalization happens as business activities expand to international markets (Hollensen, 1998). Entering new markets can increase the number of customers and can ultimately enable the firm to achieve greater growth. There are various incentives for businesses to move toward internationalization, including profit and growth, product's uniqueness, and manager' perceptions regarding the insufficiency of the domestic market for their business. Internationalization has actually been defined as extending the organization beyond the domestic market to other regions or countries (Park, 2018).

According to Oviatt and Mcdougall (1997), the most prominent theory of internationalization is the Uppsala

model which views the internationalization process as an incremental process operating depending on the organization's empirical knowledge of foreign markets. This theory is based on the fact that internationalization starts from neighboring countries. When the experience in the internationalization increases, organizations become ready to enter distant countries and raise their levels of investment. Two aspects of internationalization are considered: the physical distance and the supply chain.

According to Johanson and Wiedersheim-Paud (1977), the fundamental steps for organizations to move toward internationalization include sporadic exporting (irregular activities), export modes (independent foreign representatives), the establishment of foreign sales subsidiary, and the installation of foreign production units. According to this theory, learning through experience and knowledge development are fundamental to the possibility of external operations (Ferm, 2018).

Table 1 presents some of the most important theories in the field of business internationalization.

Table 1. Models of internationalization.

Models	Model Specifications	Weaknesses
International Entrepreneurship (Oviatt and Mcdougall, 1997)	• Focusing on the age of companies at the time of internationalization; • Emphasizing the new international business model of internationalization theory, entrepreneurship theory, strategic management, and transaction cost analysis;	• Not using the scale of businesses; • More focus on business size and costs; • Lack of a solid conceptual framework;
Uppsala model (Johanson and Vahlne, 1977)	• Best used in the early stages of internationalization; • According to the international Uppsala model, internationalization is a causal cycle; • Market knowledge and market commitments that form aspects of the situation influence decisions on resource commitment in foreign markets and current activities that constitute the aspects of change;	• The initiation of the process of internationalization is not explained; • This model is not able to use collaboration-based market entry methods; • According to this model, internationalization depends only on experience knowledge of the market. It is not like that just one factor explains the complex phenomenon of internationalization;
Network Internationalization Model (Johansson and Mattsson, 1988)	• Internationalization of a firm requires the creation and development of a network position in foreign markets; • The network internationalization development model describes a company with more international experience. This model includes industrial markets as a network of firms; • This theory is rooted in the theory of resource dependence. The network model emphasizes the need for the incremental development of market knowledge and the need to learn from interacting with other companies throughout the process;	• This model applies to industrial companies and does not include small businesses performing at lower levels; • In the network theory of unit analysis, a firm is an individual, but the relationships between different parts such as competitors, suppliers, and consumers are all considered as one network; • This model is considered as the general theory of foreign direct investment;
Gravitational Model in Internationalization (Cannone and Ughetto, 2015)	• The gravitational model has been widely used to explain bilateral trade flows;	• The technology-based firms studied were most widely acclaimed by industry norms; • This model also refers to large industrial technology-based firms and refers more to environmental factors in countries; • Political and social relations have rarely been studied;

Models that economically explain internationalization such as the theory of life cycle and monopoly advantage look at internationalization from a resource-driven perspective, the cost of exchange, and the life cycle. These theories focus more on how large businesses select and enter the markets. However, the economic view pays less attention to smaller businesses (Rialp and Rialp, 2001). The network perspective provides a stronger explanation of why and how internationally small and medium-sized businesses operate. Researchers in the field of internationalization are still paying special attention to network models.

In general, considering the cases mentioned in this section and examining the models related to the internationalization of businesses that have attracted the most attention of the researchers, it can be mentioned that among the proposed models, perhaps the closest model to be used in the domestic business is the international entrepreneurship model. However, considering the technological nature of businesses actively working in the field of oil, gas, and petrochemicals and disregarding social and environmental aspects, this model has little use in high-tech and knowledge-based businesses that are changing and developing daily. In general, if we are looking for a reasonable model of the internationalization of technology-based businesses, we have to apply the effect of the internal context and structure, which are not clearly discussed in the existing models.

2.2. Degree of Internationalization

The degree of internationalization acts as a moderator for the export activities of businesses. The internationalization of firms is based on the concept of sustainable development. Organizations are slowly internationalizing while evolving their product life cycles. The degree of the internationalization of a technology-based firm as a multi-faceted structure is a combination of its scale of performance and its scope of export strategy (Tallman and Li, 1996). The firm's scale of export performance indicates the ratio of export sales to total sales expressed in percentage terms, as well as the range of export activities and the range of regions and countries where the firm operates. These two international components underpin the company's international diversification strategy, and the combination of these two determines the degree of the internationalization of the company for sustainable development (Cadogan et al., 2009).

It should be noted that by changing the degree of internationalization, firms not only change a part of their internal strategy but also are affected by the complexity of the environments. Using the internationalization process, organizations improve their skills, managers' competence (learning foreign languages, cultures, and laws of foreigners and competitors), and marketing, which consequently leads to competitive advantages. In addition, Cadogan et al. (2009) stated that a market-oriented exporting firm in a competitive market probably adopts a learning approach that enhances its understanding of how to operate in free and competitive markets; also, as the degree of internationalization grows, such an attitude encourages the firm to transfer this knowledge to newer export markets, which will thus lead to sustainable performance and success.

On the contrary, the degree of internationalization may be low, and market orientation will have less impact on firm performance. In other words, the smaller the foreign markets that need to be interacted with are, the less the export-oriented market behavior is needed to match customer preferences and export services. In the absence of high internationalization, technology-based firms do not adapt to the changes taking place in foreign countries, and their services and goods fall short of global or international standards, thereby satisfying consumer expectations at a lower level; as a result of low levels of internationalization, the company's success is jeopardized, and this improves the positive relationship between market orientation and the export performance of technology-based firms and vice versa (Ortiz et al., 2015).

2.3. Sustainable Business Model

Issues of sustainability such as inequality and the status of the environment have led to transition to a more sustainable economic system (Geissdoerfer et al., 2018). Businesses have most capabilities and resources to accomplish such a transition (Kramer and Porter, 2011). Despite technological advances toward enhanced sustainability, many organizations have found it difficult to achieve their sustainability goals. Therefore, business model innovation seems to be essential for aligning incentives and revenue mechanisms to utilize sustainable solutions (Rashid et al., 2013). The concept of a sustainable business model is increasingly being considered today as a source of competitive advantage (Kramer and Porter, 2011; Nidumolu et al., 2009).

The sustainable business model is currently the focus of attention in the existing literature on sustainable development, as well as for business professionals and

policymakers involved in the consumption and production of social and ecological impact systems. In fact, a sustainable business model seeks to address social and environmental needs and thus creates value for the customer and the organization. Importantly, business models seek to create system-level innovations. Various categories of sustainable business models are reported in the literature, including the works of Boons and Lüdeke-Freund (2013), Clinton and Whisnant (2014), Wells (2013), Bocken et al. (2016), (Bocken, et al., 2019).

According to Osterwalder (2004) and Osterwalder et al. (2014), a sustainable business model has nine domains with a sustainability approach. These nine areas include presentable value, target customers, distribution channels, customer relationship, value configuration, capabilities, partners (stakeholders), cost structure, and the revenue model. The definitions of the sustainable business model presented in Table 2 reflect the researchers' interest in the areas of interest by Osterwalder.

Table 2 summarizes some of the most important definitions of a sustainable business model.

Table 2. Definitions of a sustainable business model (Geissdoerfer et al., 2018).

Researchers	Definition
Wells (2013)	A sustainable business model helps achieve sustainability through six principles: resource productivity, social relationships, localization and interaction, length of life, ethical sourcing, and work enrichment.
Abdelkafi and Tauscher (2016)	A sustainable business model identifies sustainability as an indispensable part of an organization's proposed value and value creation rationale. In addition, it creates value for customers, the community, and the environment.
Geissdoerfer et al. (2016)	A sustainable business model is defined as the presentation of elements, the relationship between these elements, and their interaction with stakeholders, which uses an organizational unit to create, deliver, acquire, and exchange sustainable value for the organization's stakeholders.
Evans et al. (2017)	Sustainable business model hypotheses: • A sustainable value includes economic, social, and environmental benefits that are conceptualized. • A sustainable business model requires a system of sustainable values flowing among multiple stakeholders, including social and environmental stakeholders. • A sustainable business model requires some types of value network with a new purpose, design, and governance. • A sustainable business model requires a systematic consideration of the interests and responsibilities of the stakeholders to create a mutual value. • Externalization through service–product systems drives innovation toward a sustainable business model.

Businesses need to go beyond voluntary social and environmental initiatives to achieve sustainability. The sustainable business model can support managers to understand how companies develop sustainably through attributes and values (Morioka et al., 2016). Given that this model has a specific purpose for business sustainability, it outlines a set of concepts and relationships for international sustainability development which include three key elements of the value proposition (product, service, customer segments, and relationships); value creation and delivery system (key activities, resources, technologies, etc.); and value capturing (cost structure and cash flows).

The business model framework for sustainability takes into account the companies, stakeholders (e.g. employees), business associations, suppliers, governments, nongovernmental organizations (NGOs), communities, the environment, and the society.

Creating and delivering sustainable value: This stage involves business processes such as initial activities (logistics, production, overseas logistics, marketing, and sales) and secondary activities (corporate infrastructure, human resources management, and information and communication technology). Business process management must be considered from not only the economic but also a socioeconomic point of view.

The sustainability indicators presented by Evans et al. (2017) do not guarantee sustainability, production, and delivery propositions for the business position. In the context of organizational sustainability, economic outcomes are not sufficient to guarantee sustainability, which is why sustainable development is in the center of

collective goals. In other words, it has not only short-term effects but also long-term outcomes for the realization of a value index for its domestic and foreign businesses and shareholders.

The dynamic changes in the production of modern business mechanisms create high performance and management. Over a long period of time, this performance provides important business resources for sustainable firms. A good business model is one that is capable of producing results at any market position while having consistent adaptive features. Scalability can be defined as the concept of business models to maintain the high performance of the firm. Ensuring the performance of businesses over the long term can help build a sustainable business model that is often aimed by stakeholders and shareholders and generates value-based management and corporate social responsibility. This understanding of businesses paves the way for building hybrid organizations that engage in business activities with a social profession (Jabłoński, 2016).

The strengths and weaknesses of the current frameworks have been discussed by experts and researchers. This section criticizes and combines the following three previously-selected business models: Parry and Tesker (2014); Baden-Fuller and Mangematin (2013); and Osterwalder and Pigneur (2010).

In the framework of Parry and Tesker (2014), it is clear that the value is in sharing. The society's value can be for the environment or the economy. This model works on understanding the deep and rich concepts of the value and the way to create it and focuses on creating harmony with the value; this is a real power. However, the disadvantages of this approach include: It is very conceptual, and this model does not have the details to help people through the various aspects of the business model and how they relate.

In the framework of Baden-Fuller and Mangematin (2013), modeling these people is a simple framework. In this model, the key features include customer evaluation, customer participation, revenue generation, value chain, and communication. Using this model empowers managers in workrooms and identifies creativity. However, this model does not conduct a sufficiently accurate test for managers to understand their business and only experiences the four key features. There is no reference to the different types of values such as exchange value, social or environmental value, etc. This model does not properly identify the importance of the stakeholder system.

The framework of Osterwalder and Pigneur (2010) emphasizes the ability of the model to detail and think about a wide range of aspects of the business, allowing managers to articulate their business model. The main weaknesses of this model are its procedural nature, its lack of knowledge of valuation, its more focus on monetary values, and its inability to recognize a wide range of stakeholders.

2.4. Sustainable Internationalization

Business sustainability has a variety of definitions. As one can infer from the definitions, corporate sustainability is not a one-sided concept but has three dimensions: economic, social, and environmental. Economic sustainability means a sufficient cash flow for shareholder satisfaction. Preserving the environmental dimension requires the firm's support of the environmental resources and efforts to balance the economic system that have a positive impact on the social dimension (Böhringer and Jochem, 2007).

The internationalization of businesses is one of the foremost public policies in many countries around the world because it is often small and medium-sized businesses that play a vital role in industrial innovation and make profit through economic development.

Sustainable development seeks to improve the quality of business products without intensifying the exploitation of natural resources in such a way that the nature and the totality of these resources are not threatened. The central idea of the sustainable development is to fulfill the needs of the present generation with regard to the needs of the future generations. According to this definition, sustainable development is a process toward sustainability, so it cannot be considered as a project.

2.5. Investigating Key Factors Influencing Sustainable Development and Internationalization

Overall, it can be said that corporate sustainable international development is the ability of a society to guide its development toward a desirable international prospect. From a scholarly point of view, sustainable development implies a participatory attitude to different stakeholders in the policy and implementation process. With this end in view, public and private resources are mobilized for development, and the knowledge, skills, and energy of all the social groups concerned with the future of the Earth and its inhabitants are utilized (Raskin et al., 2010).

Another point is that as international trading is expanding rapidly, in today's highly competitive business environment, export has become an important factor for the growth and survival of firms. With globalization and internationalization on a rising trend, businesses have found exporting to be a strategy to enter international markets and to increase sales and profitability (Morgan et al., 2004). Thus, given the recent political and economic situation, identifying the best and most cost-effective strategies for entering more global markets has become more important than ever.

3. Methodology

The present study is descriptive in terms of purpose and data collection methodology since none of the research variables are manipulated by the researcher (Sarmad et al., 2008). Since the present study is a multiple case study, its statistical population consists of oil, gas, and petrochemical technology-based companies:

- that have been engaged in the internationalization for the past three to five years.
- that are in the process of internationalization.

First, 10 companies were selected from the list obtained from the experts in this field, and then by evaluating the companies, a semi-structured interview (with an average completion time of 50 minutes) was conducted with six technology-based companies. Moreover, the text of the interview was written and immediately analyzed. In the sixth interview, we reached a data saturation. In other words, according to the obtained open source coding tables, adding further samples did not increase the number of the obtained categories and the knowledge of the process under study. The theoretical saturation of the categories or theories is the evaluation criterion for terminating the theoretical sample.

Then, the research factors and constructs were identified using the open and axial coding methods.

The data collection instrument for this study is an interview protocol developed based on the literature review. The validity of the face and content of the instrument was confirmed by seven scholars. Moreover, the reliability was assessed using the intercoder method where it was confirmed at 0.85. In this study, the Atlas.ti software (version 7.5) was utilized to perform the above coding.

4. Research Findings

Table 3 lists the demographic characteristics of the participants.

Table 3. Demographic characteristics of the participants.

Company Name	Company's Years of Activity	Interviewee's Gender	Work Experience of Interviewee (year)	Age of Interviewee (year)	Level of Education	Field of Expertise
Int 1	22	Male	25	48	B.A.	Chemical waste processing and refining
Int 2	15	Male	25	48	M.S.	Oil refining
Int 3	30	Male	40	68	M.S.	Railway electricity, petrochemical, oil, and gas
Int 4	7	Male	10	33	M.S.	Manufacturer of polymer products
Int 5	50	Female	14	39	M.S.	Oil refining
Int 6	30	Male	14	34	M.S.	Manufacturer of specialized chemicals

After reviewing the literature on sustainable internationalization and conducting multiple interviews with the selected firms, the qualitative data were collected. At first, the verbal statements were coded in the form of open source codes, and the list of the codes was compared in terms of semantic overlap; those that overlapped were merged. Of the 291 introductory codes, 89 were final open codes. In the second step, the axial coding was performed on the final open source code. Axial coding is a process whereby the identified classes are assigned to higher abstraction classes, and the

relationships between the larger classes and the sub-categories are established (Strauss and Corbin, 1990).

Figure 1 illustrates the coding process used to identify the factors.

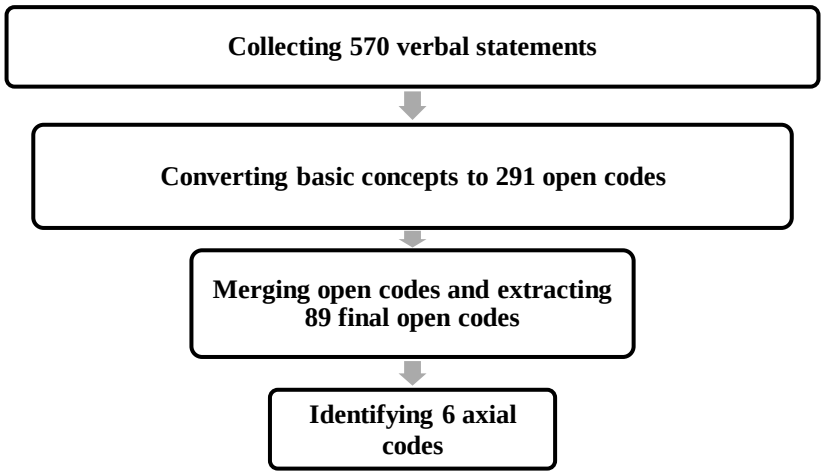

Figure 1. The process of converting verbal statements into the axial codes.

According to the results of the qualitative analysis, six main codes were extracted from the present study: economic factors, political factors, technological factors, social factors, strategies of sustainable internationalization, and the consequences of sustainable internationalization.

Table 4 tabulates the final summary of these steps, and Figure 2 summarizes the relationships identified in the model.

Table 4. The final summary of the open source codes and the axial codes.

Axial Code	Open Codes	Axial Code	Open Codes
Environmental Factors	Issues related to the sanctions	**Technological Factors**	Needs to update technological facilities
	Immediate decisions of the government		Communication Tools (WhatsApp, Email)
	Difficulty in transferring money		Company website
	Collaborating with the governments and external organizations		Web-based communication knowledge
	The strategy for circumventing the sanctions		Need to update technological facilities
	The political situation of the country	**Social Factors**	Administrative bureaucracy
	Government supports		Creating trust
	Separation between the legislator and the producer		The brand weakness of Iranian products
	Export promotions		Corporate resilience
	Customs		Corporate reputation
	Monitoring the domestic and regional competitors		Characteristics of company managers
	Transportation		Target market recognition
	The public or private nature of a company		Access to specialist human resources

Axial Code	Open Codes	Axial Code	Open Codes	
	Distribution channels		Effective conflict resolution	
	Timely delivery		Previous cooperation with the customer	
	Working directly with the Chamber of Commerce		Empirical learning	
	Launching a subsidiary office		Receiving consultancy (technical, financial, scientific, and commercial)	
	Customer payment power analysis	**Outcomes of Sustainable Internationalization Relationship**	Sustainability of the network	
	Production capacity		Profitability	
	Capacity of embassies and commercial consulting			
	Attending courses and exhibitions		Degree of Internationalization	Indirect exports
	The revenue level (currency exchange)			Launching a subsidiary office
	Internal and external suppliers			Joint venture
	Foreign exchange account license			Foreign firm registration
	Feasibility of entering the international market		Sustainable business model	Available values
	Buying by cash			Target customers
	Tax administration office			Distribution channels
				Customer relationship management (CRM)
	Weaknesses of infrastructures	**Sustainable Internationalization Strategies**		Value configuration
	Price adjustment to attract or retain customer			Capabilities
	Inflation in prices due to a full price			Partners (stakeholders)
	Modifying governmental agencies			Cost structure
	Customer professional network size			Income model
	Sample shipping and packing issues		Product Strategy	Providing after sales services
	Using a local broker to communicate with the target market			Control and maintain optimal quality
	Product variety			Quality of packaging and raw materials
	Customer information as a source			Having international standards
	Relationship with distributors			Branding and brand management
Economic Factors				

Axial Code	Open Codes	Axial Code	Open Codes	
	Financial resources		Market strategy	Price adjustment to attract or retain customer
	Participation of banks in financial transfers			Maintain domestic price level
	Domestic market constraint			The skill for determining full price of products based on the exchange rate
	Difference between domestic and foreign sales and production system			Attracting foreign customer due to a competitive price
	Proximity advantage in regional transactions			Price leadership
	Currency Commitments Related to Exporters		Production Strategy	HSE requirements
	Impact of direct exports on improving the quality of domestic production			Reverse engineering
	The bargaining power of the firm			Adjustment in production to comply with environmental standards
	Business and international language knowledge			Prioritizing customer needs
	Sales intermediaries			
	Receiving feedback to improve quality			
	Barter deal			
	Continuous market presence			
	Receiving demand from foreign sides			
	Specific customers (word of mouth (WOM) factor)			
	Marketing			
	Determining the product for the end-user			
	Advertisements			

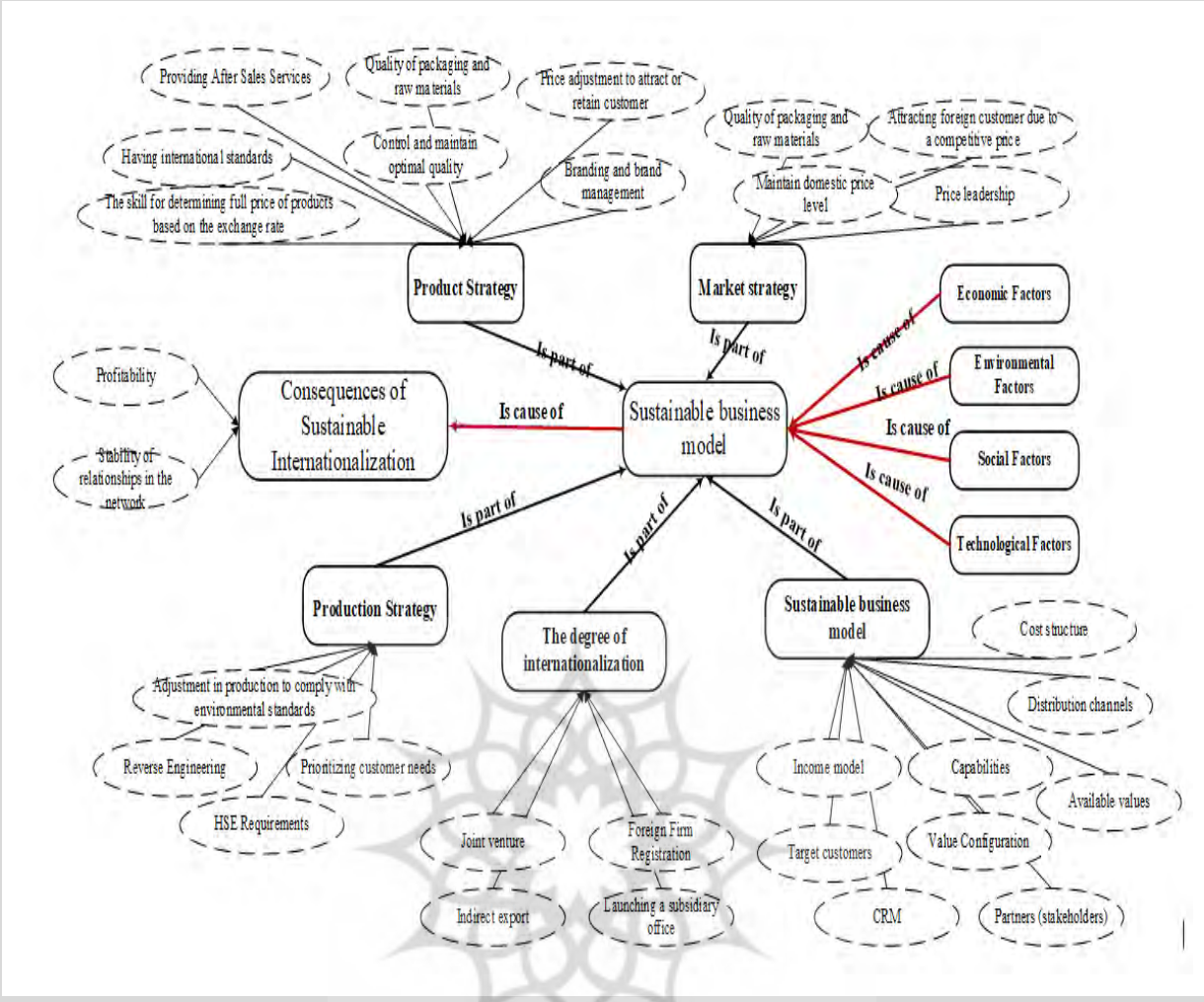

Figure 2. The final model of the study.

5. Discussion and Conclusions

Today, technology-based businesses are highly dynamic, but due to the limitations of this type of business, they use different internationalization patterns.

The present study seeks to design a model of sustainable internationalization for technology-based businesses in oil, gas, and petrochemical sector in Iran. A review of the related literature shows that previous studies have often focused on aspects such as the role of networking and clusters in the process of sustainable internationalization (Kowalski et al., 2014) and little attention has been paid to the topic of sustainable internationalization in technology-based businesses (Chetty et al., 2014; Löfgren, 2014). Not only does this study identify the factors affecting the adoption of sustainable internationalization strategies, but it also recognizes the types of strategies and the outcomes of applying such strategies to technology-based businesses.

The present study reveals that a set of factors influences the strategies of sustainable internationalization adopted by technology-based businesses. These factors include the components that influence sustainable internationalization strategies and comprise a range of economic, environmental, technological, and social factors.

The interaction between these factors provides sustainable strategies for technology-based businesses, including product strategy (after-sales services, quality control and maintenance, quality of packaging and raw materials, international standards and branding, and brand management), market strategy (adjustment of the price to attract or retain customers, maintain a domestic price level, the skills for determining the full price of products based on the exchange rate, external customer attraction due to their competitive prices, and price leadership), production strategy (HSE requirements, reverse engineering, adjusting production to satisfy the

environmental standards, and prioritizing customer needs), sustainable business models (deliverable values, target customers, distribution channels, customer relationship, value configuration, capabilities, partners or stakeholders, cost structures, and revenue models), and ultimately the degree of internationalization (indirect exports, establishing a wholly-owned subsidiary, joint venture, and registered overseas firms).

The findings of the present study have bridged the gap in previous studies (Dentchev et al., 2016) in terms of the need for further studies in the field of sustainable business models. Further, it presents the identified factors in the form of a new classification. In addition to identifying the factors affecting sustainable internationalization, this study has devised a unique combination of sustainable internationalization strategies. The findings of this study point to the dimensions of the Osterwalder's sustainable business model as part of sustainable internationalization strategies. Moreover, the current work introduces two sustainability indicators of the internationalization behavior of technology-based businesses after applying the internationalization strategies. These indicators include the profitability and the sustainability of the relationships in a network.

Despite the role of this research in providing a model of sustainable internationalization in oil, gas, and petrochemical technology-based companies, there are also limitations in some ways. Some of the limitations of the present study are related to its methodology. For instance, in data collection, the use of interviews is preferred to the direct investigation and evaluation of business documents rather than what is proposed in the multiple case study strategy. Therefore, most of the codes provided in the findings of this work are obtained through interviews. In this study, the researcher has tried to minimize the limitations, but research on the human species has unavoidable barriers and limitations, including attracting a number of people to participate in interviews which was a problem due to their busy schedules, their lack of adequate opportunities, and their already fixed plans. Furthermore, a small number of interviewees gave conservative answers to the interview questions. Therefore, in the qualitative part, factors such as the lack of access to some key and more prominent experts for the interview, the relatively short intervals of the interviews, and the conservative responses of some interviewees can be mentioned as other limitations of data collection in this part, which has unknowingly affected the research findings. Also, the lack of sufficient examples of technology-based businesses in the oil, gas, and petrochemical sectors with a sustainable internationalization background has disrupted the process of data collection, Finally, a list was prepared using interviews and consultations with the relevant experts. Additionally, due to the novelty of the issue of the sustainability of internationalization, the literature in this field was very limited.

6. Further Suggestions

Based on the findings of the present work, it is suggested that

- according to the purpose of the research, one of the important dimensions should be the sustainability indicators of technology-based businesses. Companies with better after-sales service quality remain stable in the field of international business. Having skills in determining rate-based competitive fixed prices tailored to domestic price levels is essential for such businesses. These cases are mentioned in interviews 2, 3, 4, and 5.
- along with sustainable internationalization strategies for technology-based businesses, many companies should act more successfully in manufacturing more sustainable products by reverse engineering their competitors' products. This strategy is also true for the quality of raw materials for products and packaging. These are addressed in interviews 4, 1, 5, and 6.
- regarding the sustainable business model, the core value and the core of a business should be based on quality according to customer requirements and the international standards in order to be able to provide a sustainable business model. These are addressed in interviews 1, 3, 4, and 5.

For the future studies, it is recommended that

- the relationship between each dimension of the model and the consequences of the model should be measured separately by using descriptive survey research.
- the model related to each dimension should be explained. In fact, explaining the hierarchical classification of the components specified in each dimension of the model, describing the possible strong relationships between them, and perhaps developing the specific pattern of these relationships can be considered as future research areas.

- the process of sustainable internationalization in businesses should be examined using multidisciplinary and longitudinal studies. Due to the lack of time, this examination was not realized herein; therefore, it can be taken into account in a future work.
- other industries should be examined since this work is performed in the field of technology-based businesses operating in oil, gas, and petrochemical industry in Iran.

References

Abdelkafi, N. and Täuscher, K., 2016. Business Models for Sustainability from a System Dynamics Perspective. Organization and Environment, 29(1), pp. 74–96.

Baden-Fuller, C. and Mangematin, V., 2013. Business models: A challenging agenda. Strategic Organization, 11(4), pp. 418–427.

Békés, G., 2014. Internationalization and Innovation of Firms: Evidence and Policy Carlo Altomonte, Tommaso Aquilante, Gábor Békés and Gianmarco Ottaviano Special Paper, 32.

Bocken, N., Boons, F., and Baldassarre, B., 2019. Sustainable Business Model Experimentation by Understanding Ecologies of Business Models. Journal of Cleaner Production, 208, pp. 1498–1512.

Bocken, N.M., De Pauw, I., Bakker, C. and Van Der Grinten, B., 2016. Product Design and Business Model Strategies for a Circular Economy. Journal of Industrial and Production Engineering, 33(5), pp. 308–320.

Böhringer, C., and Jochem, P. E., 2007. Measuring the Immeasurable—A Survey of Sustainability Indices. Ecological Economics, 63(1), pp 1–8.

Boons, F. and Lüdeke-Freund, F., 2013. Business models for Sustainable Innovation: State-of-the-art and Steps Towards a Research Agenda. Journal of Cleaner Production, 45, pp. 9–19.

Cadogan, J. W., Kuivalainen, O., and Sundqvist, S., 2009. Export Market-oriented Behavior and Export performance: Quadratic and Moderating Effects under Differing Degrees of Market Dynamism and Internationalization. Journal of International Marketing,17(4), pp. 71–89.

Cannone, G. and Ughetto, E., 2015. Internationalization Flows of High-Tech Start-ups: A Gravity Model. European Business Review.

Chetty, S., Johanson, M., and Martín, O. M., 2014. Speed of Internationalization: Conceptualization, Measurement *and* Validation. Journal of World Business, 49(4),pp. 633–650.

Clinton, L. and Whisnant, R., 2014. Model Behavior–20 Business Model Innovations for Sustainability. Sustainability, London.

Dentchev, N., Baumgartner, R., Dieleman, H., Jóhannsdóttir, L., Jonker, J., Nyberg, T., Tang, X., 2016. Embracing the Variety of Sustainable Business Models: Social Entrepreneurship, Corporate Intrapreneurship, creativity, Innovation, and other Approaches to Sustainability Challenges. Journal of cleaner Production.

Engert, S., and Baumgartner, R. J., 2016. Corporate Sustainability Strategy–Bridging the Gap Between Formulation and Implementation. Journal of Cleaner Production, 113, pp. 822–834.

Evans, S., Vladimirova, D., Holgado, M., Van Fossen, K., Yang, M., Silva, E.A. and Barlow, C.Y., 2017. Business Model Innovation for Sustainability: Towards a Unified Perspective for Creation of Sustainable Business Models. Business Strategy and the Environment, 26(5), pp. 597–608.

Ferm, J., 2018. Business Model Change and Internationalization of Finnish Cleantech SMEs.

Geissdoerfer, M., Vladimirova, D., and Evans, S., 2018. Sustainable Business Model Innovation: A Review. Journal of Cleaner Production, 198, pp. 401–416.

Hollensen, S., 1998. Global Marketing: A Market-Responsive Approach.

Jabłoński, A., 2016. Scalability of Sustainable Business Models in Hybrid Organizations. Sustainability, *8*(3), P. 194.

Jaffe, E. D., and Pasternak, H., 1994. An Attitudinal Model to Determine the Export Intention of non Exporting, Small Manufacturers. International Marketing Review.

Johanson, J., and Mattsson, L. G., 1988. Internationalization in Industrial Systems- a Network Approach, in Hood, N. and Vahlne, J.-E.

(Eds), Strategies in Global Competition, Croom Helm, Beckenham.

Johanson, J., and Vahlne, J. E., 1977. The Internationalization Process of the Firm - a Model of knowledge Development and Increasing Foreign Market Commitment. Journal of International Business Studies (8), pp. 23–32.

Johanson, J. and Wiedersheim-Paul, F., 1975. The Internationalization of the Firm: Four Swedish Cases. Journal of Management Studies, 12(3), pp. 305–322.

Kramer, M. R., and Porter, M., 2011. Creating shared value. Harvard business review, 89(2/1), pp. 62–77.

Kowalski, R. M., Giumetti, G. W., Schroeder, A. N., and Lattanner, M. R., 2014. Bullying in the Digital Age: A Critical Review and Meta-analysis of Cyberbullying Research Among Youth. Psychological Bulletin, 140(4), P. 1073.

Lassala, C., Apetrei, A., and Sapena, J., 2017. Sustainability Matter and Financial Performance of Companies. Sustainability, 9(9), P.1498.

Löfgren, A., 2014. International Network Management for the Purpose of Host Market Expansion: The Mediating effect of Co-Innovation in the Networks of SMEs. Journal of International Entrepreneurship, 12(2), pp. 162–182.

Moldan, B., Janoušková, S., and Hák, T., 2012. How to Understand and Measure Environmental Sustainability: Indicators and Targets. Ecological Indicators, 17, pp. 4–13.

Morioka, S. N., Evans, S., and De Carvalho, M. M. (2016). Sustainable Business Model Innovation: Exploring Evidences in Sustainability Reporting. Procedia Cirp, 40, pp. 659–667.

Morgan III, C. A., Hazlett, G., Doran, A., Garrett, S., Hoyt, G., Thomas, P., Southwick, S. M., 2004. Accuracy of Eyewitness Memory for Persons Encountered During Exposure to Highly Intense Stress. International Journal of law and Psychiatry, 27(3), pp. 265–279.

Nidumolu, R., Prahalad, C. K., and Rangaswami, M. R., 2009. Why Sustainability Is now the Key Driver of Innovation. Harvard Business Review, 87(9), pp. 56–64.

Ortiz, A., Chang, L., and Fang, Y., 2015. International Student mobility Trends 2015: An Economic Perspective. World Education News and Reviews, 1.

Osterwalder, A., Pigneur, Y., Bernarda, G. and Smith, A., 2014. Value Proposition Design: How to Create Products and Services Customers want. John Wiley & Sons.

Osterwalder, A. and Pigneur, Y., 2010. Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. John Wiley & Sons.

Osterwalder, A. (2004). The Business Model Ontology a Proposition in a Design Science Approach (Doctoral Dissertation, Université de Lausanne, Faculté des Hautes études Commerciales).

Oviatt, B.M. and McDougall, P.P., 1997. Challenges for Internationalization Process Theory: The Case of International New Ventures. MIR: Management International Review, pp. 85–99.

Park, S. B., 2018. Multinationals and sustainable development: Does Internationalization Develop Corporate Sustainability of Emerging Market Multinationals? Business Strategy and the Environment,27(8), pp. 1514–1524.

Parry, G. and Tasker, P., 2014. Value and Servitization: Creating Complex Deployed Responsive Services. Strategic Change, 23(5–6), pp. 303–315.

Rashid, A., Asif, F. M., Krajnik, P., and Nicolescu, C. M., 2013. Resource Conservative Manufacturing: An Essential Change in Business and Technology Paradigm for Sustainable Manufacturing. Journal of cleaner production, 57, pp. 166–177.

Raskin, P. D., Electris, C., and Rosen, R. A., 2010. The Century Ahead: Searching for Sustainability. Sustainability, 2(8), pp. 2626–2651.

Ruzzier, M., Antoncic, B., Hisrich, R. D., and Konecnik, M., 2007. Human Capital and SME internationalization: A Structural Equation Modeling Study. Canadian Journal of Administrative Sciences/Revue Canadienne des Sciences de l'Administration, 24(1), pp. 15–29.

Sarmad, Z., Bazargan, A., and Hejazi, A., 2008. Research Methods in Behavioral Sciences. Tehran: Agah Publication.

Senik, Z. C., Isa, R. M., Sham, R. M., and Ayob, A. H., 2014. A Model for Understanding SMEs Internationalization in Emerging Economies. Jurnal Pengurusan (UKM Journal of Management), 41.

Servaes, J., Polk, E., Shi, S., Reilly, D., and Yakupitijage, T., 2012. Towards a Framework of Sustainability Indicators for Communication for Development and Social Change Projects. International Communication Gazette, 74(2), pp. 99–123.

Skrt, B., and Antoncic, B., 2004. Strategic Planning and Small Firm Growth: An Empirical Examination. Managing Global Transitions, 2(2), P. 107.

Strauss, A., and Corbin, J., 1990. Basics of Qualitative Research: Sage Publications.

Tallman, S. and Li, J., 1996. Effects of International Diversity and Product Diversity on the Performance of multinational Firms. Academy of Management Journal, 39(1), pp. 179–196.

Wells, P., 2013. Sustainable Business Models and the Automotive Industry: A Commentary. IIMB Management Review, 25(4), pp. 228–239.