

## **FACULTY OF BUSINESS**

### **FUZZY DATA-DRIVEN MCDM MODEL FOR EXPLORING INTERRELATIONSHIP AMONG KEY DETERMINANTS OF FDI ATTRACTIVENESS**

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## **ABSTRACT**

In today's era of globalization, Foreign Direct Investment (FDI) plays a crucial role in the economic development of countries and regions, including Vietnam. FDI is widely regarded as a driving force in the global trade system, stimulating growth in the investment sector and significantly enhancing a country's global competitiveness. Moreover, economic growth and global diversity directly influence the amount of FDI a country receives.

A hybrid model that integrates Fuzzy-Delphi, Fuzzy-DEMATEL, and DANP methods has been proposed to identify and prioritize the main factors affecting FDI attraction in Vietnam. Using multiple techniques, the proposed approach provides a more robust analysis considering the inherent uncertainties and complexities of the FDI decision-making process. The study explores the network and interrelationships between the factors, providing a more nuanced understanding of the determinants of FDI attraction and their impact on other factors. The study's results are expected to reveal the critical factors affecting FDI attraction in Vietnam and their relative importance, which can serve as a basis for policymakers to design effective strategies for attracting FDI. This can be particularly important for developing countries like Vietnam, where FDI can drive economic growth and development.

Furthermore, the proposed methodology has the potential to contribute significantly to the literature on FDI attraction and provide a valuable framework for future research. By taking a comprehensive and integrated approach, the study can help to advance our understanding of the factors that drive FDI attraction and inform policies that promote economic growth and development.

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## LIST OF ABBREVIATIONS

ABBREVIATION	FULL DEFINITION
FDI	Foreign Direct Investment
DEMATEL	Decision-making trial and evaluation laboratory
MNCs	Multinational corporations
MCDM	multi-criteria decision-making
AHP	Analytic Hierarchy Process
ANP	Analytic Network Process
DANP	DEMATEL-based ANP
ISM	Interpretive Structural Modeling
NRM	Network Relation Map
EPU	Economic policy uncertainty
NAFTA	North American Free Trade Agreement
TPP	Trans-Pacific Partnership
R&D	Research and development
UNCTAD	United Nations Conference on Trade and Development
SEM	Structural equation modeling
CPTPP	Progressive Agreement for Trans-Pacific Partnership
EVFTA	EU-Vietnam Free Trade Agreement



# CHAPTER 1: INTRODUCTION

## 1.1 Topic Background

### 1.1.1. FDI Definition

FDI stands for Foreign Direct Investment. According to the IMF and OECD definitions, FDI refers to the acquisition of a long-term interest by a resident entity of one economy (known as the direct investor) in an enterprise that is resident in another economy (known as the direct investment enterprise). The process of FDI involves the initial transaction that establishes the relationship between the investor and the enterprise, as well as any subsequent capital transactions between them or among their affiliated enterprises, whether incorporated or unincorporated. It's worth noting that even capital transactions that don't result in a financial settlement, such as the exchange of shares among affiliated companies, should be recorded in both the Balance of Payments and the International Investment Position. It refers to an investment made by a foreign reality (existent, company, or government) into a business or association located in another country. FDI is distinguished from other forms of investment, similar as portfolio investment, where investors only buy stocks or bonds in a foreign company but don't laboriously share in its operation.

There are different delineations of FDI, but generally, it involves a long-term relationship between the investor and the company or association in which the investment is made. The investor may acquire a controlling stake in the business or contribute capital for the purpose of establishing a new business or expanding and being one.

FDI can bring several benefits to the host country, including the creation of jobs, transfer of technology, and access to new requests. Still, it also poses implicit pitfalls, similar as the transfer of gains to the investor's home country, reliance on foreign capital, and the eventuality for the investor to play too important influence on the host country's programs and frugality.

### 1.1.2. Importance Of FDI In The Global Economy

Foreign Direct Investment (FDI) has been associated with globalization for years. It enables host countries to grow economically by allowing multinational corporations (MNCs) to expand their business operations internationally. FDI aids the host country's economic development, access to science and technology, job creation, and labor resource management. FDI assists multinational corporations in obtaining cheap labor, lowering production costs, and diversifying markets. Therefore, how to attract FDI is a problem that host countries must confront and investigate the effects on national companies' investment decisions.

Since 1980, FDI has increased more than 12 times in developing economies (OCED, 2022). Even though developed countries obtain the majority of FDI, many developing countries now

perceive FDI as a significant funding source. For instance, more than 60% of investment flows are constantly made up for developing countries (Herzer et al., 2008). The heterogeneous effects of FDI on developing countries are mainly explained by country-to-country differences in degrees of freedom from government intervention, entrepreneurship, and volatility of FDI and its dependence on exports (Herzer, 2012).

Following the COVID-19 pandemic, the global economy is now in a phase of recovery and growth, allowing governments to improve their industries' structures and increase FDI. In the first half of 2022, FDI inflows reached \$972 billion globally, representing a 16% increase compared to the same period in 2021 (OCED, 2022). Therefore, attracting FDI has become a crucial development strategy for governments in the post-pandemic era (Ahmad et al., 2020). As a result of this post-COVID opening and the need for foreign investment, developing countries have expanded their efforts to attract investment, leading to increased competition and challenges for MNCs.

### **1.1.3. Overview Vietnamese FDI Situation**

Vietnam has attracted significant FDI over the past few decades, becoming one of Southeast Asia's most attractive investment destinations. In 1987, the Vietnamese government introduced the Law on Foreign Investment, opening the door to foreign investors and providing various incentives to invest in the country. From 1987 until the end of 2006, FDI capital has come to most sectors of the economy, with most in industry and construction. The largest recipient was heavy industry attracting 1,994 projects with total registered capital of US\$18.2 billion, 43.6 percent of all projects, 48.8 percent of total capital, and 34.7 percent of the realized capital in the construction and industry field. The light industry attracted 1,921 projects with total registered capital of US\$9.7 billion, corresponding to 42 percent, 25.9 percent, and 17.3 percent (The Ministry of Finance, 2006).

Vietnam received increasing levels of foreign direct investment (FDI) from 2007 to 2019, fluctuating due to economic and political conditions. The FDI inflows totaled \$9.5 billion in 2007, peaked at \$19.1 billion in 2018, and were \$16.1 billion in 2019. The largest investors included Japan, South Korea, Singapore, Taiwan, and Hong Kong. The FDI inflows have contributed significantly to Vietnam's economic growth and development, particularly in the manufacturing, real estate, and services industries (International Monetary Fund, 2019)

Since the outbreak of COVID-19 in early 2020, Vietnam's FDI inflows have been affected as global economic activity has slowed. However, Vietnam has successfully contained the pandemic, which has helped maintain investor confidence. In 2020, Vietnam attracted a total of \$28.5 billion in FDI, a decrease of 25% compared to 2019. Despite the pandemic, Vietnam has remained an

attractive destination for FDI due to its stable political environment, strong economic fundamentals, and strategic location. The largest investors during this period were South Korea, Japan, and Singapore, with a significant portion of FDI going into the manufacturing and processing industries (World Bank, 2023).

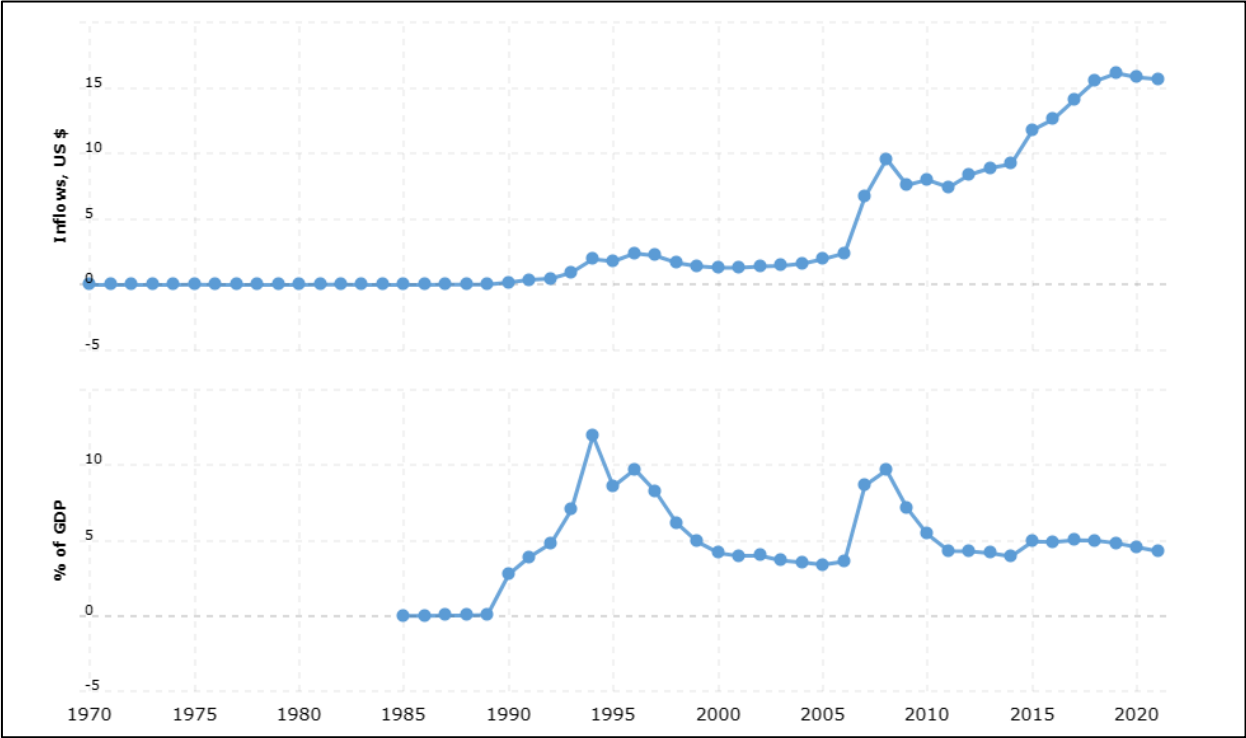
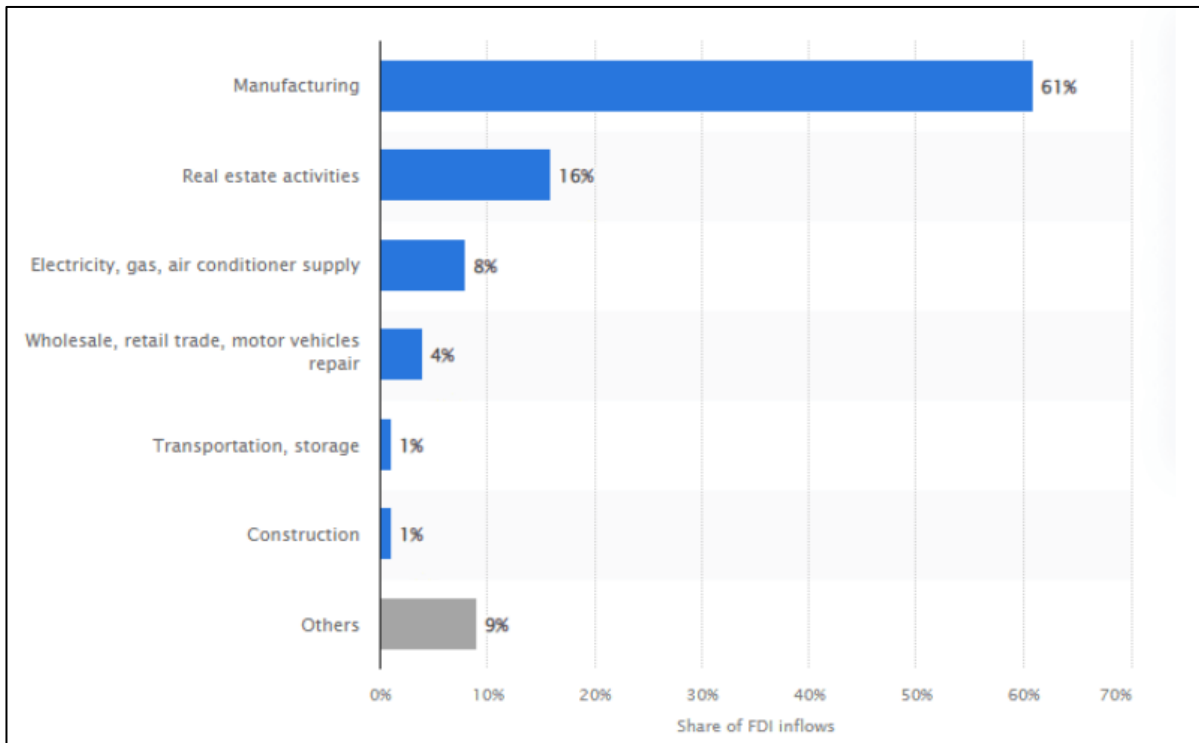


Figure 1.1: Vietnam Foreign Direct Investment 1970-2023

As of December 2022, 108 countries have invested capital in Vietnam, according to the Ministry of Planning and Investment. Among them, Singapore, Korea, and Japan are the top three countries with the largest foreign investment in Vietnam. Singapore leads with over \$6.46 billion, representing 23.3% of the newly registered FDI capital. Korea follows closely, accounting for 17.6% of Vietnam's total foreign investment capital, with an investment of \$4.88 billion. Japan holds the third position with a total investment of \$4.78 billion, accounting for 17.3% of the total investment in Vietnam (Savills, 2023).



**Figure 1.2: Current Status of FDI in Vietnam by Industry**

Foreign investors have shown interest in 19 out of the 21 economic sectors in the nation. The processing and manufacturing industry has garnered the highest investment of over 16.8 billion USD, constituting 60.6% of the total registered capital. The real estate business came in second, with an investment of over 4.45 billion USD, which accounts for 16.1% of the total registered investment capital. Electricity production and distribution industries and scientific and technological activities follow suit, with registered capital of over 2.26 billion USD and nearly 1.29 billion USD, respectively. The remaining sectors fall under other industries.

Regarding the number of new projects, wholesale and retail sectors, manufacturing and processing industries, and professional science and technology activities have attracted the most projects, accounting for 30%, 25.1%, and 16.3% of the total projects, respectively (Bộ Kế hoạch và Đầu tư, 2022).

**Table 1.1: Foreign direct investment 2022 by industry (From January 1, 2022, to December 20, 2022)**

	<b>Industry</b>	<b>Number of new projects</b>	<b>Newly registered capital (million USD)</b>	<b>Number of adjusted projects</b>	<b>Adjustable registered capital (million USD)</b>	<b>Number of times of capital contribution to buy shares</b>	<b>Value of capital contribution, share purchase (million USD)</b>	<b>Total registered capital (million USD)</b>
1	Manufacturing and processing industry	511	7,213	644	7,977.90	471	1,611.06	16,801.53
2	Real estate business	75	1,816	37	1,059.28	103	1,576.55	4,451.44
3	Producing and distributing electricity, gas, water, air conditioning	11	2,101	6	70.74	17	89.97	2,261.51
4	Expertise, science, and technology	331	249	106	172.43	603	867.90	1,289.31
5	Wholesale and retail; repair cars, motorcycles, motorbikes	611	318	151	297.36	1,417	394.85	1,010.69
6	Media and communication	241	183	52	310.73	305	161.64	655.23
7	Warehousing transportation	72	356	16	46.78	133	35.81	438.91
8	Education	36	12	16	136.78	51	104.70	253.41
9	Construction industry	32	94	23	35.54	77	117.90	247.48
10	Agriculture, forestry, and fisheries	12	30	5	11.67	16	26.70	67.96
11	Sector Administrative activities and support services	54	24	22	12.50	70	27.65	63.67
12	Banking, finance, and insurance	8	29	1	24.69	13	3.81	57.70

13	Water supply and waste treatment industry	3	2	1	16.00	7	39.44	57.30
14	Health sector and social assistance activities	2	10	4	1.71	11	09.02	21.16
15	Mining sector	1	2	-	-	3	17.09	19.06
16	Accommodation and catering services	33	8	18	(59.82)	240	63.71	11.44
17	Other service activities	2	0	4	3.37	17	2.24	5.92
18	Arts, entertainment, and entertainment industry	1	0	1	0.15	11	3.50	3.85
19	Employment activities in households	-	-	-	-	1	0.55	0.55
	Total	2,036	12,446.22	1,107	10,117.81	3,566	5,154.10	27,718.13

In 2022, foreign investors invested in 54 provinces and cities nationwide. Ho Chi Minh City is leading with more than 3.94 billion USD of registered investment capital, representing 14.2% of the total registered investment capital and increasing by 5.4% compared to last year. Binh Duong is in second place with over 3.14 billion USD of total investment capital, accounting for 11.3% of the total capital and increasing by 47.3% compared to the same period. Quang Ninh takes third place with almost 2.37 billion USD of registered investment capital, making up 8.5% of the total capital, more than twice the amount compared to the same period in 2021. The following are Bac Ninh, Hai Phong, and Hanoi.

Regarding the number of new projects, foreign investors focus on investing in large cities with convenient infrastructure, like Ho Chi Minh City and Hanoi. Ho Chi Minh City is leading with regards to the number of new projects (43.9%), the number of investment certificate issuance (67.6%), and ranking second in terms of the number of projects adjusting investment capital (17.3%, after Hanoi with 18.6%) (Bộ Kế hoạch và Đầu tư, 2022).

*Table 1.2: Foreign investment in 2022 by local (From January 1, 2022, to December 20, 2022)*

	<b>Local</b>	<b>Number of new projects</b>	<b>Newly registered capital (million USD)</b>	<b>Number of adjusted projects</b>	<b>Adjustable registered capital (million USD)</b>	<b>Number of times of capital contribution to buy shares</b>	<b>Value of capital contribution, share purchase (million USD)</b>	<b>Total registered capital (million USD)</b>
1	Ho Chi Minh City	893	601.07	192	1,600.72	2,411	1,738.61	3,940.40
2	Binh Duong	68	1,909.08	26	37.11	186	1,196.48	3,142.67
3	Quang Ninh	9	2,181.17	-	-	6	186.99	2,368.16
4	Bac Ninh	147	503.09	123	1,685.63	60	55.19	2,243.90
5	Hai Phong	91	1,139.00	41	792.74	26	31.48	1,963.23
6	Ha Noi	365	233.27	206	842.53	387	630.03	1,705.84
7	Thai Nguyen	5	323.00	11	1,212.16	7	10.47	1,545.62
8	Dong Nai	51	485.19	90	593.54	66	173.37	1,252.09
9	Bac Giang	36	438.96	45	678.16	30	97.50	1,214.63
10	Ba Ria - Vung Tau	17	282.13	7	50.22	22	621.87	954.23
11	Nghe An	19	490.51	2	400.00	2	0.17	890.67
12	Long An	61	468.89	83	315.15	58	62.34	846.38
13	Hung Yen	21	316.77	58	387.35	19	41.99	746.10
14	Phu Tho	8	406.87	20	288.59	3	5.21	700.67
15	Tay Ninh	18	537.80	19	155.03	7	5.49	698.32
16	Ha Nam	19	176.86	38	350.59	3	0.76	528.21
17	Hai Duong	17	59.44	33	306.01	21	5.16	370.61
18	Thai Binh	8	219.82	5	86.29	2	1.75	307.87

19	Ha Tinh	1	275.00	-	-	2	1.13	276.13
20	Vinh Phuc	28	225.47	3	18.44	4	0.61	244.52
21	Binh Phuoc	33	121.03	21	93.19	4	11.67	225.89
22	Tien Giang	9	40.68	4	181.05	1	0.04	221.76
23	Thua Thien Hue	6	197.31	2	0.02	2	0.17	197.50
24	Can Tho	6	174.23	2	2.34	9	9.39	185.97
25	Vinh Long	4	102.24	12	53.59	1	0.13	155.95
26	Da Nang	47	69.88	35	5.79	49	58.33	133.99
27	Soc Trang	2	110.03	1	1.80	1	4.54	116.38
28	Thanh Hoa	7	69.33	5	27.40	4	0.78	97.51
29	Ninh Thuan	1	6.00	-	-	12	81.56	87.56
30	Quang Ngai	4	73.42	2	13.50	1	0.00	86.92
31	Quang Nam	5	68.24	3	1.70	19	9.30	79.25
32	Ninh Binh	5	16.51	1	02.02	5	48.84	67.37
33	Nam Dinh	7	43.02	4	2.95	6	11.62	57.60
34	Binh Dinh	2	4.32	2	15.15	6	14.74	34.21
35	Binh Thuan	2	16.06	1	0.21	5	8.51	24.79
36	An Giang	2	23.00	1	1.50	2	0.14	24.64
37	Dak Lak	2	5.65	2	3.94	2	1.24	10.83
38	Yen Bai	3	6.61	-	-	6	3.10	9.71
39	Khanh Hoa	1	0.77	-	-	55	7.92	8.69



40	Kien Giang	1	2.00	-	-	11	2.67	4.67
41	Tra Vinh	1	3.00	1	0.03	-	-	03.03
42	Ben Tre	1	01.08	1	(0.45)	3	2.23	2.86
43	Phu Yen	-	-	-	-	2	1.83	1.83
44	Lang Son	-	-	-	-	1	1.72	1.72
45	Hoa Binh	-	-	-	-	3	1.44	1.44
46	Tuyen Quang	-	-	-	-	4	0.86	0.86
47	Dak Nong	-	-	1	0.49	1	0.13	0.62
48	Kon Tum	-	-	-	-	3	0.57	0.57
49	Quang Tri	-	-	-	-	3	0.47	0.47
50	Hau Giang	1	0.01	-	-	3	0.28	0.29
51	Ca Mau	-	-	-	-	2	0.14	0.14
52	Gia La	-	-	-	-	1	0.11	0.11
53	Lam Dong	1	0.04	3	(9.38)	17	03.02	(6.31)
54	Bac Lieu	1	18.35	1	(79.30)	-	-	(60.95)
Total		2,036	12,446.22	1,107	10,117.81	3,566	5,154.10	27,718.13

FDI has had a significant impact on various regions in Vietnam, although the extent of the impact varies between regions. Regions that have attracted more FDI have seen faster economic growth, which has led to improvements in infrastructure, education, and healthcare, and the promotion of new industries, as well as the modernization of existing ones. Additionally, FDI has created job opportunities in various regions of Vietnam, particularly in urban areas, which has led to a reduction in poverty and an increase in living standards. However, FDI has also contributed to income inequality between regions, with regions that have attracted more FDI experiencing higher levels of economic growth and higher average incomes, leading to disparities with regions that have received less FDI. Furthermore, FDI has had both positive and negative impacts on the

environment, with the promotion of cleaner technologies and more efficient production processes on the one hand, and environmental degradation in areas where environmental regulations are weak or not enforced on the other hand.

In summary, FDI in Vietnam has been a vital catalyst for economic growth and development, creating millions of jobs in the manufacturing sector, reducing poverty, and improving living standards. However, the effects of FDI on different regions in Vietnam depend on various factors. Therefore, it is crucial to ensure that the benefits of FDI are distributed equitably across different regions to reduce disparities and promote sustainable development. In addition, FDI has facilitated the transfer of technology and knowledge from advanced economies, which has promoted industry modernization. Moreover, FDI has contributed to economic growth by diversifying the economy, increasing exports, and developing infrastructure such as transportation, power, and telecommunications. As a result, FDI has boosted competitiveness and improved the productivity, quality, and efficiency of Vietnam's economy.

## **1.2. Research Gaps**

Despite the substantial literature on the determinants affecting FDI, there is a gap in the use of comprehensive research methods that consider the interplay of factors (Karimi & Sofiyabadi, 2013). Although several studies have employed multi-criteria decision-making (MCDM) models such as Analytic Hierarchy Process (AHP), Analytic Network Process (ANP), and Interpretive Structural Modeling (ISM) to identify and rank the critical factors affecting FDI attraction, they have not explored the inter-relationships between these factors. The lack of attention to the interplay of factors is a significant limitation of these studies, as it can lead to erroneous investment decisions. The inter-relationships between factors are essential to understanding the complexity of the FDI attraction process and designing effective strategies to attract FDI. Thus, MCDM models are useful in identifying and prioritizing factors affecting FDI attraction in Vietnam because FDI involves numerous and diverse factors that need to be considered. Traditional decision-making approaches may not be suitable as they often assume crisp and certain relationships between variables, whereas, in real-world scenarios, relationships can be fuzzy and uncertain.

The fuzzy Delphi method is beneficial for analyzing complicated issues and choosing determinants. Nevertheless, its use has some constraints, such as expert panel selection, subjectivity, lack of transparency, limited scope, and the time-consuming nature of the method. Therefore, it is crucial to consider these restrictions while utilizing the method to tackle intricate problems (Fink-Hafner et al., 2019). The Decision-Making Trial and Evaluation Laboratory method-based Fuzzy Sets Theory is a decision-making tool that combines fuzzy logic and the DEMATEL method to analyze the causal relationships among factors affecting a problem. Some

of the strengths of the Fuzzy-DEMATEL method include its ability to handle complex and uncertain problems, identify the most influential factors and their causal relationships, and provide a structured decision-making approach. Nevertheless, there are some constraints to its use, such as the Fuzzy-DEMATEL method can be difficult to understand and apply for those without expertise in the method, and it may require extensive data and information input.

Additionally, the subjectivity of expert opinions can introduce biases and affect the validity of the results. Finally, like other decision-making methods, the Fuzzy DEMATEL method is only as good as the data and information used to construct it, so care must be taken to ensure that the data and information are reliable and accurate (Han & Deng, 2018). Besides, the DANP method is an extension of DEMATEL that uses ANP to handle more complex decision-making problems, but it is more complex, requires a significant amount of data, is subjective, and is time-consuming. Despite its usefulness, the DANP method's limitations should be considered when applying it to real-world situations. Therefore, there is a need for more comprehensive research that considers the interrelationships between factors using suitable MCDM models such as Fuzzy-Delphi, Fuzzy-DEMATEL, and DANP. These models can provide a more nuanced and flexible approach to decision-making by allowing for the incorporation of subjective judgments, uncertainty, and non-linear relationships between factors. This research gap highlights the need for a more comprehensive and integrated approach to understanding and promoting FDI attraction in emerging markets such as Vietnam.

Specifically, the Fuzzy-Delphi technique provides a more nuanced and flexible approach to agreement- structure, allowing for the expression and aggregation of nebulous or disagreeing opinions. This makes it a useful tool for decision-making in complex and uncertain situations, similar to threat assessment, resource allocation, and policy-timber. Also, the Fuzzy-DEMATEL method allows for incorporating subjective judgment and uncertainty in the causal relationships between variables, unlike the traditional DEMATEL method, which assumes crisp and certain relationships. This makes the Fuzzy-DEMATEL method more suitable for real-world decision-making problems where clear and certain relationships between variables may not always exist. The Fuzzy-DEMATEL method provides a means for incorporating uncertainty and subjectivity into the decision-making process, making it a useful tool for decision-makers. The DANP model offers several advantages over the traditional ANP method. One of the main advantages is that it allows for identifying non-linear relationships between elements. This is important in cases where the elements of a problem are not directly related to each other but can still impact the overall outcome.

Additionally, the DANP method can provide a more detailed analysis of the problem, allowing for a more accurate assessment of the various elements and their relationships. Another advantage

of the DANP technique is its ability to identify the most important elements of a problem. This is especially useful in cases where there are a large number of elements that need to be considered. Identifying the most important elements makes it easier to make decisions and develop strategies based on them.

### **1.3. Research questions**

The present work introduces a three-phase method that utilizes the Fuzzy-Delphi, Fuzzy-DEMATEL, and DANP techniques to reveal the interdependencies among pertinent factors. To be more precise, the investigation aims to address the following research inquiries:

- (RQ1) What are the critical criteria affecting FDI attraction?
- (RQ2) What are the network and interrelationships among the criteria of FDI attraction?
- (RQ3) What are the priorities of the selected criteria?

### **1.4. Research Objectives and Contributions**

The research objectives are aims to address the gaps in the current research, finding the interrelationship among determinants affecting FDI attractions and their interdependencies through a three-phased method as follow:

- (i) The study employs the Fuzzy-Delphi technique to identify crucial factors.
- (ii) It uses the Fuzzy-DEMATEL method to identify the relationships between critical factors, providing a comprehensive understanding of the determinants and their influence on other factors.
- (iii) The study applies the DANP method to accurately assess the relative importance of the factors based on the results of the Fuzzy-DEMATEL method.

This study makes significant contributions through the proposed model, which can aid decision-makers in investigating the underlying causes of the FDI system and inform their decision-making. The study's key contributions are as follows:

- (i) Improved understanding of FDI determinants: The integrated model considers the interrelationships between determinants, helping policymakers identify and understand key factors influencing FDI. This can lead to informed decision-making on attracting FDI.
- (ii) Enhanced decision-making for FDI promotion: Policymakers can prioritize actions based on the relative importance of determinants, leading to more effective decision-making and better use of resources for FDI promotion.

- (iii) More accurate FDI forecasting: The model helps forecast FDI inflows based on determinants and their interrelationships, enabling policymakers to make more accurate predictions and plan accordingly.
- (iv) Improved competitiveness of host country: Attracting FDI can enhance the host country's competitiveness by increasing access to new technologies, boosting exports, and creating jobs. The model helps identify key determinants to attract FDI and improve host country competitiveness.
- (v) Enhanced research methodology: The integrated model combines several decision-making and analysis techniques, developing new research methodologies and enhancing the understanding of complex systems.

## 1.5. Thesis outline

**Chapter 1: Introduction:** This section introduces the role of FDI in the economy and the importance of attracting FDI into Vietnam. This section also provides research objectives, scope, subjects, questions, methodology, and data used in the research.

**Chapter 2: Literature review:** The second chapter contains several literature reviews pertinent to the thesis topic. It defines and provides criteria for selecting and gives an overview of interactions of factors. The literature review will also examine studies undertaken to assess the FDI situation in Vietnam and specific implementations of the methods.

**Chapter 3: Methodology:** The research methodologies are introduced in this third chapter to clarify the research topic. The integrated research team employs three methods: Fuzzy-Delphi, Fuzzy-DEMATEL, and DANP. The research formula and conclusions are developed based on established theories and assumptions.

**Chapter 4: Data analysis and results:** This chapter is important to the research topic. From the data analysis, the research team offers empirical analysis and results of research methods. Furthermore, the research's important findings and the study's limitations.

**Chapter 5: Discussion and conclusion:** This chapter outlines proposals for additional research that will be explained here. Chapter 1 provides background information and some key points of the topic relevant to this study. This chapter will cover the thematic background, practice problem, research objective, research question, research scope, and methodology. It also kicks off the main idea of the study. The following chapter will highlight technical terms used in the research.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1. Literature Review On MCDM Models**

MCDM models are widely used in various fields for making complex decisions involving multiple criteria. In recent years, fuzzy theory and other fuzzy-based models have gained significant attention in MCDM modeling due to their ability to handle uncertainties and vagueness in decision-making. Through a review of existing literature, it becomes evident that multiple approaches and discussions surround developing indicator frameworks and identifying key factors. Given the various research methods utilized in investigating factors influencing FDI, it is necessary to incorporate multiple approaches to achieve the most comprehensive perspective.

#### **2.1.1. Fuzzy Sets Theory**

Fuzzy Sets Theory, or fuzzy logic, is a mathematical framework dealing with uncertainty and information vagueness. Lotfi A. Zadeh developed it in the 1960s as an extension of classical set theory. Fuzzy theory utilizes the concept of class function to handle varying linguistic variables. This approach deals with sources of ambiguity or imprecision that are not statistical or well-defined. Since the 1970s, the fuzzy set proposal has been used to categorize geographic realities with vague class descriptions (Chang et al., 2011).

In a fuzzy system, variables can take on values between 0 and 1, representing degrees of membership in a set. This allows for a more flexible approach to modeling complex systems that are difficult to describe with traditional crisp sets. Fuzzy logic is used to make decisions based on incomplete or uncertain information. One of the main advantages of fuzzy theory is its ability to handle nonlinear relationships between variables. This makes it particularly useful in control systems, where complex interactions between inputs and outputs can be difficult to model with traditional methods.

#### **2.1.2. Delphi And Fuzzy-Delphi Methods**

The Delphi technique was developed by Olaf Helmer and his colleagues at the Rand Corporation in the early 1950s while working on defense exploration. The Delphi system is a process substantially used in exploration and economics that aims to collect opinions on a particular exploration question or content to gain agreement. The opinions are collected from unpacked experts, typically through questionnaires (Galani, 2018). The limitation of this approach is that it requires experts to survey it repeatedly - often more than twice - to allow the forecast values to converge. Repetition of surveys makes them expensive and response rates lower, especially for a complex survey.

The Fuzzy Sets Theory has been incorporated into the Delphi method to handle uncertainty and vagueness in expert opinions. This hybrid approach is known as the Fuzzy-Delphi method. The Fuzzy-Delphi method that might process fuzziness in forecasting has been proposed. The method uses fuzzy sets to represent the experts' degree of agreement or disagreement. Thus, this process has been completed, and the corresponding anticipated value becomes a casting value if a distance that satisfies a given confluence criterion is set up (Ishikawa et al., 1993). Fuzzy-Delphi has been applied in various areas, including risk assessment, project management, and decision-making. It has effectively handled imprecise or uncertain information and provided a more accurate picture of the experts' opinions.

### **2.1.3. DEMATEL and Fuzzy-DEMATEL methods**

The Battelle Memorial Institute first conducted the DEMATEL method through its Geneva Research Centre in 1973 (Falatoonitoosi et al., 2013). The DEMATEL system utilizes directed graphs, or digraphs, to separate interconnected factors into cause-and-effect groups. Digraphs are more effective than undirected graphs because they show the directed connections of subsystems. The digraph can provide an initial understanding of contextual relationships among elements of a system, where the values represent the strength of influence. Hence, DEMATEL can convert the relationship between causes and effects factors into a comprehensible structural system model. The DEMATEL can propose the most important criteria which affect other criteria. The DEMATEL can reduce the number of criteria for assessing factor effectiveness, coincidentally; companies can ameliorate the effects of specific factors grounded on the impact digraph chart (Chang et al., 2011).

The Fuzzy-DEMATEL method is an extension of the DEMATEL method that uses fuzzy logic to handle the vagueness and uncertainty involved in decision-making. The method involves converting the experts' opinions into fuzzy numbers and constructing fuzzy direct and indirect relation matrices. The method then uses the alpha-cut technique to transform the fuzzy matrices into crisp matrices, which can be used for further analysis (Herrera et al., 2000).

### **2.1.4. ANP and DANP methods**

The ANP is an extension of the logical scale process AHP (Saaty, 2004) enables the assessment of complex non-interactions among decision situations and attributes. It is a comprehensive decision-making approach that measures the dependence and feedback within and between criteria or preferences. The ANP method has been used in multiple criteria decision-making to eliminate hierarchical structure restrictions and has been applied to selection problems.

Furthermore, most research assumes that each cluster in the ANP would be given equal weight if a weighted super-matrix were created. To address this issue, we applied a novel DEMATEL and

ANP technique combination known as the DANP, which we used to calculate the influential weights of the criteria based on the Network Relation Map (NRM) of DEMATEL. The DANP has recently seen widespread application in various fields, such as tourism policy, best vendor selection, hot spring hotel performance evaluation, and the Fuzzy-DEMATEL-based ANP used on national park websites. In this research model, DANP is applied to accurately assess the relative importance of the factor's effect on FDI.

## **2.2. Literature Review On Main Dimensions and Key Determinants**

These are the typical factors that we have selected for the degree of influence on FDI. There are 19 factors we refer to from the report "The 2021 Foreign Direct Investment (FDI) Confidence Index" (Garrett, 2022). This report synthesizes factors affecting FDI from different research papers and ranks them according to their influence on FDI in 2020 and 2021 on a global scale. As for the remaining factors, we refer to and select them from the articles "The key success factors for attracting foreign investment in the Post Epidemic Era" (Huang et al., 2021) and "Apply the Hybrid of Dematel and Anp to explore the determinants of MNES FDI abroad" (Z. Cheng et al., 2018). These articles all have the same factors affecting FDI such as taxes, government policies, markets, and so on. However, there are still different factors depending on the research context of each article. Therefore, after synthesizing, evaluating, and selecting factors suitable for the Vietnamese context, we have selected 24 determinants and divided them into three groups: Government, Market, and Resources.

### **2.2.1. Literature Review On Main Dimensions**

**Governmental Dimension:** Governments can either set up policies and regulations that make it easy for foreign investors to conduct business or create an environment encouraging foreign investment. Low tax rates and simple tax payment options may make foreign direct investment more alluring. MNC investment rates will rise if government regulations are transparent and there is no corruption. One of globalization's most frequently mentioned aspects is the rapid growth of trade and foreign direct investment flows (Stephenson & Perea, 2018). In order to exercise their sovereign right to control the inflow and establishment of foreign investment on their soil, host nations have several policy tools at their disposal. They include business registration and approval regulations and the complete or partial ban on foreign investment in particular economic sectors.

**Market Dimension:** Various factors, including inflation, domestic demand, and government policies, influence the domestic economic performance of a country. A high inflation rate can decrease consumer demand and foreign investment, while low inflation can attract foreign investors (Golub et al., 2003). Domestic demand determines a country's production, employment, and economic growth level (Dang & Nguyen, 2021). The institutional and artistic determinants are



also important factors influencing foreign direct investment in transition countries. The population's volume, quality, structure, distribution, and movement can also affect a country's profitable development rate. GDP, affectation, and request competition are important indicators that help measure a country's domestic economic performance.

**Resources Dimension:** The charges associated with paying workers for their work. This includes their base payment, benefits, and any lagniappes or impulses they may admit. For labour-seeking FDI, request attractiveness is likely determined by the labor cost. Therefore, for labour-seeking FDI, request attractiveness was measured as the average yearly pay envelope in manufacturing (Glam & Böke, 2017). The qualifications, training, and capability of workers to be willing to work in a particular region also impact FDI magnetism in both directions. Data collected from the UN Conference on Trade and Development's World Investment Report 2020 and the World Economic Forum's Global Competitiveness Report 2019, also anatomized by Investment Examiner, shows that countries with advanced- professed and better-educated workforces tend to attract further greenfield FDI systems.

### 2.2.2. Literature Review On Key Determinants

We arrange 24 key determinants into 3 groups of dimensions based on their definitions and the properties of each dimension group. For the Government, we prioritize the elements related to government policies, regulations, and taxes. As for the Market group, we choose factors belonging to the potential of the market. As for the resource group, we select the factors of labor, raw materials, capital and infrastructure.

*Table 2.1: 24 determinants belonging to 3 main factors*

<b>Main Dimension</b>	<b>Determinants and Explanation</b>
Government	<p>Tax rates and ease of tax payment (Hong &amp; Smart, 2010)</p> <p>The efficiency of legal and regulatory processes (Contractor et al., 2020)</p> <p>Transparency of government regulations and lack of corruption (Zhao et al., 2003)</p> <p>Strength of investor and property rights (Seyoum, 1996)</p> <p>Government incentives for investors (Dadush, 2013)</p>

Ease of moving capital into and out of the country (Elo, 2021)

General security environment (UNCTAD, 2019)

Country's participation in regional/bilateral trade agreements (Thangavelu & Findlay, 2011)

Checks and Balances (Huang et al., 2021)

The future orientation of government (Huang et al., 2021)

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Market Research and development (R&D) capabilities (Peterson & Laudicina, 2021)

Geographic (Nachum & Wymbs, 2002)

Technological and innovation capabilities (Mendoza-Silva, 2020)

Population (Xu, 1984)

Culture (Silajdzic & Mehic, 2021)

Domestic market size (Goh & Wong, 2011)

Trade openness (Huang et al., 2021)

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Resources Quality of infrastructure (Götz, 2020)

Availability of raw materials and other inputs (Brouthers et al., 2008)

Availability of land/real estate (Ding & Lichtenberg, 2011)

Cost of labor (Glam & Böke, 2017)

Talent/skill level of labor pool (Braconier et al., 2005)

Availability of financial capital in the domestic market (OCED, 2002)

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- **Tax rates and ease of tax payment**

The percentage of income or the value of an item that an individual or organization must pay to the government as tax (Hong & Smart, 2010). Tax rates can vary depending on the type of tax being levied, such as income tax, sales tax, property tax, or capital gains tax. For example, income tax is a tax on the income earned by individuals or businesses. The tax rate for income tax can vary depending on the income earned, with higher earners typically paying a higher tax rate. Similarly, sales tax is a tax on the value of goods or services purchased, with the tax rate typically being a fixed percentage of the total value of the item. Tax rates can be progressive, meaning that the percentage of tax paid increases as the amount of income or the value of the item being taxed increases. Alternatively, tax rates can be regressive, meaning that the percentage of tax paid decreases as the amount of income or the value of the item being taxed increases. Governments use tax rates to generate revenue to fund public services such as healthcare, education, and infrastructure. Tax rates can also encourage or discourage certain behaviors, such as investing in particular industries or products, or discourage harmful practices like smoking.

The process of paying taxes, including how simple and convenient it is for individuals and organizations to comply with their tax obligations (Contractor et al., 2020). The tax payment process can involve various steps, such as registering for taxes, filing tax returns, and paying taxes owed. When the process is straightforward to understand, taxpayers are more likely to comply with their tax obligations, which helps the government collect revenue more efficiently. The ease of tax payment can be influenced by various factors, such as the availability of online tax payment platforms, clear and concise instructions on tax obligations, the ease of accessing tax information, and the level of support provided to taxpayers. For example, a user-friendly tax payment platform allowing taxpayers to make payments easily and securely from their computers or mobile devices can greatly simplify the payment process.

On the other hand, a complex and confusing tax payment process can discourage taxpayers from complying with their tax obligations, reducing government revenue. Additionally, if taxpayers perceive the tax payment process as burdensome, they may be more likely to engage in tax evasion, which can have serious consequences for individuals and the government. Therefore, ensuring the ease of tax payment is essential for promoting tax compliance, reducing tax evasion, and ensuring a stable source of revenue for the government. Governments can achieve this by simplifying tax laws, providing user-friendly tax payment platforms, and offering support to taxpayers to ensure they can easily comply with their tax obligations.

Tax rates and ease of tax payment can have significant effects on foreign direct investment (FDI) attraction. In general, countries with low tax rates and an efficient tax payment process are more

likely to attract FDI than countries with high tax rates and a cumbersome tax payment process. Firstly, lower tax rates can make a country more attractive to foreign investors because it means they will have more after-tax profits to reinvest in the country. Investors are more likely to invest in a country where they can maximize their returns on investment, and lower tax rates can help achieve this goal. Secondly, an efficient tax payment process can also positively impact FDI attraction. An easy-to-understand tax payment system can reduce the cost of compliance for foreign investors, which can make investing in a country more attractive. Conversely, a complex and confusing tax payment system can increase the cost of compliance, discouraging foreign investors from investing in the country. Moreover, a simplified tax payment process can also create a more favorable business environment, which can be beneficial for attracting FDI. If the tax payment process is simple and easy, investors may perceive the country as having a more stable and efficient business environment, which can help attract FDI.

- **Efficiency of legal and regulatory processes**

The effectiveness and promptness with which legal and regulatory systems operate and deliver results (Contractor et al., 2020). It refers to how well a country's legal and regulatory frameworks can enforce laws and regulations in a timely and efficient manner and to what extent they can produce the desired outcomes. In a well-functioning legal and regulatory system, laws and regulations are clear and enforceable, and the legal and regulatory authorities can take action quickly and effectively to uphold them. This can help to deter individuals and organizations from breaking the law and ensure that those who do so are held accountable for their actions. In addition, an effective and prompt legal and regulatory system can provide a framework for resolving disputes and conflicts fairly and transparently and help protect the rights and interests of individuals and businesses. However, if a legal and regulatory system is ineffective or slow to act, it can create uncertainty, undermine confidence in the system, and make it difficult for individuals and businesses to operate in a predictable and stable environment. This can ultimately negatively affect economic growth, social stability, and society's overall well-being. Therefore, the effectiveness and promptness with which legal and regulatory systems operate and deliver results are key factors in determining a country's overall health and prosperity.

While tax rates and ease of tax payment can impact FDI attraction, a well-functioning legal and regulatory system can also play a crucial role in attracting foreign investors. When a legal and regulatory system operates effectively and promptly, it can create a stable and predictable environment for foreign investors, which can be essential for attracting FDI. A well-functioning legal and regulatory system can provide foreign investors with the assurance that their investments will be protected, and their contractual rights will be respected. This can help create a sense of trust in the system, which is important for foreign investors who are operating in an unfamiliar

legal and regulatory environment. Furthermore, an effective legal and regulatory system can also help ensure that foreign investors can operate in a level playing field. This means that all businesses, foreign and domestic, are subject to the same rules and regulations, and legal disputes are resolved fairly and transparently. This can help to reduce the risk of corrupt practices, which can be a significant concern for foreign investors when operating in a new market. In contrast, a poorly functioning legal and regulatory system can deter foreign investors from investing in a country. If laws and regulations are not enforceable, or if the legal and regulatory authorities are ineffective, investors may perceive the country as being high-risk and uncertain and may be hesitant to invest. Additionally, if legal disputes are not resolved in a fair and transparent manner, foreign investors may be reluctant to enter contracts or conduct business in the country. Therefore, while tax rates and ease of tax payment are important factors in FDI attraction, a well-functioning legal and regulatory system is also critical. Countries that have effective legal and regulatory systems are likely to attract more foreign investment as they provide a stable and predictable environment for investors to operate in. On the other hand, countries with ineffective legal and regulatory systems may struggle to attract foreign investment as investors may perceive them as being high-risk and uncertain.

- **Transparency of government regulations and lack of corruption**

The openness and clarity of the rules, processes, and decision-making procedures that govern the actions of government agencies and officials' actions " refer to the governance system's transparency. Transparency is a critical aspect of good governance, and it entails that government agencies and officials are accountable to the people they serve. Openness and clarity mean that the government's rules, procedures, and decision-making processes are easy to understand, accessible, and available for public scrutiny. This transparency allows citizens to understand how decisions are made, who is responsible for making them, and how they can participate in the decision-making process. Clear rules and procedures also help to prevent corruption and abuse of power. When government officials know their actions are subject to public scrutiny, they are likelier to act in the public interest and avoid engaging in corrupt activities. In addition, transparent governance systems promote trust between the government and its citizens. When people see how decisions are made and understand their reasoning, they are more likely to trust their government and feel engaged in the democratic process. Overall, openness and clarity in the governance system promote accountability, prevent corruption, and build trust between the government and its citizens.

Lack of corruption: the absence of dishonest or unethical behavior by government officials and employees (Zhao et al., 2003). Lack of corruption refers to the absence of dishonest or unethical behavior by government officials and employees. It means that government officials and employees are expected to perform their duties with integrity, honesty, and accountability and not

engage in activities that could be perceived as corrupt or unethical. A government can function more effectively and efficiently when it is free of corruption. The public trust in the government increases, and citizens have confidence that their tax dollars are being used appropriately. A lack of corruption also promotes a level playing field for businesses, as they are not forced to pay bribes or engage in other corrupt practices to gain access to government contracts or services. Some examples of corrupt behavior by government officials and employees include taking bribes, using public funds for personal gain, nepotism, cronyism, and embezzlement. These actions violate citizens' trust in their government and divert resources from important public services and programs. To combat corruption, governments may implement policies such as transparency in government operations, strong codes of ethics for government officials and employees, and independent oversight bodies. Additionally, citizens can prevent corruption by reporting any suspected corrupt behavior and holding their government officials and employees accountable for their actions.

Transparency of government regulations and lack of corruption have significant effects on foreign direct investment (FDI) attraction. Firstly, transparent governance systems that provide clear rules, accessible decision-making processes, and open procedures can attract FDI by promoting a stable and predictable environment for investment. When foreign investors can trust the government and understand the rules and procedures, they are more likely to invest in a country, as they have confidence in the business environment's predictability and stability. Secondly, a lack of corruption can also attract FDI. Foreign investors are more likely to invest in a country with a low corruption rate because they have confidence that their investments will be protected and that they will not face unfair competition from companies that engage in corrupt practices. Countries with low corruption rates often have a level playing field for businesses, which means that companies can compete based on their products and services' quality and price, rather than through bribes and other corrupt practices.

- **Strength of investor and property rights**

The protection and security that individuals and organizations have in their investments and property (Seyoum, 1996). It refers to the measures taken to safeguard assets from theft, damage, loss, or any other risks that could negatively impact their value or usefulness. These assets could include real estate, stocks, bonds, cash, intellectual property, or any other valuable possession. Individuals and organizations protect their investments and property in various ways, including:

**Insurance:** Insurance policies can provide financial protection against potential losses or damage to assets, such as fire, theft, or natural disasters.

**Physical security:** This involves using security cameras, locks, alarms, and security personnel to deter or prevent theft and vandalism.

Legal protection: Individuals and organizations can also seek legal protection through patents, trademarks, copyrights, and other intellectual property laws to safeguard their inventions, ideas, and creative works.

Diversification: Spreading investments across different asset classes or industries can reduce the risk of losses in any one area.

Due diligence: Thorough research and evaluation of potential investments or business partners can help identify risks and prevent fraud.

So, protecting investments and property is crucial to ensuring financial stability and long-term success for individuals and organizations. By taking appropriate measures, investors and property owners can minimize potential risks and ensure the security of their assets.

The strength of investor and property rights is an important factor in attracting foreign direct investment (FDI) because it provides a secure and stable environment for investors to operate in. When investors have confidence that their investments and property will be protected and that they have legal recourse in case of disputes or infringements, they are more likely to invest in a country. Conversely, weak, or poorly enforced investor and property rights can discourage foreign investment and result in capital flight. Countries with strong investor and property rights typically have clear and transparent legal frameworks that protect property ownership, contracts, and intellectual property. They also have well-functioning legal systems that provide efficient and timely dispute resolution mechanisms. In such countries, investors are assured that their investments will be safe and secure, and that they will be able to enforce their rights in case of any infringement. On the other hand, countries with weak investor and property rights are likely to experience higher levels of corruption, political instability, and economic volatility, which can undermine the value and security of investments. Investors may also face barriers to entry or exit, as well as restrictions on their ability to repatriate profits, which can discourage foreign investment.

- **Government incentives for investors**

Programs and policies are designed to encourage investment (Dadush, 2013). It refers to government initiatives encouraging businesses to invest in certain areas or industries. These programs and policies aim to stimulate economic growth and job creation. Governments can use various types of programs and policies to encourage investment. Some of the most common include tax incentives, subsidies, and grants. Tax incentives are designed to reduce the taxes businesses must pay. This can take many forms, such as tax credits for investments in specific areas or industries or accelerated depreciation schedules for certain types of assets. Subsidies are financial grants that are provided to businesses to help offset the costs of investment. These subsidies may be cash grants, low-interest loans, or loan guarantees. Grants are direct financial assistance provided to businesses to help them cover the costs of specific investments or projects.

These grants may be targeted toward specific industries or regions, or they may be more broadly available. In addition to these financial incentives, governments may provide other support forms to encourage investment. For example, they may provide training and education programs to help businesses develop the skills they need to succeed or provide infrastructure improvements to make it easier for businesses to operate in certain areas.

Government incentives for investors can have a significant effect on FDI attraction. By providing financial and other types of support to businesses, governments can reduce the costs of investment and encourage businesses to invest in their countries. This can lead to increased job creation, economic growth, and improved standards of living for citizens. Tax incentives, for example, can make investing in certain areas or industries more attractive by reducing the taxes that businesses must pay. This can make it easier for businesses to allocate resources to these areas or industries and help spur economic development. Subsidies and grants can also provide direct financial assistance to businesses, which can reduce the risks associated with investing and encourage more businesses to take the leap. In addition to financial incentives, training and education programs can help businesses develop the skills they need to succeed in the local market, improving the chances of success and encouraging continued investment. Infrastructure improvements can also make it easier for businesses to operate in certain areas, reducing transportation costs, and increasing access to markets and customers.

- **Ease of moving capital into and out of the country**

The freedom and simplicity of transferring money across international borders (Elo, 2021). It refers to the ease with which individuals and businesses can send or receive money from individuals or businesses located in other countries. In the past, this process was often cumbersome, time-consuming, and expensive, but in recent years, technological advancements have made it much easier. One of the main factors contributing to the freedom and simplicity of international money transfers is the rise of digital payment platforms and services. These platforms, such as PayPal, TransferWise, and Venmo, allow users to transfer money quickly and securely from one country to another, often with low fees and favorable exchange rates. Many platforms offer features such as automatic currency conversion and sending money to bank accounts or mobile wallets in other countries. Another factor contributing to the freedom and simplicity of international money transfers is the growing acceptance of cryptocurrencies such as Bitcoin and Ethereum. These digital currencies operate independently of traditional banking systems, allowing users to send and receive payments across borders quickly and securely, with lower fees and faster transaction times than traditional payment methods.



When it is easy for investors to transfer money in and out of a country, it can provide them with greater flexibility and confidence in their investments. This can increase the likelihood of investors choosing to invest in that country, as it reduces the risks associated with investing in a foreign market. Furthermore, the ease of moving capital can also facilitate the repatriation of profits and dividends earned by foreign investors, which can further increase the attractiveness of a country for FDI. When investors are confident that they can repatriate their profits and dividends without encountering significant obstacles or delays, it can provide them with greater certainty and predictability in their investment decisions. On the other hand, if it is difficult or cumbersome to move capital into or out of a country, it can act as a significant barrier to FDI attraction. Investors may be reluctant to invest in a country if they anticipate difficulties in transferring money in or out of the country, as this can increase the risks and uncertainty associated with their investment. Therefore, policies and regulations that facilitate the movement of capital across borders can play an important role in attracting foreign investment.

- **General security environment**

The overall state of safety and security in a particular area, region, or world (UNCTAD, 2019). It refers to protection and assurance against potential harm or danger in that location. This can encompass various aspects of safety and security, including physical safety, personal safety, financial security, cyber security, and more. For instance, when we talk about the safety and security of a region, we may consider factors such as crime rates, natural disasters, infrastructure, access to healthcare, and emergency services. We may also look at how effective the local law enforcement agencies are in enforcing the law and how well they are equipped to respond to emergencies. On a global level, the state of safety and security may be determined by factors such as terrorism, political stability, international conflicts, and pandemics. Governments and international organizations such as the United Nations may use various measures to assess the safety and security of different regions and countries, including the Global Peace Index, the Human Development Index, and the Global Terrorism Index.

Investors are more likely to choose countries or regions with stable political environments and low levels of crime and violence. A safe and secure environment can provide a sense of assurance and stability to potential investors, reducing their perceived risk and increasing their confidence in the investment. Additionally, a stable security environment can create a more conducive environment for business operations, as it can minimize disruptions and ensure the safety of employees and assets. On the other hand, high levels of crime, political instability, and security threats can deter potential investors and lead to a decrease in FDI inflows.

- **Country's participation in regional/bilateral trade agreements**

Its active involvement in negotiations and creating trade agreements with other countries within a specific region or on a bilateral basis (Thangavelu & Findlay, 2011). Active involvement in negotiations and creating trade agreements is a key component of international trade policy. It involves governments or international organizations engaging in discussions with other countries or regional groups to establish mutually beneficial economic relationships.

These negotiations and agreements can occur on a bilateral basis, meaning between two countries, or on a multilateral basis, meaning between multiple countries or regions. For example, the North American Free Trade Agreement (NAFTA) is a trilateral trade agreement between the United States, Canada, and Mexico, while the Trans-Pacific Partnership (TPP) was a multilateral trade agreement between 12 countries in the Asia-Pacific region. Such agreements promote international trade by reducing trade barriers, such as tariffs, quotas, and regulatory obstacles, and creating more predictable and stable trading relationships. By reducing trade barriers, countries can expand their export markets, access a wider range of goods and services, and increase economic growth and job opportunities. Active involvement in negotiations and the creation of trade agreements can also be used to promote other policy objectives, such as environmental protection, labor standards, and intellectual property rights. Negotiations may also include provisions related to dispute resolution mechanisms and rules for investment and government procurement.

A country's participation in regional/bilateral trade agreements can have a significant impact on FDI attraction. Trade agreements can create a more favorable business environment by reducing trade barriers, which can increase market access and reduce costs for businesses. By creating a more predictable and stable trading relationship, trade agreements can also reduce uncertainty for businesses and investors, which can increase confidence and encourage investment. Additionally, trade agreements can provide a framework for protecting foreign investments and intellectual property, which can increase the attractiveness of a country as a destination for FDI. This protection can help investors feel more secure in their investments and reduce their perceived risk. Furthermore, by participating in regional/bilateral trade agreements, countries can signal their commitment to international cooperation and economic integration, which can enhance their reputation as a reliable and stable partner for trade and investment. This can increase the perception of a country as a safe and attractive destination for FDI.

- **Checks and Balances**

The government has a system of regulatory mechanisms to monitor and regulate the flow of foreign investment into the country (Huang et al., 2021). To prevent these negative impacts, governments often put in place a system of regulatory mechanisms to monitor and regulate the

flow of foreign investment into the country. This system typically involves laws, policies, and regulations designed to safeguard the country's and its citizens' interests while still attracting foreign investment. One key component of this system is the screening and approval processes for foreign investments. These processes allow governments to assess foreign investments' potential risks and benefits and determine whether they align with the country's economic and social goals. Governments may also require foreign investors to meet certain criteria or conditions before investing in the country. Another important aspect of this system is enforcing regulations and laws governing foreign investment. Governments may monitor the activities of foreign investors to ensure that they comply with local laws and regulations and that they do not engage in any activities that harm the country's interests.

The existence of a system of regulatory mechanisms to monitor and regulate the flow of foreign investment can have both positive and negative effects on FDI attraction. On the one hand, such a system can provide a sense of security and stability for foreign investors by assuring them that their investments are protected by clear and enforceable laws and regulations. This can increase confidence in the country's investment climate and attract more FDI. On the other hand, a system of regulatory mechanisms that is too restrictive or overly burdensome can discourage foreign investment. If the approval processes for foreign investment are lengthy, complex, and unpredictable, foreign investors may decide to invest elsewhere, where the regulatory environment is more welcoming. Similarly, if the regulations governing foreign investment are too stringent, foreign investors may be deterred from investing in the country altogether. Therefore, the key is to strike a balance between protecting the country's interests and attracting foreign investment. A well-designed system of regulatory mechanisms that provides reasonable checks and balances can help achieve this balance and encourage FDI while safeguarding the country's interests.

- **Future orientation of government**

Government focus on the long-term goals, plans, and strategies that will shape the country's future (Huang et al., 2021). That means they are taking a forward-thinking approach to governance. Instead of simply addressing short-term problems or responding to immediate crises, the government is looking at the big picture and thinking about creating a better future for its citizens. Long-term goals may include economic growth, social stability, environmental sustainability, or technological progress. These goals may take years or even decades to achieve, but they are important for creating a strong and prosperous country in the future. To achieve these goals, the government will develop plans and strategies that outline the steps needed to reach the desired outcome. For example, if the government's long-term goal is to achieve a certain level of economic growth, it may develop a plan that includes investment in infrastructure, education, and innovation to stimulate economic activity. In addition, the government will need to consider the potential

challenges and obstacles that may arise along the way and develop strategies for overcoming these challenges. For example, if the government is working towards environmental sustainability, it may need to consider the impact of climate change and develop strategies for mitigating its effects.

A government that is focused on long-term goals, plans, and strategies can create a stable and predictable business environment, which is attractive to foreign investors. When a government has a clear vision for the future of the country, it can communicate this vision to potential investors and provide them with confidence in the country's economic prospects. By developing plans and strategies that are aligned with long-term goals, governments can create an environment that is conducive to investment. For example, if a government's long-term goal is to develop a knowledge-based economy, it may invest in education and innovation, which can attract foreign investors seeking a highly skilled workforce and access to new technologies. Similarly, if a government is focused on environmental sustainability, it may develop policies and regulations that incentivize green investments, such as renewable energy projects, which can be attractive to foreign investors. Furthermore, a government that is forward-thinking and future-oriented is likely to have a stable and predictable policy environment, which is crucial for attracting foreign investment. This stability can come from a government's commitment to long-term goals and strategies, as well as its ability to anticipate and plan for potential challenges and obstacles that may arise along the way.

- **R&D capabilities**

The ability of a company, organization, or country to conduct research and develop new products, processes, and technologies (Peterson & Laudicina, 2021). Companies, organizations, and even countries must remain competitive and relevant in today's rapidly evolving business landscape. Innovation capacity depends on various factors, including financial resources, human resources (talent and skills), access to technology and infrastructure, and the legal and regulatory environment. Financial resources are necessary to fund R&D efforts, often requiring significant investments. Financially sound companies are more likely to have the resources needed to invest in R&D and bring new products and technologies to market. Human resources are equally important. A company or organization needs skilled and talented researchers, scientists, engineers, and other professionals to develop innovative ideas and turn them into practical solutions. Developing a culture of innovation, attracting and retaining talent, and providing opportunities for professional development and collaboration are all critical factors for building a strong innovation capacity. Access to technology and infrastructure is also essential for innovation. This includes access to cutting-edge equipment, tools, software, research facilities, and networks. Companies that can leverage advanced technologies and infrastructure are more likely to develop new products and processes that are more efficient, effective, and competitive. Finally, the legal and regulatory

environment can also significantly influence innovation capacity. Countries with strong intellectual property protections, favorable tax policies, and supportive government programs for R&D tend to have higher innovation capacities than those without such policies.

Companies often look for locations where they can access a strong pool of talent, cutting-edge technology, and advanced research facilities. Countries with strong R&D capabilities can offer these advantages and attract FDI from companies looking to expand their research and development activities. Such investment can contribute to job creation, technology transfer, and knowledge spillovers, leading to overall economic growth and development. Additionally, a country's ability to innovate and develop new products and technologies can improve its competitiveness in the global marketplace, further attracting foreign investment.

- **Geographic**

The location and distribution of investment flow between countries and regions (Nachum & Wymbs, 2002). Investment flows refer to the movement of funds from one country or region to another, intending to earn a return on that investment. There are several reasons why the location and distribution of investment flows are important. Firstly, investment flows can significantly impact economic growth and development. Countries or regions that receive high levels of investment can use these funds to build infrastructure, invest in education and healthcare, and create jobs. This can lead to increased economic activity, higher standards of living, and a poverty reduction. Secondly, investment flows can also have an impact on international trade. When investments flow into a country, they can finance the production of goods and services, which can then be exported to other countries. This can help to promote global trade and economic integration. Finally, investment flows can also have an impact on financial stability. If investment flows are concentrated in a few countries or regions, this can lead to instability in those markets. On the other hand, if investment flows are distributed more evenly, this can help to mitigate risks and reduce the likelihood of financial crises.

Countries or regions that are strategically located, such as those with access to major transportation routes or those in proximity to major markets, may be more attractive to foreign investors. Additionally, countries or regions that have a stable political and economic environment, favorable tax policies, and a strong legal framework may also be more attractive to foreign investors. Conversely, countries or regions with a high level of political or economic instability, weak legal protections for investors, or high levels of corruption may be less attractive to foreign investors. The distribution of investment flows can also be important, as a more even distribution of investment can reduce the risk of financial instability and increase the overall attractiveness of a region for FDI.

- **Technological and innovation capabilities**

The ability of a firm to develop, adopt, and use new technologies and innovations (Mendoza-Silva, 2020). When a firm can develop, adopt, and use new technologies and innovations, it can signal to potential investors that it is well-equipped to compete in the global marketplace. This could make the firm more attractive to foreign investors looking for opportunities to invest in companies with a competitive advantage. For example, if a firm can develop new technologies that can improve its efficiency or productivity, it may be able to produce goods or services at a lower cost than its competitors. This can make the firm more attractive to foreign investors looking for opportunities to invest in companies offering high returns on their investments. In addition, a firm that can adopt and use new technologies and innovations can also benefit from knowledge spillovers. This refers to sharing knowledge and expertise between firms, which can help improve the domestic economy's overall competitiveness. This can make the country more attractive to foreign investors, who may seek opportunities to invest in a country with a strong innovation ecosystem.

Companies and investors are often attracted to countries or regions that have a strong innovation ecosystem, with a well-educated workforce, cutting-edge research facilities, and a favorable environment for the development and adoption of new technologies. This can provide companies with a competitive advantage and help them to remain relevant in a rapidly evolving business landscape. Foreign investors are particularly interested in investing in companies with strong technological and innovation capabilities. Such companies are more likely to produce innovative products and services, gain market share, and generate higher returns on investment. For example, a foreign investor may be interested in investing in a technology start-up that has developed a new product or service with significant market potential. In addition, a country's technological and innovation capabilities can spill over to other sectors of the economy, leading to overall improvements in productivity and competitiveness. This can make the country more attractive to foreign investors who are seeking opportunities to invest in a country with a strong innovation ecosystem.

- **Population**

The number of people living in a particular geographical area (Xu, 1984). The size of the market is an important factor in attracting FDI. A large population in a particular geographical area means a large potential customer base for a company. This can translate to higher sales revenue and profits for the company, which makes it an attractive investment opportunity for foreign investors. Furthermore, a large population can also provide a ready and skilled labor force for the company, which can reduce the cost of production and increase efficiency. This is particularly important for

companies engaged in manufacturing, as labor-intensive production processes require a large number of workers.

A large population means a potentially large market for goods and services, which can make a country more attractive to foreign investors. In addition, a large population can provide a skilled labor force, which can reduce the cost of production and increase efficiency, making the country an attractive location for manufacturing investments. Moreover, a large population can also provide a source of innovation and entrepreneurship, which can attract foreign investors looking to invest in startup companies with high growth potential. Finally, a large population can help to create a favorable business environment, which can include access to specialized suppliers, service providers, and infrastructure, such as transportation and telecommunications networks. All these factors can increase the likelihood of FDI attraction to a country with a large population.

- **Domestic economic performance**

The economic activity, output, and prosperity level within a particular country (Dang & Nguyen, 2021). It refers to the overall health and strength of the country's economy. This includes factors such as the country's GDP, inflation rate, employment levels, trade balance, and overall business climate. FDI attraction is heavily influenced by economic activity, output, and prosperity within a particular country. A country with a strong and stable economy, with a high economic activity and output level, is generally considered a more attractive destination for foreign investment. A strong economy indicates a stable business climate, a skilled workforce, and a higher potential for return on investment. Conversely, a weak economy with low economic activity and output levels may indicate a less stable business climate, fewer investment opportunities, and a higher risk of financial loss.

Countries with a strong and stable economy, with a high level of economic activity and output, are generally more attractive to foreign investors. This is because a strong economy indicates a stable business climate, a skilled workforce, and a higher potential for return on investment. Conversely, a weak economy with low economic activity and output levels may indicate a less stable business climate, fewer investment opportunities, and a higher risk of financial loss. Additionally, a strong domestic economy can also provide foreign investors with access to a large and growing consumer market, as well as a skilled and productive labor force. These factors make a country with a strong economic performance a more attractive destination for FDI.

- **Culture**

The shared beliefs, values, customs, behaviors, and artefacts characterize a group or society (Silajdzic & Mehic, 2021). When a society shares common beliefs and values, it creates a sense of stability and predictability for foreign investors. This stability reduces the risk of political and

economic instability, which can negatively affect a business's bottom line. Investors prefer to invest in countries with a sense of stability and predictability. Similarly, when a society has shared customs and behaviors, it creates a more hospitable environment for foreign businesses. For example, if a society values punctuality, foreign investors will expect to be able to conduct business meetings on time. This predictability and consistency in business practices make it easier for foreign investors to do business in the country.

Additionally, shared artefacts such as language, infrastructure, and technology attract FDI. When a country has a common language, it makes it easier for foreign investors to communicate and conduct business. Similarly, a country with well-developed infrastructure and technology makes it easier for foreign investors to access markets, transport goods, and communicate with customers.

A shared culture that values stability and predictability can create a more hospitable environment for foreign investors, reducing the risk of political and economic instability. Additionally, shared customs and behaviors can make it easier for foreign businesses to operate in the country. Shared artefacts, such as language, infrastructure, and technology, can also attract FDI by making it easier for foreign investors to communicate, access markets, transport goods, and connect with customers. On the other hand, a culture that is perceived as inhospitable to foreign investors, due to factors such as corruption, lack of trust, or cultural differences, may discourage FDI.

- **Domestic market size**

The total demand for goods and services within a country's borders (Goh & Wong, 2011). This determinant is an important factor affecting FDI attraction since a strong demand for goods and services indicates a growing economy and a potential market for foreign companies. When a country has a high demand for goods and services, it means that there is a large consumer base that foreign companies can tap into. This can allow foreign companies to expand their customer base and increase profits. A strong domestic market can also provide a stable source of revenue for foreign companies operating in the country.

Moreover, a strong domestic market also indicates a favorable business environment, which can attract foreign investors. Investors are more likely to invest in countries with stable and growing economies with high consumer demand for goods and services. On the other hand, if the domestic demand for goods and services is weak, foreign companies may be less inclined to invest in the country. This is because weak demand can indicate a struggling economy and limited business growth potential.



Therefore, a large domestic market size is a critical factor in attracting FDI as it offers significant opportunities for foreign companies to expand their customer base and increase profits.

- **Trade openness**

The degree to which a country allows goods and services to be traded with other countries (Huang et al., 2021). A country with a more open economy has fewer barriers and restrictions on international trade. This includes lower tariffs, fewer quotas, and fewer regulations that can impede the flow of goods and services across borders. This open environment encourages foreign investors to invest in the country, allowing them to access a larger market and export their products to other countries. In addition, an open economy creates opportunities for foreign investors to set up businesses or partner with local companies to take advantage of the country's resources and labor force. This can lead to increased competition, efficiency, and innovation, all attractive qualities for foreign investors.

Trade openness has a significant effect on FDI attraction. A more open economy with fewer barriers and restrictions on international trade is generally seen as more attractive to foreign investors. This is because an open economy provides more opportunities for foreign companies to enter the market and do business. When a country has lower tariffs, fewer quotas, and fewer regulations that can impede the flow of goods and services across borders, it encourages foreign investors to invest in the country. An open economy allows foreign companies to access a larger market and export their products to other countries, which can lead to increased profits and revenue. Moreover, an open economy creates opportunities for foreign investors to set up businesses or partner with local companies to take advantage of the country's resources and labor force. This can lead to increased competition, efficiency, and innovation, all of which are attractive qualities for foreign investors. On the other hand, a closed economy with high barriers to trade can be a deterrent to foreign investors. This is because restrictions on trade can limit a company's ability to do business and access markets, which can reduce profitability and hinder growth potential.

- **Quality of infrastructure**

Quality of infrastructure: The level of development, accessibility, functionality, and reliability of the basic systems and facilities that support a society (Götz, 2020). It refers to the infrastructure and public services essential for a society's smooth functioning. These systems and facilities include transportation networks (such as roads, bridges, and public transportation), communication networks (such as internet and telephone services), energy and power supply (such as electricity and gas), water supply and sanitation systems, healthcare facilities, educational institutions, and emergency services (such as police and fire departments). The level of development of these systems and facilities can greatly impact the quality of life for people living within a society.

Accessible and reliable transportation networks can increase mobility and access to job opportunities, education, and healthcare. Efficient communication networks can facilitate business, commerce, and social connectivity. Reliable energy and power supply can ensure the functioning of businesses and homes, while access to clean water and sanitation systems can improve public health.

Foreign investors look for countries with well-developed and reliable infrastructure, as it provides a stable and efficient platform for conducting business operations. Good infrastructure can reduce transportation costs and time, facilitate communication, and access to information, and provide a conducive environment for businesses to operate in. This can increase the attractiveness of a country to foreign investors, leading to increased FDI inflows. On the other hand, poor infrastructure can make it difficult for foreign investors to operate in a country, leading to increased costs and reduced competitiveness. This can discourage foreign investors and lead to decreased FDI inflows.

- **Availability of raw materials and other inputs**

The ease with which a company can obtain the necessary resources to produce its goods or services (Brouthers et al., 2008). It is an important factor that can impact the success and competitiveness of a company. This is because a company's ability to access the resources it needs efficiently and at a reasonable cost can directly affect its profitability and ability to meet customer demands. If a company has difficulty obtaining the resources it needs, it may have to pay higher prices or face production delays, which can increase costs and reduce profitability. Additionally, if a company cannot obtain the necessary resources, it may be unable to produce its goods or services, leading to lost sales and market share.

On the other hand, if a company can easily obtain the necessary resources, it can lower costs and improve its competitiveness. This can help the company to offer its products or services at lower prices or to offer a wider range of products or services to its customers. In general, the ease with which a company can obtain the necessary resources is influenced by a range of factors, including the availability of resources, the cost of the resources, the level of competition for the resources, and the efficiency of the supply chain. Companies that can manage these factors effectively and obtain the necessary resources will likely be more successful and competitive in the long term.

The availability of raw materials and other inputs can have a significant impact on FDI attraction. When a country has abundant supplies of the raw materials or other inputs needed for a particular industry, it can be an attractive location for foreign companies looking to invest in that industry. This is because having access to a reliable and abundant supply of inputs can lower costs

and increase efficiency, allowing companies to be more competitive in the global market. For example, a country with large reserves of oil and gas may be an attractive location for foreign companies in the energy industry. Similarly, a country with a strong agricultural sector and abundant supplies of crops may be an attractive location for foreign companies in the food and beverage industry. In addition, the availability of skilled labor can also be an important factor. Companies require a skilled workforce to effectively utilize raw materials and other inputs, and a country that can offer a highly skilled and educated labor force may be more attractive to foreign investors.

- **Availability of land/real estate**

The available property is ready for use or purchase (Ding & Lichtenberg, 2011). It refers to the quantity of real estate currently on the market that interested parties can use or purchase. This includes properties listed for sale or lease, as well as those currently vacant and available for occupancy. Property availability is an important factor in the real estate market, as it can impact supply and demand, pricing, and overall market activity. When there is a large amount of property available, buyers and renters have more options, which can lead to greater competition among sellers and landlords.

Conversely, when there is a limited amount of available property, prices may increase due to increased demand and limited supply. Tracking the amount of available property in a particular area is a key indicator of the health of the local real estate market. It can be useful for buyers, sellers, investors, and other market participants in making informed decisions about real estate transactions.

Foreign investors often require suitable land or real estate to establish their operations. When there is a high availability of land or real estate in a particular area, it can make it easier for foreign investors to find suitable locations for their operations. This can help to reduce the time and costs associated with searching for and acquiring land or real estate. Additionally, a high availability of land or real estate can create competition among sellers, leading to lower prices and more favorable terms for foreign investors. Beside that, when land or real estate is scarce, it can be more difficult for foreign investors to find suitable locations for their operations, and prices may be higher due to increased demand and limited supply. This can make it less attractive for foreign investors to invest in the area.

- **Cost of labor**

The expenses associated with paying employees for their work, including their base salary, benefits, and any bonuses or incentives they may receive (Glam & Böke, 2017). One of the key factors foreign investors consider when deciding to invest in a country is the cost of labor. If the

cost of labor in a particular country is too high, it may deter foreign investors from setting up operations there. On the other hand, if the labor cost is too low, it may raise concerns about the quality of the workforce and the level of employee protection. Therefore, a country that can offer its employees a competitive salary and benefits package while maintaining an affordable cost of living is more likely to attract FDI. In addition, a country that provides incentives for businesses to invest, such as tax breaks or infrastructure support, may be more attractive to foreign investors. Furthermore, a country with a skilled and educated workforce and a stable labor market can appeal to foreign investors, who are more likely to find the talent to run their operations successfully.

The cost of labor is an important factor that can influence FDI attraction. If the cost of labor is too high, foreign investors may be discouraged from investing in a country. This is because high labor costs can increase the operating costs of businesses, which can reduce their profitability and competitiveness. However, if the cost of labor is too low, foreign investors may question the quality of the workforce and the level of protection offered to employees. Therefore, a country that can offer a competitive salary and benefits package to its employees while maintaining an affordable cost of living is more likely to attract FDI. In addition, a country that provides incentives for businesses to invest, such as tax breaks or infrastructure support, may be more attractive to foreign investors. Furthermore, a country with a skilled and educated workforce and a stable labor market can appeal to foreign investors, who are more likely to find the talent to run their operations successfully.

- **Talent/skill level of the labor pool**

The level of expertise, training, and ability of the workers available for employment in a specific area (Braonier et al., 2005). Foreign companies looking to establish operations in a new location often seek locations with a skilled workforce that can meet their specialized needs. A highly skilled and capable workforce is an important factor for companies considering the foreign direct investment, as it can ensure that their operations are staffed with qualified workers who can produce high-quality products or services. Therefore, areas with a highly skilled and well-trained workforce can attract foreign direct investment from companies looking for such talent, leading to job creation and economic growth. In contrast, areas with a low level of expertise, training, and ability of the workers may struggle to attract foreign direct investment as companies may find it difficult to recruit the required talent for their operations.

Additionally, the availability of skilled workers can positively impact the local economy and quality of life. A highly skilled workforce can contribute to the growth of the local economy and increase residents' living standards. This, in turn, can make an area more attractive to foreign investors looking for a stable and prosperous business environment.

Foreign investors seek locations with a skilled workforce that can meet their specialized needs, and having access to a highly skilled and capable workforce can ensure that their operations are staffed with qualified workers who can produce high-quality products or services. This can lead to job creation and economic growth in the area. Furthermore, a skilled workforce can positively impact the local economy and quality of life. A highly skilled workforce can contribute to the growth of the local economy by driving innovation and entrepreneurship, increasing productivity and efficiency, and attracting additional investment. This, in turn, can improve the living standards of residents in the area, making it more attractive to foreign investors looking for a stable and prosperous business environment. In contrast, areas with a low level of expertise, training, and ability of the workers may struggle to attract foreign direct investment as companies may find it difficult to recruit the required talent for their operations. Therefore, a country or region that invests in its education and training systems, and prioritizes the development of its workforce, can become more attractive to foreign investors seeking a talented and skilled labor pool.

- **Availability of financial capital in the domestic market**

The amount of money readily available for investment within a specific country (OCED, 2002) When there is a high amount of money available for investment, it creates an environment favorable for FDI. Investors are more likely to be attracted to countries with ample opportunities to invest their capital and generate a return. This can result in an increase in FDI inflows into the country. On the other hand, a low amount of money available for investment can make it more difficult for a country to attract FDI. Investors may be hesitant to invest in a country where there are limited investment opportunities or where the return on investment is low. This can lead to a decrease in FDI inflows into the country.

When there is a large pool of financial capital available for investment within a country, it creates an environment that is attractive to foreign investors. This is because investors are more likely to be attracted to countries where there are ample investment opportunities and where they can generate a return on their investment. In addition, a large pool of financial capital can also provide support for FDI activities. For example, it can help finance the infrastructure and facilities required by foreign investors to establish their operations in the country. It can also provide support for research and development activities that can help drive innovation and competitiveness. Conversely, a low amount of financial capital available for investment can make it more challenging for a country to attract FDI. Investors may be hesitant to invest in a country where there are limited investment opportunities or where the return on investment is low. This can lead to a decrease in FDI inflows into the country, which can have negative effects on the economy, including reduced job creation, decreased productivity, and lower overall economic growth.

### **2.3. Proposed Model**

The proposed hypothesis is that a hybrid model that integrates Fuzzy-Delphi, Fuzzy-DEMATEL, and DANP methods can identify and prioritize the main factors affecting FDI attraction in Vietnam. The model considers the inherent uncertainties and complexities of the FDI decision-making process, and the study aims to explore the network and interrelationships between the factors. By doing so, the study expects to reveal the critical factors affecting FDI attraction in Vietnam and their relative importance, which can serve as a basis for policymakers to design effective strategies for attracting FDI. The model's use of multiple techniques allows for a more comprehensive analysis of the factors influencing FDI attraction. The Fuzzy-Delphi method is used to identify the most relevant factors affecting FDI attraction, the Fuzzy-DEMATEL method is used to assess the interrelationships between the factors, and the DANP method is used to prioritize the factors based on their relative importance. The proposed model's potential contribution to the literature on FDI attraction is significant. By providing a more nuanced understanding of the determinants of FDI attraction and their impact on other factors, the study can help policymakers to design effective strategies for attracting FDI, particularly in developing countries like Vietnam, where FDI can play a crucial role in driving economic growth and development.

### **2.4. Literature Gap**

There is limited use of hybrid models that combine Fuzzy-Delphi, Fuzzy-DEMATEL, and DANP methods to analyze the factors affecting FDI attraction in developing countries like Vietnam. Also, many studies do not focus on the interrelationships between factors, and there is a lack of consideration of inherent uncertainties and complexities. A more comprehensive approach that considers multiple factors is needed to provide a more robust analysis. Additionally, while some studies have identified critical factors affecting FDI attraction in Vietnam, few have provided policy implications for informed decision-making by policymakers. This study aims to address these gaps by proposing a hybrid model that considers inherent uncertainties and complexities while providing a more nuanced understanding of the determinants of FDI attraction and their impact on other factors. Moreover, it provides a basis for policymakers to design effective strategies for attracting FDI.

## CHAPTER 3: METHODOLOGY

### 3.1. Introduction

#### 3.1.1. Research Philosophy

According to (Clementz et al., 2011), the research philosophy focuses on the origin, nature, and development of information. The philosophy encompasses the gathering, examination, and utilization of phenomena. Four primary corporate and management ideologies are described below.

**Realism** is a philosophy that acknowledges the existence and nature of things independent of any personal viewpoints or perceptions. In other words, realism maintains that things are real regardless of whether anyone thinks about or perceives them.

**Interpretivism**, on the other hand, emphasizes the researcher's interest in the research topic. This approach recognizes the differences between individuals as a fundamental premise.

**Positivism** is based on statistical analysis that relies on quantifiable observations. This philosophy maintains that reliable knowledge can be obtained through objective and empirical methods.

Finally, **pragmatism** deals with concepts that facilitate practical actions. This approach seeks to understand why problems arise and attempt to differentiate them. Different types of analysis can be employed simultaneously within the realm of pragmatics.

#### 3.1.2. Research Approaches

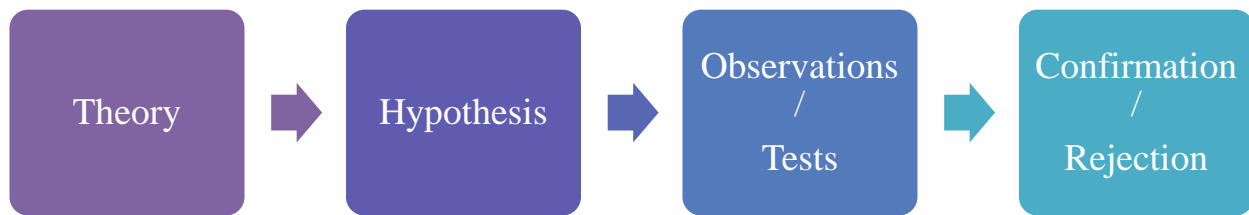
There are three types of research approaches inductive, deductive, and abductive.

Inductive reasoning involves the collection of data and the subsequent development of theory through data analysis. In this type of inference, untested hypotheses are generated from known premises, with generalizability from specific to general. Data collection aims to investigate a particular phenomenon, identify patterns and themes, and construct a conceptual framework. In this research approach, the theory focuses on generating and building new ideas (Sauder et al., 2010).



*Figure 3.1: Inductive reasoning approach*

Deductive reasoning involves concluding general statements to specific instances. This type of reasoning begins with a theory and uses it to develop a new hypothesis. The results are then narrowed down through data collection to test the hypothesis. Deductive reasoning relies on facts, laws, descriptions, or objects to support conclusions. When the premises of deductive inference are correct, the conclusion must also be correct. According to (Sauder et al., 2010), data collection is used to evaluate propositions or hypotheses related to an existing theory within deductive reasoning.



*Figure 3.2: Deductive reasoning approach*

Abductive reasoning is a synthesis of both inductive and deductive reasoning. In abductive inference, known premises derive testable conclusions that allow for generalizability from specific and general interactions. Data collection is conducted to examine a particular phenomenon, recognize patterns and themes, and integrate them into a conceptual framework that is then tested via data collection. The purpose of theory in this research approach is to generate new ideas or modify existing theories while incorporating relevant existing theories as appropriate to construct a new theory (Sauder et al., 2010).

This research is conducted by the inductive method. In certain instances, hypotheses are relatively straightforward since the process starts with findings that serve as proof of regularities. If proven, the pattern is detected; in some situations, it is hard since there is little as a shred of prior evidence, and the assumptions proceed. This is the most suitable way to assess businesses.

### **3.1.3. Research Methods**

There are two main types of collecting data: qualitative and quantitative. For discriminating between the two types of data, it is essential to use numerical (numbers) data or not numeric (words) data.

**Quantitative research** is characterized by the results shown in the form of statistics and graphs. When conducting this kind of study, broad, generalizable facts on the subject are established. These three techniques are the most often used in research: experiments, observations recorded as numbers, and surveys with closed-ended questions.



**Qualitative research** is expressed in words. It is used to understand concepts, thoughts, or experiences. This type of research enables gathering in-depth insights on poorly understood topics. Standard methods include interviews with open-ended questions, observations described in words, and literature reviews that explore concepts and theories. This research used quantitative and qualitative data to improve the strengths of one particular type of data and balance the limitations of its drawbacks.

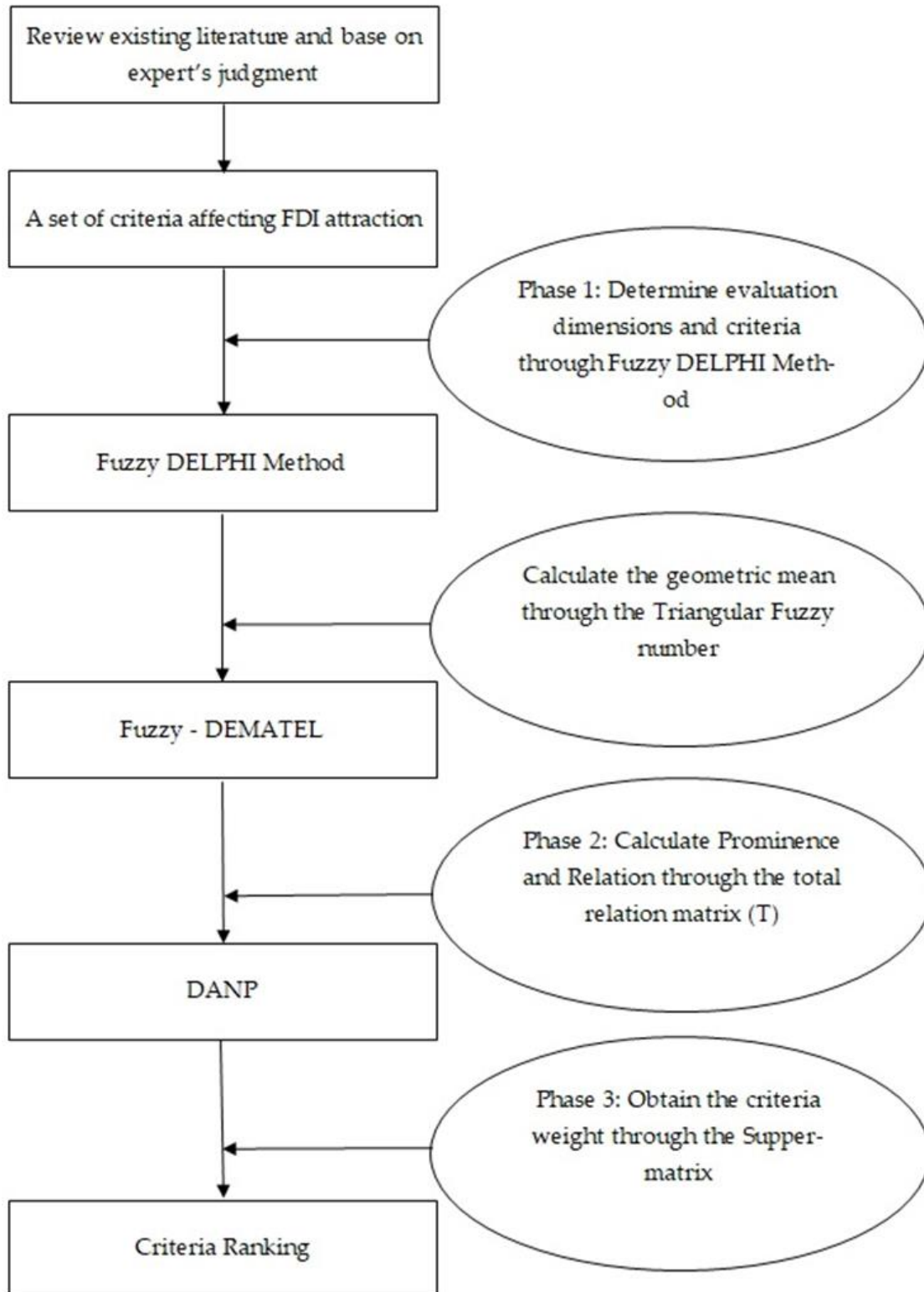
### **3.2. Research Design And Research Process**

This project uses quantitative research to collect and analyze survey data, determine the impact of factors on the main subject and the level of impact between factors, and evaluate and test hypotheses. The project's research focuses on experts who have worked or taught in the FDI sector.

The thesis focuses on quantitative research to assess the scale's reliability, test the research model and hypotheses, and evaluate the influence of the factor variables. Affects the attraction of FDI in Vietnam. These research results are the basis for assessing the current situation and proposing solutions. Collect research data by survey questionnaire with 30 experts.

To carry out the research, the authors have built two sets of survey questionnaires to collect data, standardized the language to ensure the questions are clear, not confusing, and suitable for the respondents as well as Adjust the way to get the data to ensure the most accurate, convenient for the respondents but still meet the information requirements of the thesis. The first questionnaire will evaluate and rank the importance of the factor variables affecting the attraction of FDI. From the results of the first questionnaire, continue with the second questionnaire to evaluate the correlation relationship between these factors.

**Figure 3.3** presents the research framework for FDI attraction. First, the Fuzzy-Delphi questionnaire was conducted to obtain the FDI experts' judgment, including university scholars, policymakers, and managers who work in the FDI field with various experiences. Second, the Fuzzy-DEMATEL method is utilized to evaluate the interdependence between the dimensions, and then the weights of core criteria were explored by DANP. A supermatrix is created using a non-linear network structure, and relative weights are obtained by multiplying it until it reaches a stable state (Chen, 2016).



*Figure 3.3: Proposed research framework*

### **3.3. Sample And Data Collection**

#### **3.3.1. Sample Size**

The sample size for a Fuzzy Delphi study can vary depending on the research question, the level of expertise and heterogeneity of the panellists, and the desired level of consensus. Generally, fuzzy Delphi studies involve a panel of experts who provide their opinions or estimates on a particular topic, and these opinions are aggregated and analyzed using fuzzy logic techniques.

However, some researchers have suggested that traditional Delphi studies typically involve a small panel of experts between 10 and 20. For example, Linstone and Turoff stated that "the panel usually consists of 10 to 20 experts" (Turoff & Linstone, 2002), while (Okoli & Pawlowski, 2004) noted that "typical Delphi panels consist of 10-20 experts". Similarly, (Hsu & Sandford, 2019) reported that "the number of panel members used in Delphi studies has typically ranged from 10 to 20".

In this study, we distributed 30 questionnaires, collected 28 answers, and filtered 25 satisfactory answers. The following section will discuss the survey questionnaire and data collection process details.

#### **3.3.2. Data Collection**

The authors designed two sets of questionnaires to collect data for the study. The first questionnaire proposes questions to identify and rank the influence of factors on attracting FDI in Vietnam. The second questionnaire, based on the results of the first questionnaire, will provide questions to assess the correlation relationship between factors. For the first questionnaire, after referring to the scales of previous studies, our questionnaire is divided into two parts. First of all, we have a set of questionnaires that screen the audience in the survey. Here we will ask for general information about the respondents, their education, field of work, and years of experience. It ensures the credibility and quality of our answers. The second part, the main part, is the assessment questions about the importance/influence of each factor on the FDI deficit in Vietnam. This section's questions are built on a fuzzy linguistic scale (EX - Extreme, D - Demonstrated, S - Strong, M - Moderate, EQ - Equal). Based on some previous studies on factors affecting FDI attraction, we built 24 factors into three large groups: Government - 10 factors, Market - 8 factors, and Resource - 6 factors.

Similar to the second questionnaire, we divide it into two parts, part one is a question about the general information of survey respondents, and part two is a correlation assessment. In part two, we create a large table with n columns and n rows corresponding to n elements. To evaluate, we also convention a scale of 5 levels (NE - No effect, EW - Extremely weak effect, W - Weak effect,

S - Strong effect, ES - Extremely strong effect). So, the result will be that line 1 is factor 1 that affects factor 2, factor 1 affects factor 3, ... factor 1 affects factor n, line 2 is factor 2 affects factor 1, factor 2 affects factor 3... in turn until the end.

### 3.4. Analysis procedure

#### 3.4.1. Fuzzy sets

##### 3.4.1.1. Definition

In Information and Control, the notion of a fuzzy set was introduced by L.A Zadeh (Goguen, 1973)

Given an arbitrary set X, a fuzzy set (on X) is a function from X to the unit interval  $I \sim [0,1]$ ,

$$\mu: X \rightarrow I$$

To comprehend why the term "fuzzy set" was coined, it is necessary to review how subsets of a given set are typically defined. As explained in the first chapter, a subset of X (referred to as A) can frequently be defined by specifying an additional property P that the elements of X must satisfy to be part of A. A is a subset of X with elements that meet the property P. We then write A as

$$A = \{x \in X \mid x \models P \}$$

where

$$x \models P$$

stands for "x fulfils the property P". For example, if  $X \sim \mathbb{R}$  and we consider the property  $x > 2$ , we obtain the set of all real numbers larger than 2. The idea of a fuzzy set is to generalize the " $x \models P$ "-part. As long as P is a well-formulated mathematical property, there is no need to generalize. The need occurs as soon as we want to describe collections, the elements of which fulfil vaguely or imprecisely described properties.

By using the indicator of subset A in set X, we can observe that the concept of a fuzzy set extends beyond the notion of a subset itself. The extension involves allowing values between 0 and 1. The closer a value is to 1, the more the corresponding point is considered to meet the given property, while the closer it is to 0, the less it is deemed to fulfil the property.

Various notations have been used for fuzzy sets. However, throughout this book, we will use the simple, functional notation presented in the previous definition. Nonetheless, for completeness, we will also mention the other notations that are often encountered.

### 3.4.1.2. Notations

When fuzzy sets represent an imprecisely defined collection, the function selected depends on the context. For example, the vague description of "all large numbers" means something entirely different in astronomy than in microscopy. Some authors use a symbol (e.g.,  $A$ ) to represent the vague description and another symbol (e.g.,  $\mu A$ ) to represent the fuzzy set that models the vague description in a specific context. It is important to note that only  $\mu A$  is a well-defined symbol representing a function from set  $X$  to  $I$ . In contrast, symbol  $A$  has no mathematical or precise meaning whatsoever. From a mathematical standpoint, this notation is not entirely legitimate, and we should avoid using it. However, in some cases, and for clarity, it may be useful to use this notation.

One sometimes finds the following notation if the underlying set is finite. Say that

$$X \sim \{x_1, \dots, x_n\}.$$

Then a fuzzy set  $tL$  on  $X$  has been denoted by the collection of pairs of the functional relation  $\mu$ ,

$$\{(x_1, \mu(x_1)), \dots, (x_n, \mu(x_n))\}$$

Although this notation is legitimate, it is cumbersome and should only be used in specific concrete cases, not general theory.

A notation finally, which is quite unacceptable but and unfortunately often used, is one involving the summation or integration symbol. If  $X$  is the underlying set and  $A$  again stands for a kind of label, then the fuzzy set representing  $A$  has been denoted by,

$$\int_X \mu_A(x)/x \text{ or } \sum_X \mu_A(x)/x$$

It is important to reiterate that the notation described earlier is highly irregular, as it is unnecessary and misuses widely accepted symbols with precise meanings. This research will only focus on fuzzy sets defined in the above definition, where the range is the unit interval. However, a more extensive generalization of the original concept defined by Zadeh exists, where a more general lattice replaces the range. This type of generalization is not the focus of this work.

### 3.4.1.3. Basic Operation on Fuzzy Sets

Consider the fuzzy sets  $A$  and  $B$  in the Universe  $U$ ,

$$A = \{(x, \mu_A(x))\}, \quad \mu_A(x) \in [0,1],$$

$$B = \{(x, \mu_B(x))\}, \quad \mu_B(x) \in [0,1].$$

The operations with A and B are introduced via an operation on their membership functions  $\mu_A(x)$  and  $\mu_B(x)$ .

- **Equality**

The fuzzy sets A and B are equally denoted by  $A = B$  if and only if for every  $x \in U$ ,

$$\mu_A(x) = \mu_B(x).$$

- **Inclusion**

The fuzzy set A is included in the fuzzy set B denoted by  $A \subseteq B$  if for every  $x \in U$ ,

$$\mu_A(x) \leq \mu_B(x).$$

Then A is called a subset of B.

- **Proper subset**

The fuzzy set A is called a proper subset of the fuzzy set B denoted  $A \subset B$  when A is a subset of B and  $A \neq B$ , that is

$$\mu_A(x) \leq \mu_B(x) \text{ for every } x \in U,$$

$$\mu_A(x) < \mu_B(x) \text{ for at least one } x \in U.$$

For instance, the nonnormalized sets in Figure 3.3 (a) and (b) are proper.

- **Complementation**

The fuzzy sets A and  $\bar{A}$  are complementary if

$$\mu_{\bar{A}}(x) = 1 - \mu_A(x) \text{ or } \mu_A(x) + \mu_{\bar{A}}(x) = 1.$$

The membership function  $\mu_{\bar{A}}(x)$  is symmetrical to  $\mu_A(x)$  concerning the line  $\mu = 0.5$ .

- **Intersection**

The operation intersection of A and B, denoted as  $A \cap B$ , is defined by

$$\mu_{A \cap B}(x) = \min(\mu_A(x), \mu_B(x)), \quad x \in U.$$

If  $a_1 < a_2$ ,  $\min(a_1, a_2) = a_1$ . For instance,  $\min(0.5, 0.7) = 0.5$ .

- **Union**

The operation union of A and B, denoted as  $A \cup B$ , is defined by

$$\mu_{A \cup B}(x) = \max(\mu_A(x), \mu_B(x)), \quad x \in U.$$

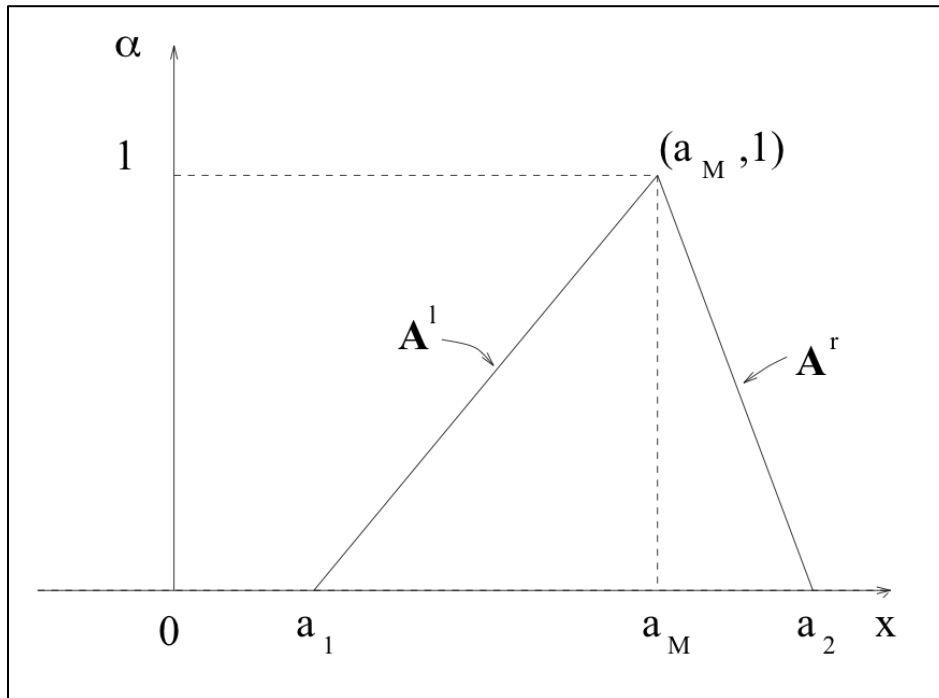
If  $a_1 < a_2$ ,  $\max(a_1, a_2) = a_2$ . For instance,  $\max(0.5, 0.7) = 0.7$

#### 3.4.1.4. Triangular Fuzzy Numbers

A triangular fuzzy number A or simply a triangular number with a membership function  $\mu_A(x)$  is defined on  $\mathbb{R}$  by Equation (1):

$$A \triangleq \mu_A(x) = \begin{cases} \frac{x - a_1}{a_M - a_1} & \text{for } a_1 \leq x \leq a_M, \\ \frac{x - a_2}{a_M - a_2} & \text{for } a_M \leq x \leq a_2, \\ 0 & \text{otherwise,} \end{cases} \quad (1)$$

Where  $[a_1, a_2]$  is the supporting interval and the point  $(a_M, 1)$  is the peak (see Figure 3.2). The third line in (1) can be dropped.

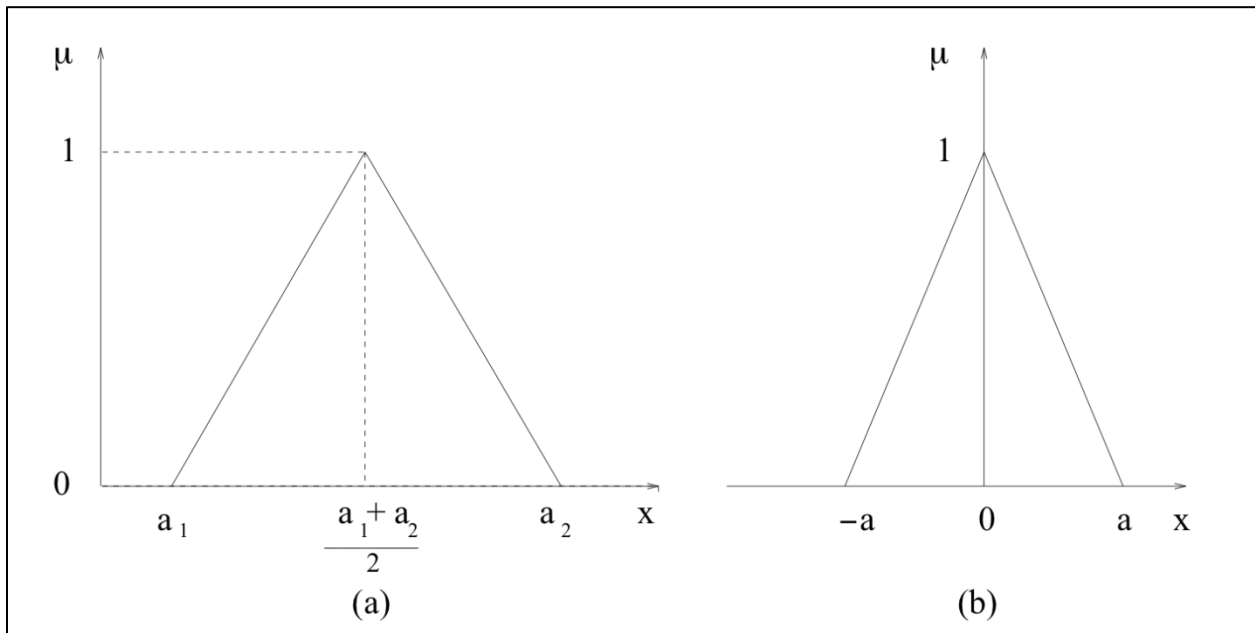


**Figure 3.2:** Triangular fuzzy number

Often in applications, the point  $a_M \in (a_1, a_2)$  is located at the middle of the supporting interval, i.e.  $a_M = \frac{a_1 + a_2}{2}$ . Then substituting this value into (1) gives:

$$A \triangleq \mu_A(x) = \begin{cases} 2 \frac{x - a_1}{a_M - a_1} & \text{for } a_1 \leq x \leq \frac{a_1 + a_2}{2} \\ 2 \frac{x - a_2}{a_M - a_2} & \text{for } \frac{a_1 + a_2}{2} \leq x \leq a_2, \\ 0 & \text{otherwise,} \end{cases} \quad (2)$$

We say that (2) represents a central triangular fuzzy number (see Figure 3.3 (a)). Similarly to the piecewise-quadratic fuzzy number, describing the word close (close to  $a_M$ ) is very suitable. Triangular numbers are often used in applications (fuzzy controllers, managerial decision-making, business and finance, social sciences, ...). They have a membership function consisting of two linear segments  $A^l$  (left) and  $A^r$  (right) joined at the peak ( $a_M, 1$ ) (see Figure 3.2), which makes graphical representations and operations with triangular numbers very simple. Also, it is important that they can be constructed easily based on little information



**Figure 3.3:** (a) Central triangular number; (b) Central triangular number symmetrical about  $\mu$

While dealing with an uncertain value, we can specify the smallest and largest possible values, i.e., the supporting interval  $A = [a_1, a_2]$ . If we can further indicate a value  $a_M$  in  $[a_1, a_2]$  as most plausible to represent the uncertain value, then the peak will be the point  $(a_M, 1)$ . Hence with the three values  $a_1$ ,  $a_2$ , and  $a_M$ , one can construct a triangular number and write down its membership function (1). That is why the triangular number is also denoted by



$$A = (a_1, a_M, a_2). \quad (1.14) \quad (3)$$

A central triangular number is symmetrical concerning the axis  $\mu$  if in (2)  $a_1 = -a$ ,  $a_2 = a$ , hence  $a_M = 0$  (see Figure 3.3(b)). According to (3), it is denoted by

$$A = (-a, 0, a)$$

It is very suitable to express the word small. The right branch (segment) of  $A = (-a, 0, a)$ , i.e., when  $0 \leq x \leq a$ , can be used to describe positive small (PS), for instance, young age, small profit, small risk, .... We can denote it by  $A^r = (0, 0, a)$ .

More generally, the left and right branches of the triangular number (3) can be denoted correspondingly by  $A^l = (a_1, a_M, a_M)$  and  $A^r = (a_M, a_M, a_2)$ . They will be considered triangular numbers and called correspondingly left and right triangular numbers. The left triangular number  $A^l$  (see Figure 3.2) is suitable to represent positive large (PL) or words with similar meanings, for instance, old age, big profit, and high risk...., provided that  $a_M$  is the large number.

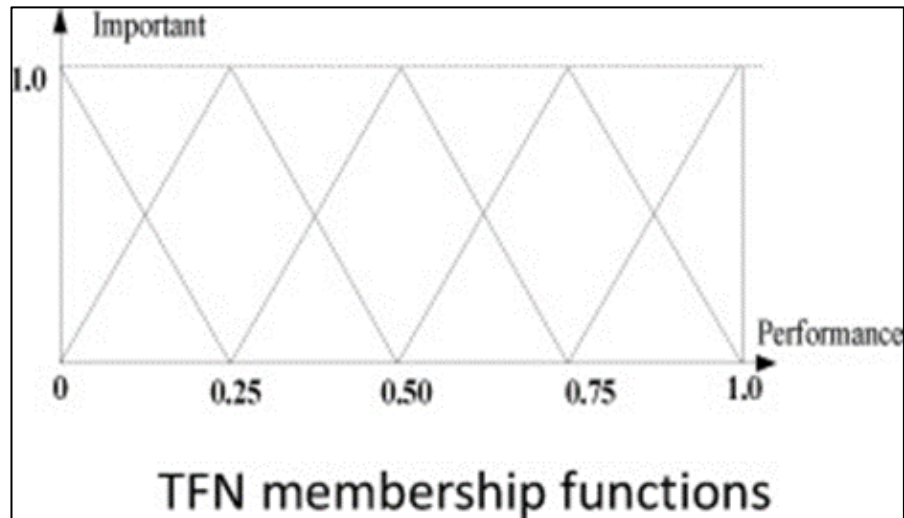
### 3.4.2. Fuzzy-Delphi method

The Fuzzy-Delphi approach combines the Delphi method and fuzzy set theory that has various benefits, including creating a consensus among expected perspectives, saving time and money, and reducing the number of expected opinion collection rounds (Mohammadfam et al., 2019). Compared with the traditional Delphi, both techniques have their merits, but the Fuzzy-Delphi method has certain advantages that make it more suitable for certain types of decisions. One of the primary advantages of the Fuzzy-Delphi method is its ability to provide a more accurate representation of the group's opinions because the fuzzy Delphi method allows for a greater range of responses that can be used to represent the opinions of the group. This allows for a more nuanced understanding of the group's opinions, which can be beneficial for making decisions. Another advantage of the Fuzzy-Delphi method is that it is more efficient than the traditional Delphi method because it allows for a more rapid exchange of information between participants, which can help speed up the decision-making process. Additionally, the fuzzy Delphi method allows for greater anonymity, which can help ensure that all participants feel comfortable expressing their opinions.

There are several varieties of fuzzy numbers, and Triangular Fuzzy Numbers (TFN) were utilized in this study. TFN was shown using three real numbers  $M = (l, m, u)$ , in which the lower bound ( $l$ ), infimum ( $m$ ), and the upper bound ( $u$ ) (C. H. Cheng & Lin, 2002). TFN represents the membership by the function, which may more clearly and accurately display the experts' knowledge concerning a challenging decision-making problem (F. Wang, 2021).

**Table 3.1: Fuzzy-Delphi linguistic terms transformation**

Linguistic terms (importance)	TFNs
Extreme	(0.75, 1.0, 1.0)
Demonstrated	(0.1, 0.75, 1.0)
Strong	(0.25, 0.5, 0.75)
Moderate	(0, 0.25, 0.5)
Equal	(0, 0, 0.25)



Step 1: Assuming that there are  $n$  experts and  $m$  attributes. Expert  $a$  ( $a = 1, 2, 3, \dots, n$ ) determines the importance value of attribute  $b$  ( $b = 1, 2, 3, \dots, m$ ) as  $j = (x_{ab}; y_{ab}; z_{ab})$ .

The weight  $j_b$  of an attribute,  $b$  is therefore defined as  $j_b = (x_b; y_b; z_b)$  where  $x_b = \min(x_{ba})$ ,  $y_b = \sqrt[n]{\prod_1^n y_{ab}}$  and  $z_b = \max(z_{ba})$ . As a result, as illustrated in **Table 3.1**, linguistic values are produced utilizing linguistic terms and TFN.

Step 2: Using a parameter of  $\lambda$  (in this study,  $\lambda = 0.5$ ), the convex combination value  $D_b$  is calculated using the (3) formula. Note that  $\lambda$  is customized from 0 to 1 based on whether the experts' perceptions are positive or negative and are in equilibrium with the average judgments among the expert group:

$$\begin{aligned}
u_b &= z_b - \lambda(z_b - y_b) \\
v_b &= x_b - \lambda(y_b - yx_b)
\end{aligned}
\tag{3}$$

Step 3: The accurate value of  $D_b$  is then calculated as:

$$D_b = \int (u_b, v_b) = \lambda[u_b + (1 - \lambda)v_b] \tag{4}$$

Step 4: The threshold for the valid attributes is generated by Equation (5):

$$\epsilon = \sum_{a=1}^n \frac{D_b}{n} \tag{5}$$

If  $D_b > \epsilon$  attribute b is accepted otherwise if  $D_b < \epsilon$ , attribute b is rejected (Nguyen, 2022).

### 3.4.3. Fuzzy-DEMATEL method

The Fuzzy-DEMATEL method has been gaining popularity in recent years, but it is important to consider the advantages and disadvantages of this approach compared to the conventional DEMATEL method. This comparison explains why we choose the Fuzzy-DEMATEL instead of the traditional DEMATEL. One of the major advantages of the Fuzzy-DEMATEL method is that it allows for greater flexibility in the decision-making process because the Fuzzy-DEMATEL method allows for considering multiple criteria when making decisions, which can help ensure that decisions are made in a more informed and comprehensive manner. Additionally, the Fuzzy-DEMATEL method can help reduce the time it takes to make decisions, as it allows for a more efficient way of determining the most important factors in the decision-making process. However, the Fuzzy-DEMATEL method can be more difficult to understand and interpret than the conventional DEMATEL method, requiring more technical knowledge.

The Fuzzy-DEMATEL questionnaire used in this study comprised a non-symmetric  $n \times n$  matrix. These tables' factors were evaluated using a pairwise matrix. The total-relation matrix is used by the Fuzzy-DEMATEL approach to discover the linkages between the criteria and sub-criteria as well as the effective (cause) and affected (effect) criteria. The experts expressed their judgments regarding the link between the factors using a 5-point linguistic scale (**Table 3.2**).

**Table 3.2:** Triangular fuzzy numbers corresponding to linguistic terms (R. J. Li, 1999)

Linguistic Expressions	Triangular fuzzy numbers
No effect	(0, 0, 0.25)
Extremely weak effect	(0, 0.25, 0.5)
Weak effect	(0.25, 0.5, 0.75)
Strong effect	(0.5, 0.75, 1)
Extremely strong effect	(0.75, 1, 1)

Step 1: According to the responses of experts, the initial direct-relation fuzzy matrix was calculated using Equation (6):

$$Z_{ij}^k = \begin{pmatrix} 0 & \dots & \tilde{X}_{1n}^k \\ \vdots & \ddots & \vdots \\ \tilde{X}_{1n}^k & \dots & 0 \end{pmatrix}, K = 1, 2, 3, \dots, P \quad (6)$$

Where P is noted as the number of experts.

Step 2: The aggregated mean of expert opinions was measured using Equation (8) - (10)

$$\tilde{Z}_{ij} = \frac{\tilde{X}^1 + \tilde{X}^2 + \tilde{X}^3 + \tilde{X}^4 + \dots + \tilde{X}^P}{P} \quad (8)$$

where  $\tilde{X}^1$ ,  $\tilde{X}^2$ ,  $\tilde{X}^3$ , and  $\tilde{X}^P$  are the pairwise comparison matrixes of the experts  $j^{th}$ .

$$\tilde{Z}_{ij} = \begin{pmatrix} 0 & \dots & \tilde{X}_{1n} \\ \vdots & \ddots & \vdots \\ \tilde{X}_{n1} & \dots & 0 \end{pmatrix} \quad (9)$$

$$\tilde{Z}_{ij} = \left( l_{ij} + m_{ij} + u_{ij} \right) \quad (10)$$

Step 3: Normalizing the direct-relation fuzzy matrix using Equations (11) and (12):

$$r = \max \sum_{j=1}^n u'_{ij} \quad (11)$$

$$\tilde{H}_{ij} = \frac{\tilde{z}_{ij}}{r} = \left( \frac{l'_{ij}}{r} \cdot \frac{m'_{ij}}{r} \cdot \frac{u'_{ij}}{r} \right) = \left( l''_{ij} \cdot m''_{ij} \cdot u''_{ij} \right) \quad (12)$$

Step 4: Determining the total-relation matrix. The total-relation fuzzy matrix (T) was measured using Equations (13) – (17):

$$T = \lim_{k \rightarrow \infty} \left( \tilde{H}^1, \tilde{H}^2, \tilde{H}^3 \right) \quad (13)$$

$$\tilde{t}_{ij} = \left( l^t_{ij} \cdot m^t_{ij} \cdot u^t_{ij} \right) \quad (14)$$

$$l^t_{ij} = H_l \times \left( I - H_l \right)^{-1} \quad (15)$$

$$m^t_{ij} = H_m \times \left( I - H_m \right)^{-1} \quad (16)$$

$$u^t_{ij} = H_u \times \left( I - H_u \right)^{-1} \quad (17)$$

Step 5: De-fuzzing the total-relation fuzzy matrix base on Equation (18):

$$t_{ij} = \frac{l^t_{ij} + 2m^t_{ij} + u^t_{ij}}{4} \quad (18)$$

Step 6: The total-relation defuzzed matrix's extracted variables are used to calculate the R-value and C-value using Equations (19) and (20):

$$R_j = \sum_{j=1}^n t_{ij} \quad (j = 1, 2, 3, \dots, n) \quad (19)$$

$$C_i = \sum_{i=1}^n t_{ij} \quad (i = 1, 2, 3, \dots, n) \quad (20)$$

Each component's total number of elements in each row ( $R_j$ ) indicates how much that factor impacts the system's other variables. On the other hand, each component's total number of elements in each column ( $C_i$ ) reveals the extent to which other systemic factors influence that factor.

Step 7: Drawing cause/effect interrelationship based on the value of ( $R_j + C_i$ ) and ( $R_j - C_i$ )

The values of ( $R_j + C_i$ ) depict the degree to which other factors influence one-factor influences and. In other words, the more the component interacts with other factors in a system, the greater its ( $R_j + C_i$ ) value. On the opposite, ( $R_j - C_i$ ) values demonstrate how one element influences the system's other variables. In general, a variable is regarded as a cause variable if ( $R_j - C_i$ ) is positive, and as an effective variable if ( $R_j - C_i$ ) is negative. A Cartesian coordinate system is shown after numbers have been defuzzed, with the x-axis displaying ( $R_j + C_i$ ) values and the y-axis displaying ( $R_j - C_i$ ) values.

#### 3.4.4. DANP method

The DANP method combines the DEMATEL and ANP techniques (Yang et al., 2008). The ANP-based DEMATEL is a powerful decision-making tool that can identify the most important elements of a problem and the relationships between them (Chiu et al., 2013). This technique has been used in various fields, such as engineering, economics, and business. DANP offers several advantages over traditional ANP methods. One of the main advantages is that it allows for identifying non-linear relationships between elements. This is important in cases where the elements of a problem are not directly related to each other but can still impact the overall outcome.

Additionally, DANP can provide a more detailed analysis of the problem, allowing for a more accurate assessment of the various elements and their relationships. Another advantage of DANP is its ability to identify the most important elements of a problem. This is especially

useful in cases where there are a large number of elements that need to be considered. Identifying the most important elements makes it easier to make decisions and develop strategies based on them. Last but not least, DANP can be used to identify the most important relationships between elements, allowing for a more comprehensive understanding of the problem.

Step 1: Establishing an unweighted supermatrix.

From the DEMATEL, the total-relation matrix can be calculated. For normalization, the total of each column is used. The Total-relation matrix  $T_C = [t_{ij}]_{n \times n}$  is obtained by the criteria, and  $T_D = [t_{ij}^D]_{m \times m}$  is obtained by the dimensions (clusters) from  $T_C$ .

Then, the supermatrix  $T_C$  is normalized for the ANP weight of the dimensions using the relation matrix  $T_D$ .

$$T_C = \begin{matrix} & \begin{matrix} c_{11} & D_1 & & D_j & & D_b \end{matrix} \\ \begin{matrix} D_1 \\ \vdots \\ D_i \\ \vdots \\ D_m \\ \vdots \\ c_{nm_n} \end{matrix} & \begin{matrix} c_{12} \\ \vdots \\ c_{21} \\ \vdots \\ c_{2m_2} \\ \vdots \\ c_{n1} \\ \vdots \\ c_{n2} \\ \vdots \\ c_{nm_n} \end{matrix} & \begin{matrix} c_{11\dots c_{1m_1}} & \dots & c_{j1\dots c_{jm_j}} & \dots & c_{n1\dots c_{nm_n}} \end{matrix} \end{matrix} \begin{bmatrix} T_C^{11} & \dots & T_C^{1j} & \dots & T_C^{1n} \\ \vdots & & \vdots & & \vdots \\ T_C^{i1} & \dots & T_C^{ij} & \dots & T_C^{in} \\ \vdots & & \vdots & & \vdots \\ T_C^{n1} & \dots & T_C^{nj} & \vdots & T_C^{nn} \end{bmatrix} \quad (21)$$

After normalizing the total-influence matrix  $T_C$  through the dimensions (clusters), a new matrix  $T_C$ , a is obtained

$$T_c^a = \begin{matrix} & c_{11} & D_1 & D_j & D_b \\ D_1 & c_{12} & c_{11\dots c_{1m_1}} & \dots & c_{j1\dots c_{jm_j}} & \dots & c_{n1\dots c_{nm_n}} \\ & \vdots & & & & & \\ & c_{1m_1} & \left[ \begin{array}{cccc} T_c^{a11} & \dots & T_c^{a1j} & \dots & T_c^{a1n} \\ \vdots & & \vdots & & \vdots \\ T_c^{ai1} & \dots & T_c^{aij} & \dots & T_c^{ain} \\ \vdots & & \vdots & & \vdots \\ T_c^{an1} & \dots & T_c^{anj} & \dots & T_c^{ann} \end{array} \right] \\ & \vdots & & & & & \\ & c_{21} & & & & & \\ & c_{22} & & & & & \\ & \vdots & & & & & \\ D_i & c_{2m_2} & & & & & \\ & \vdots & & & & & \\ & c_{n1} & & & & & \\ & c_{n2} & & & & & \\ D_m & \vdots & & & & & \\ & c_{nm_n} & & & & & \end{matrix} \quad (22)$$

Step 2: The normalization  $T_c^{a11}$  is explained and that of the other and  $T_c^{ann}$  is the same as above

$$d_{ci}^{11} = \sum_{j=1}^{m_1} t_{ij}^{11}, \quad i = 1, 2, \dots, m_1 \quad (23)$$

$$T_c^{a11} = \begin{bmatrix} t_{c11}^{11}/d_{c1}^{11} & \dots & t_{c1j}^{11}/d_{c1}^{11} & \dots & t_{c1m_1}^{11}/d_{c1}^{11} \\ \vdots & & \vdots & & \vdots \\ t_{ci1}^{11}/d_{ci}^{11} & \dots & t_{c11}^{11}/d_{ci}^{11} & \dots & t_{cim_1}^{11}/d_{ci}^{11} \\ \vdots & & \vdots & & \vdots \\ t_{cm_11}^{11}/d_{cm_1}^{11} & \dots & t_{cm_1j}^{11}/d_{cm_1}^{11} & \dots & t_{cm_1m_1}^{11}/d_{cm_1}^{11} \end{bmatrix} = \begin{bmatrix} t_{c11}^{a11} & \dots & t_{c1j}^{a11} & \dots & t_{c1m_1}^{a11} \\ \vdots & & \vdots & & \vdots \\ t_{ci1}^{a11} & \dots & t_{cij}^{a11} & \dots & t_{cim_1}^{a11} \\ \vdots & & \vdots & & \vdots \\ t_{cm_11}^{a11} & \dots & t_{cm_1j}^{a11} & \dots & t_{cm_1m_1}^{a11} \end{bmatrix} \quad (24)$$

Let the interdependence clusters correspond to the total-relation matrix. The unweighted supermatrix is the outcome, and it is based on the dimensions of the normalized relation matrix  $T_c^a$  (clusters):

$$W = (T_c^a)' = \begin{bmatrix} W^{11} & \dots & W^{i1} & \dots & W^{n1} \\ \vdots & & \vdots & & \vdots \\ W^{1j} & \dots & W^{ij} & \dots & W^{nj} \\ \vdots & & \vdots & & \vdots \\ W^{1n} & \dots & W^{in} & \dots & W^{nn} \end{bmatrix} \quad (25)$$



Step 3: Obtaining the weighted supermatrix.

Each column is added for normalization using Equation (26):

$$T_D = \begin{bmatrix} t_D^{11} & \dots & t_D^{1j} & \dots & t_D^{1n} \\ \vdots & & \vdots & & \vdots \\ t_D^{i1} & \dots & t_D^{ij} & \dots & t_D^{in} \\ \vdots & & \vdots & & \vdots \\ t_D^{n1} & \dots & t_D^{nj} & \dots & t_D^{nn} \end{bmatrix} \quad (26)$$

Step 4: The total-relation matrix TD is normalized, and a new matrix  $T_D^a$  is obtained, where  $t_D^{aij} = t_D^{ij}/d_i$  using Equations (27)-(28):

$$T_D^a = \begin{bmatrix} t_D^{11}/d_1 & \dots & t_D^{1j}/d_1 & \dots & t_D^{1n}/d_1 \\ \vdots & & \vdots & & \vdots \\ t_D^{i1}/d_i & \dots & t_D^{ij}/d_i & \dots & t_D^{in}/d_i \\ \vdots & & \vdots & & \vdots \\ t_D^{n1}/d_n & \dots & t_D^{nj}/d_n & \dots & t_D^{nn}/d_n \end{bmatrix} = \begin{bmatrix} t_D^{a11} & \dots & t_D^{aj1} & \dots & t_D^{an1} \\ \vdots & & \vdots & & \vdots \\ t_D^{ai1} & \dots & t_D^{aij} & \dots & t_D^{ain} \\ \vdots & & \vdots & & \vdots \\ t_D^{an1} & \dots & t_D^{anj} & \dots & t_D^{ann} \end{bmatrix} \quad (27)$$

$$W = (T_D^a)' = \begin{bmatrix} W^{11} & \dots & W^{i1} & \dots & W^{n1} \\ \vdots & & \vdots & & \vdots \\ W^{1j} & \dots & W^{ij} & \dots & W^{nj} \\ \vdots & & \vdots & & \vdots \\ W^{1n} & \dots & W^{in} & \dots & W^{nn} \end{bmatrix} \quad (28)$$

Step 5: Let the normalized total influence matrix  $T_D^a$  Complete the unweighted supermatrix to obtain a weighted supermatrix using Equation (29):

$$W^a = T_D^a W = \begin{bmatrix} t_D^{a11} \times W^{11} & \dots & t_D^{ai1} \times W^{i1} & \dots & t_D^{an1} \times W^{n1} \\ \vdots & & \vdots & & \vdots \\ t_D^{a1j} \times W^{1j} & \dots & t_D^{aij} \times W^{ij} & \dots & t_D^{anj} \times W^{nj} \\ \vdots & & \vdots & & \vdots \\ t_D^{a1n} \times W^{1n} & \dots & t_D^{ain} \times W^{in} & \dots & t_D^{ann} \times W^{nn} \end{bmatrix} \quad (29)$$

Step 6: Limiting the weighted supermatrix.

Creating a super-hyperbolic matrix. Forming a super-limit matrix by converting the balanced supermatrix using relation and then using the DANP technique to calculate  $\lim_{z \rightarrow \infty} (W^a)^z$  the final weights.

## CHAPTER 4: DATA ANALYSIS AND RESULTS

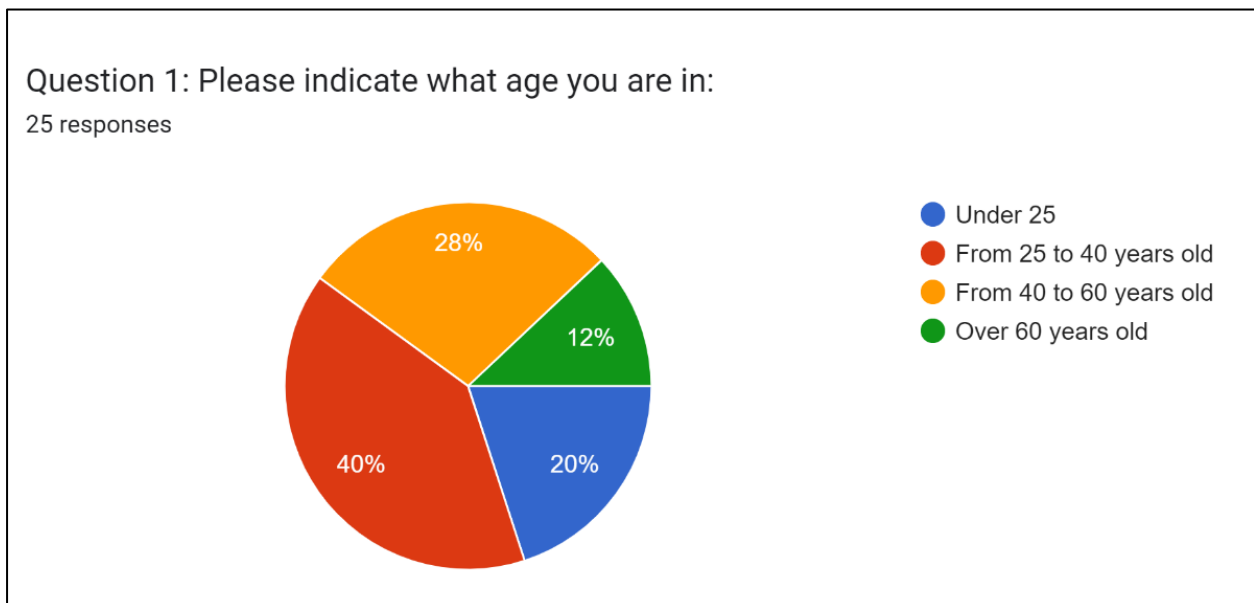
### 4.1. Descriptive Statistics

As per the previous mention, we created two questionnaires corresponding to the two methods section of this study. The first is for Fuzzy-Delphi, and the second is for Fuzzy-DEMATEL. We believe those willing to do the first survey will continue to complete the second one. In addition, because these two surveys have an inheritance, the unification of survey respondents will return more accurate and reliable results.

We distributed 30 questionnaires, collected 28 responses, and filtered out 25 standard questionnaires. The following are the characteristics of the survey sample:

*Table 4.1: Descriptive Statistics of Age*

Age	Frequency	Percent	Cumulative Percent
Under 25	5	20	20
From 25 to 40 years old	9	36	56
From 40 to 60 years old	6	24	80
Over 60 years old	5	20	100
Total	25	100	

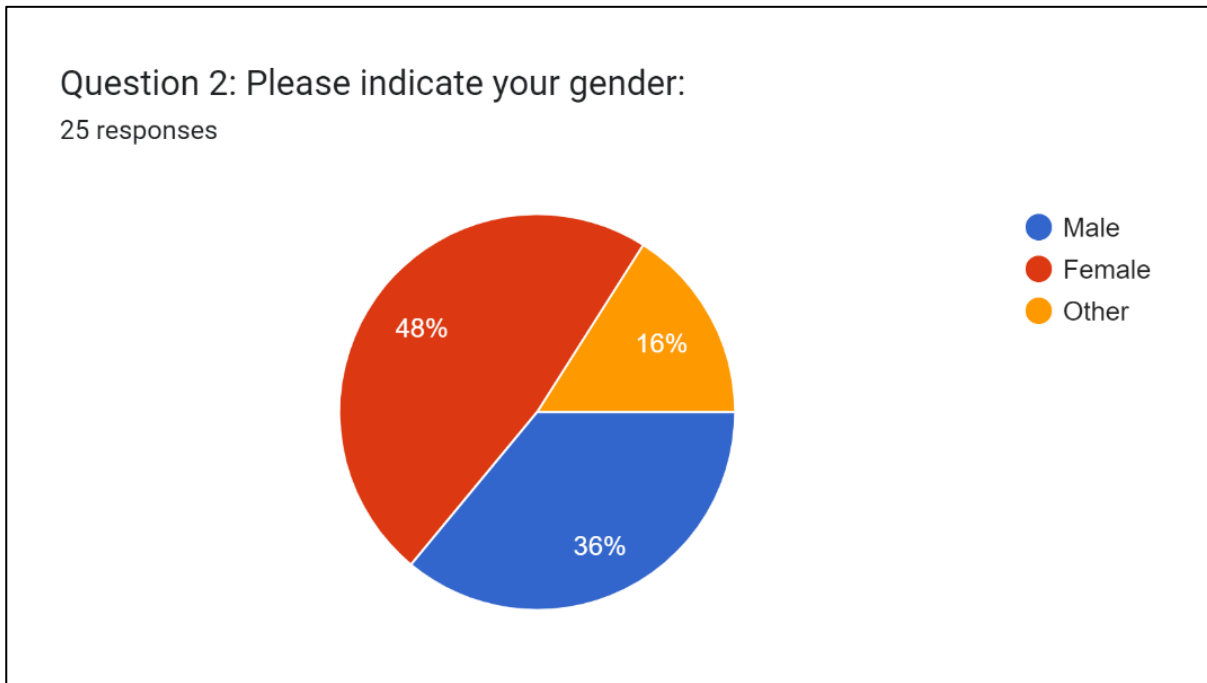


*Figure 4.1: Responses of Question 1*

In our survey, up to 9 people (40%) are between the ages of 25 and 40, the main working age. The next 28% in the age group of 40 to 60, the age group with stability and experience, is considered a certain veteran at work. 20% of people surveyed are under 25, have just graduated from school, and entered the labor force. The remaining 12% are over 60 years old.

**Table 4.2: Descriptive Statistics of Gender**

Gender	Frequency	Percent	Cumulative Percent
Male	9	36	36
Female	12	48	84
Other	4	16	100
Total	25	100	

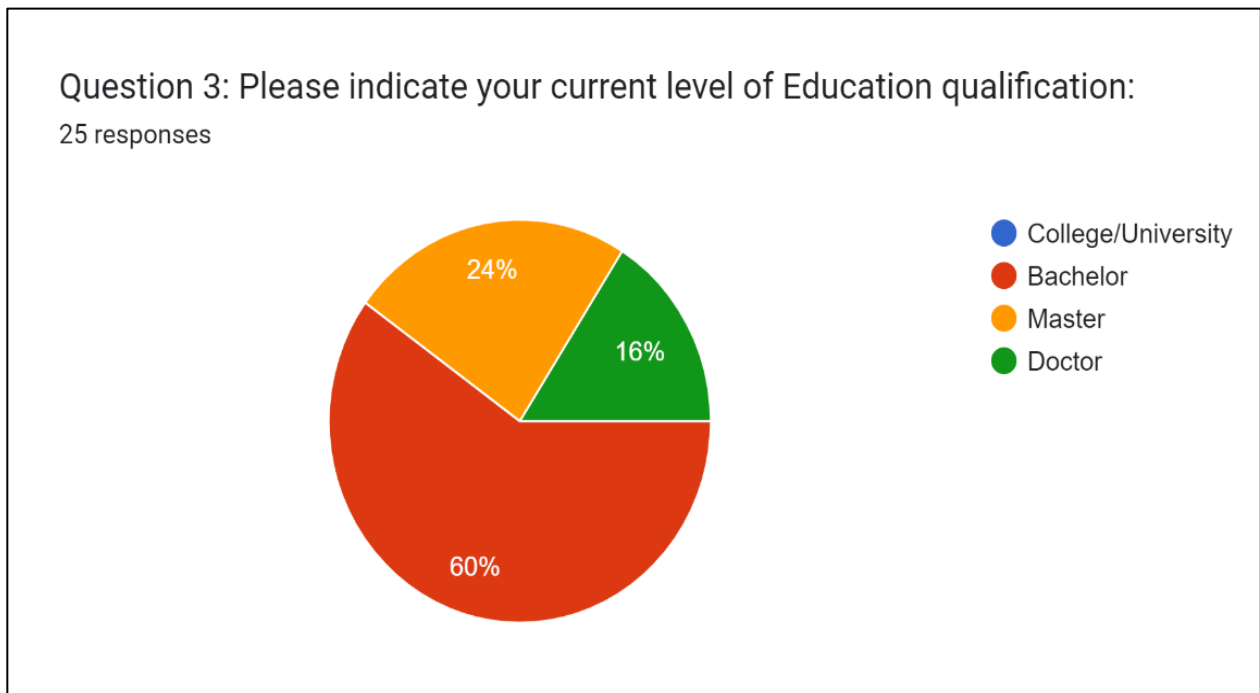


**Figure 4.2: Responses of Question 2**

Based on the survey results, most survey respondents are female, with 12 people accounting for 48%, nine male respondents accounting for 36%, and several people choosing the other gender is four, accounting for 16%.

**Table 4.3: Descriptive Statistics of Education Qualification**

Education Qualification	Frequency	Percent	Cumulative Percent
Bachelor	15	60	60
Master	6	24	84
Doctor	4	16	100
Total	25	100	

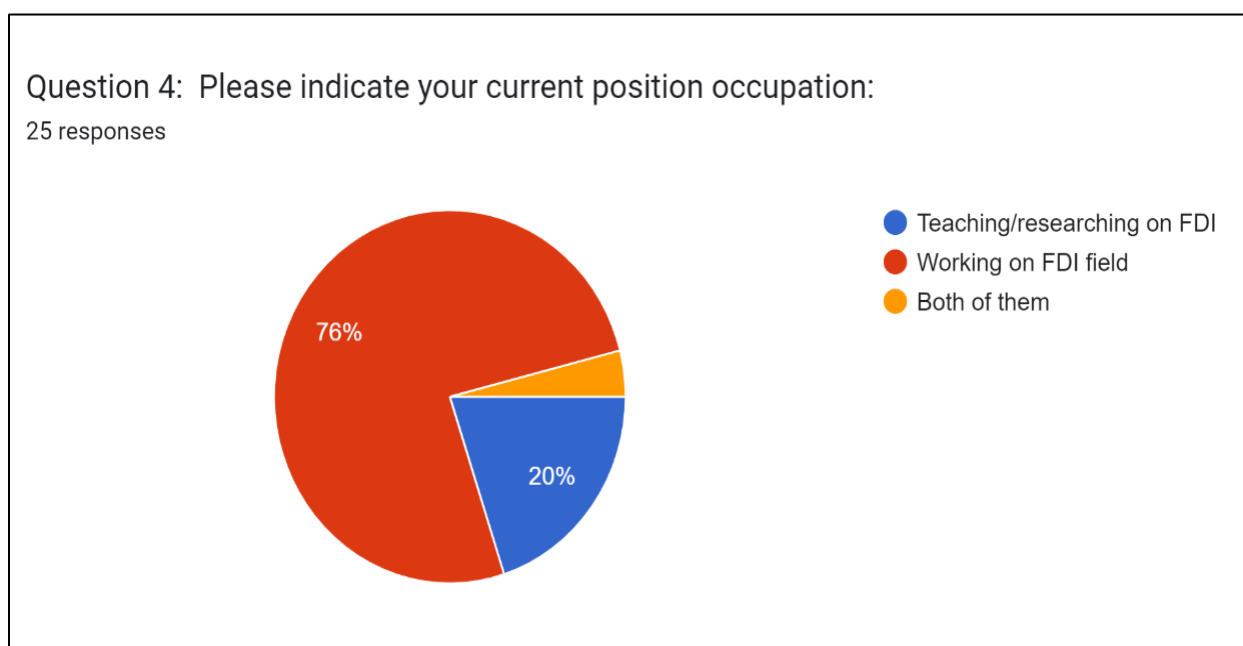


**Figure 4.3: Responses of Question 3**

Most of our survey respondents had a bachelor's degree (60%). Six people are at the Master level, accounting for 24%, and four at the Doctor level, taking up 16%.

**Table 4.4:** Descriptive Statistics of Position Occupation

Position Occupation	Frequency	Percent	Cumulative Percent
Working on the FDI field	19	76	76
Teaching/researching on FDI	5	20	96
Both of them	1	4	100
Total	25	100	

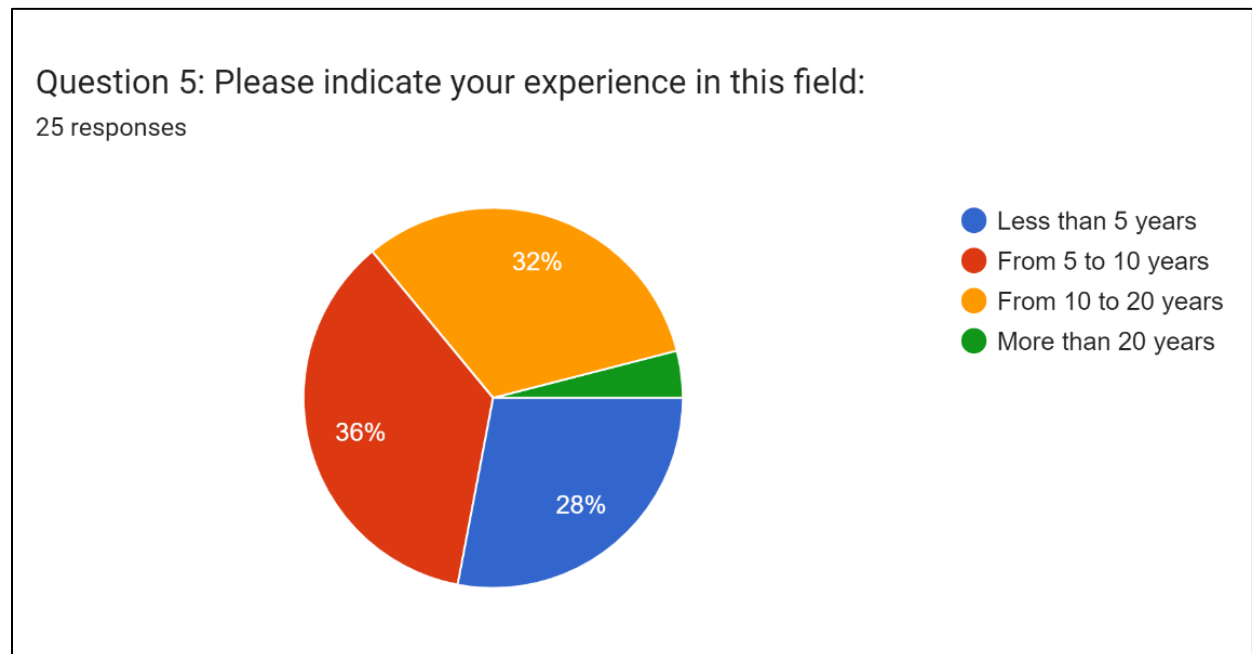


**Figure 4.4:** Responses of Question 4

Because our research subjects in this article are those who must know the FDI field, specifically, we divide into two groups: those working in the FDI sector and those teaching subjects related to FDI. The people working in the FDI industry are the main group, with 19 accounting for 76%. Besides, there are five lecturers, accounting for 20%, and one person working in both fields, both working and teaching in the field of FDI.

**Table 4.5: Descriptive Statistics of Experience Years**

Experience	Frequency	Percent	Cumulative Percent
Less than 5 years	7	28	28
From 5 to 10 years	9	36	64
From 10 to 20 years	8	32	96
More than 20 years	1	4	100
Total	25	100	



**Figure 4.5: Responses of Question 5**

Regarding the number of years of experience of the surveyors, we are divided into five groups and are evenly distributed among the groups. The most people with 5-10 years of experience, nine people, accounting for 36%. The second is people with 10-20 years of experience, accounting for 32%. Seven people have less than 5 years of experience (28%), especially since there is one person with over 20 years of experience.

## 4.2. Result Of The Fuzzy-Delphi Method

After identifying the effective variables, we use the Fuzzy-Delphi method for only one purpose, filter out the variables with the most influence on FDI attraction. The ranking we present in this section only to show why we reject 3 criteria: first they have  $Db < \text{Threshold}$ , second, they rank last in the rankings but mainly will be based on the first reason.

We build a questionnaire with items on a Likert scale and distribute it to experts to achieve the highest consensus and accuracy. After collecting the questionnaires, we cleaned the data and converted them to TFNs.

This study overrides three main criteria (Government, Market, Resource), including 24 subcriteria (**Table 2.1**). The Fuzzy-Delphi method uses Equation (1) - (2) to generate the criteria weights to determine the valid ones with a three hold  $\sigma = 0.396$ . Twenty-one of 24 elements are acceptable for use in the next stage of Fuzzy-DEMATEL, as shown in **Table 4.6**.

*Table 4.6: Fuzzy-DELPHI Method result*

Criteria	u	v	Db	Validate	Ranking
G1	0.910	-0.057	0.441	Accept	1
G2	0.786	0.036	0.402	Accept	17
G3	0.859	-0.019	0.425	Accept	4
G4	0.847	-0.010	0.421	Accept	5
G5	0.834	-0.001	0.417	Accept	6
G6	0.798	0.027	0.405	Accept	11
G7	0.792	0.031	0.404	Accept	15
G8	0.796	0.028	0.405	Accept	13
G9	0.647	-0.147	0.287	Reject	22
G10	0.647	-0.147	0.287	Reject	23
M1	0.804	0.022	0.407	Accept	9
M2	0.874	-0.030	0.429	Accept	3
M3	0.804	0.022	0.407	Accept	9
M4	0.786	0.036	0.402	Accept	17
M5	0.798	0.027	0.405	Accept	11
M6	0.794	0.029	0.404	Accept	14



M7	0.789	0.033	0.403	Accept	16
M8	0.635	-0.135	0.284	Reject	24
R1	0.780	0.040	0.400	Accept	21
R2	0.814	0.014	0.411	Accept	7
R3	0.806	0.020	0.408	Accept	8
R4	0.898	-0.049	0.437	Accept	2
R5	0.783	0.038	0.401	Accept	19
R6	0.783	0.038	0.401	Accept	19

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Threshold: 0.396

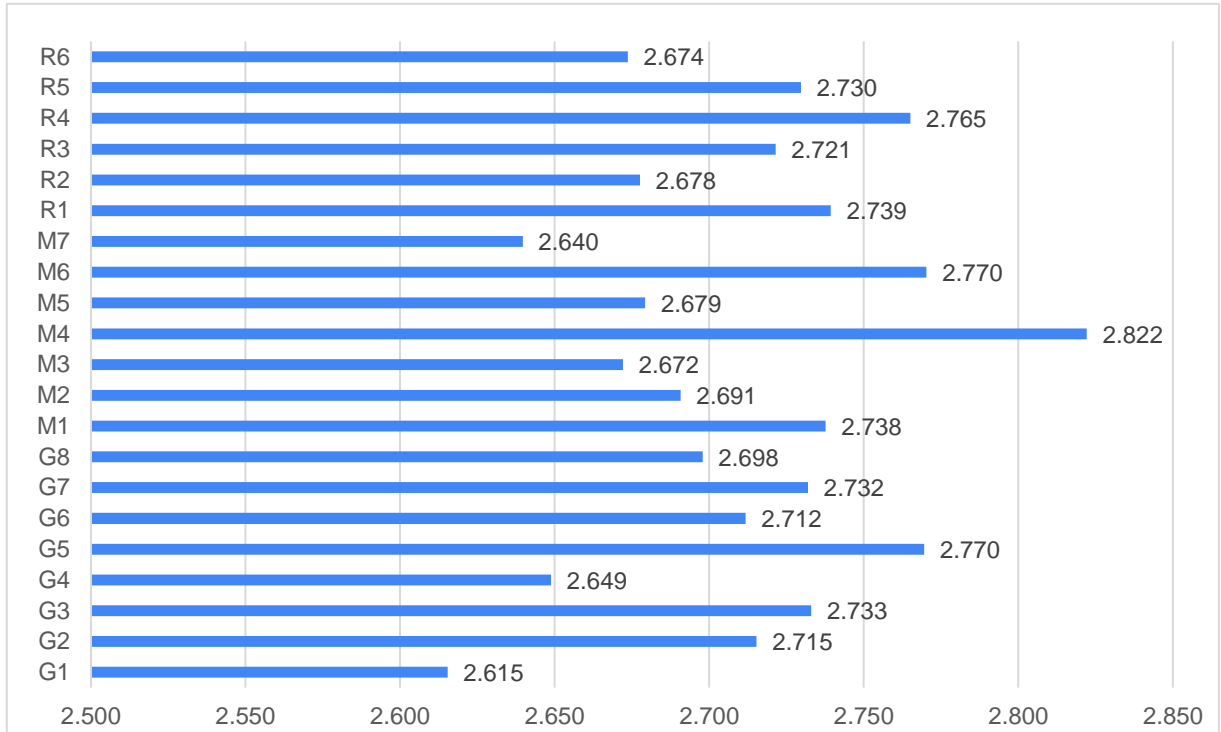
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The results of **Table 4.6** also revealed that in the top 10 most important factors, there are four elements in the Government group, 3 in the Market group, and 3 in the Resource group.

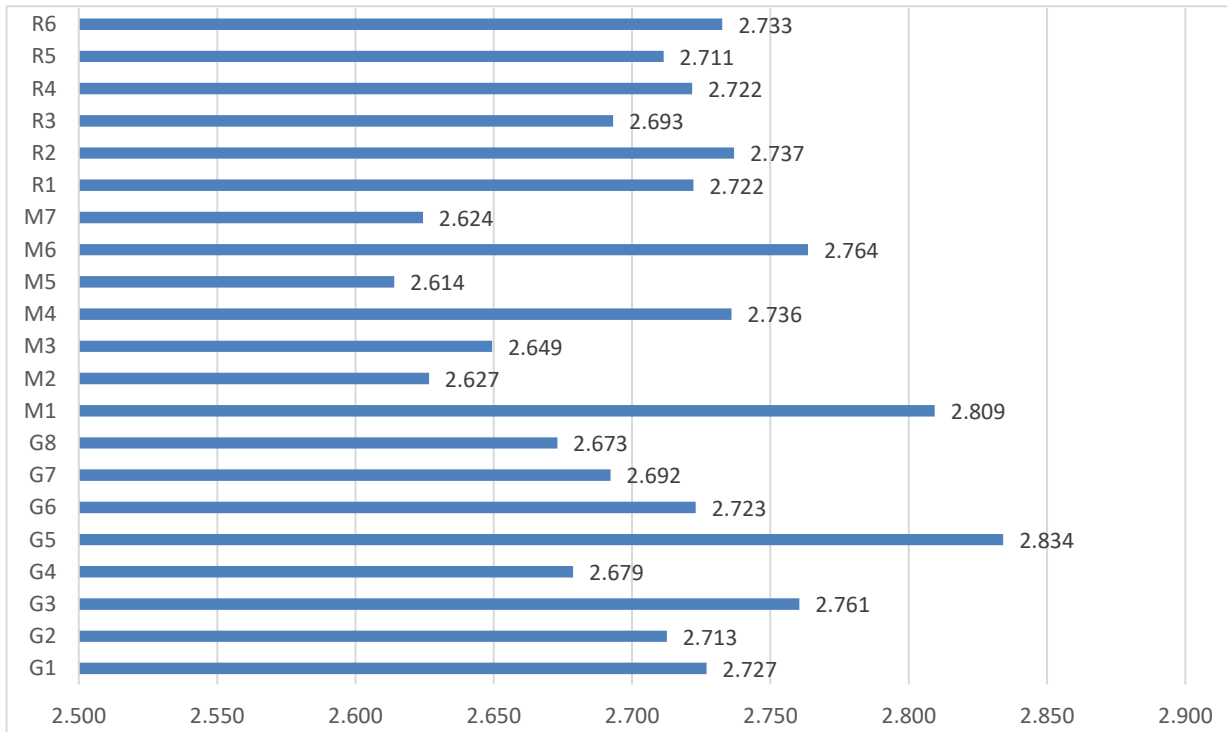
The most desirable effect criterion to FDI attraction is Tax rates and ease of tax payment, and the next top is Costs of labor, Geographic, Transparency of government regulations and lack of corruption, the strength of investor and property rights, and government incentives for investors.

### 4.3. Result of the Fuzzy-DEMATEL method

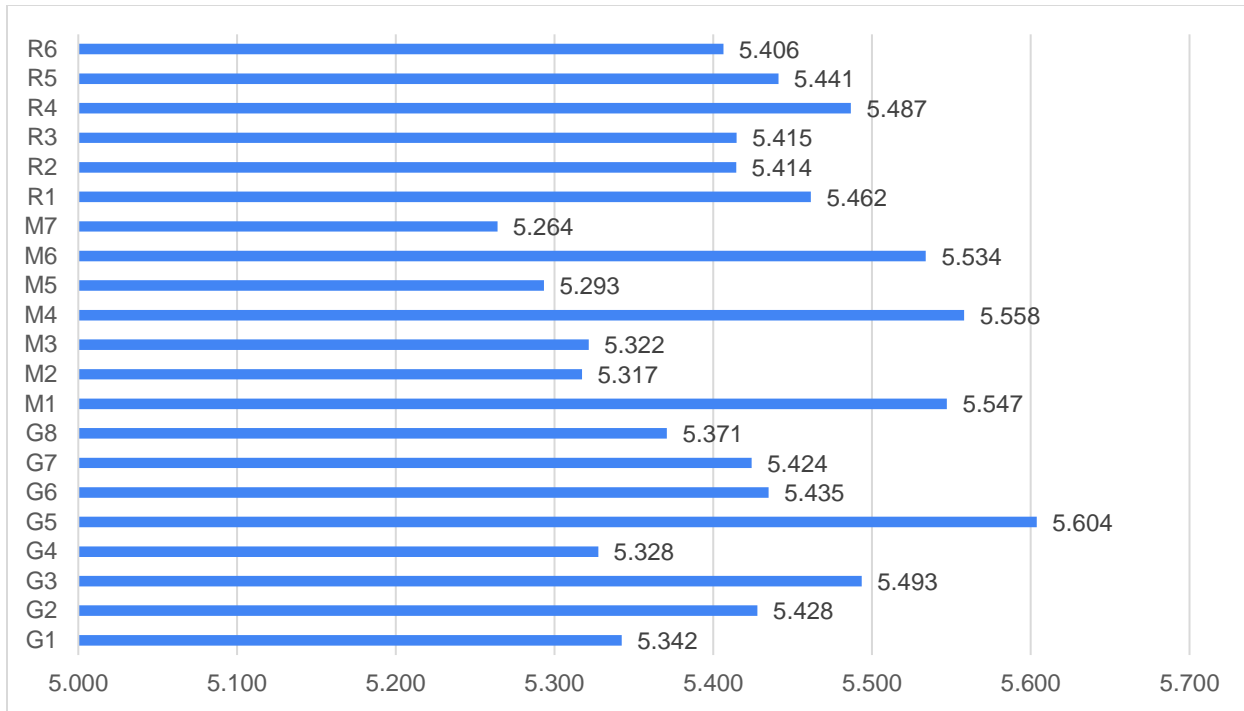
The primary criteria (Government, Market, Resource), as well as each of their sub-criteria, were assessed during this study phase and given to specialists as pairwise-matrix questions, which were then examined for cause-and-effect relationships. Appendix A lists the variables chosen for the Fuzzy DEMATEL investigation. The direct-relation fuzzy matrix was created by compiling expert opinions on how different variables interact. The total-relation matrix was created next, and then the normalized direct-relation matrix (Appendix B). The variables in each row and column were added to calculate the R-value (**Figure 4.6**), and the variables in each column were added to calculate the C value (**Figure 4.7**). Using the R and C values, it was then possible to calculate the interaction of variables (R + C) or dominance matrix (**Figure 4.8**) and the relationship between variables (R - C) or relationship matrix (**Figure 4.9**). A positive (R - C) connection meant that a factor was regarded as effective (causes), whereas a negative (R - C) relationship meant that a factor was considered impacted (effects)



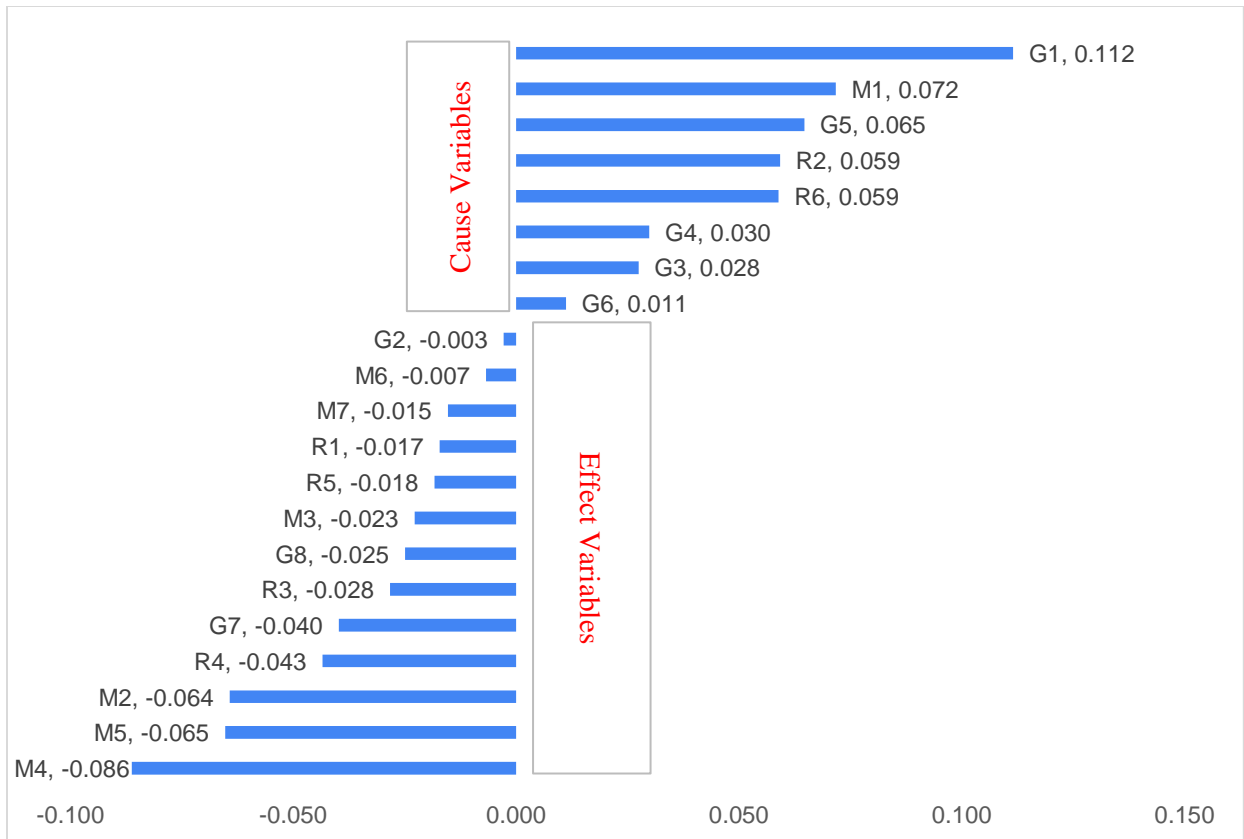
**Figure 4.6:** Influence of variable on other variables (R values)



**Figure 4.7:** Influenced impact index variables (C values)

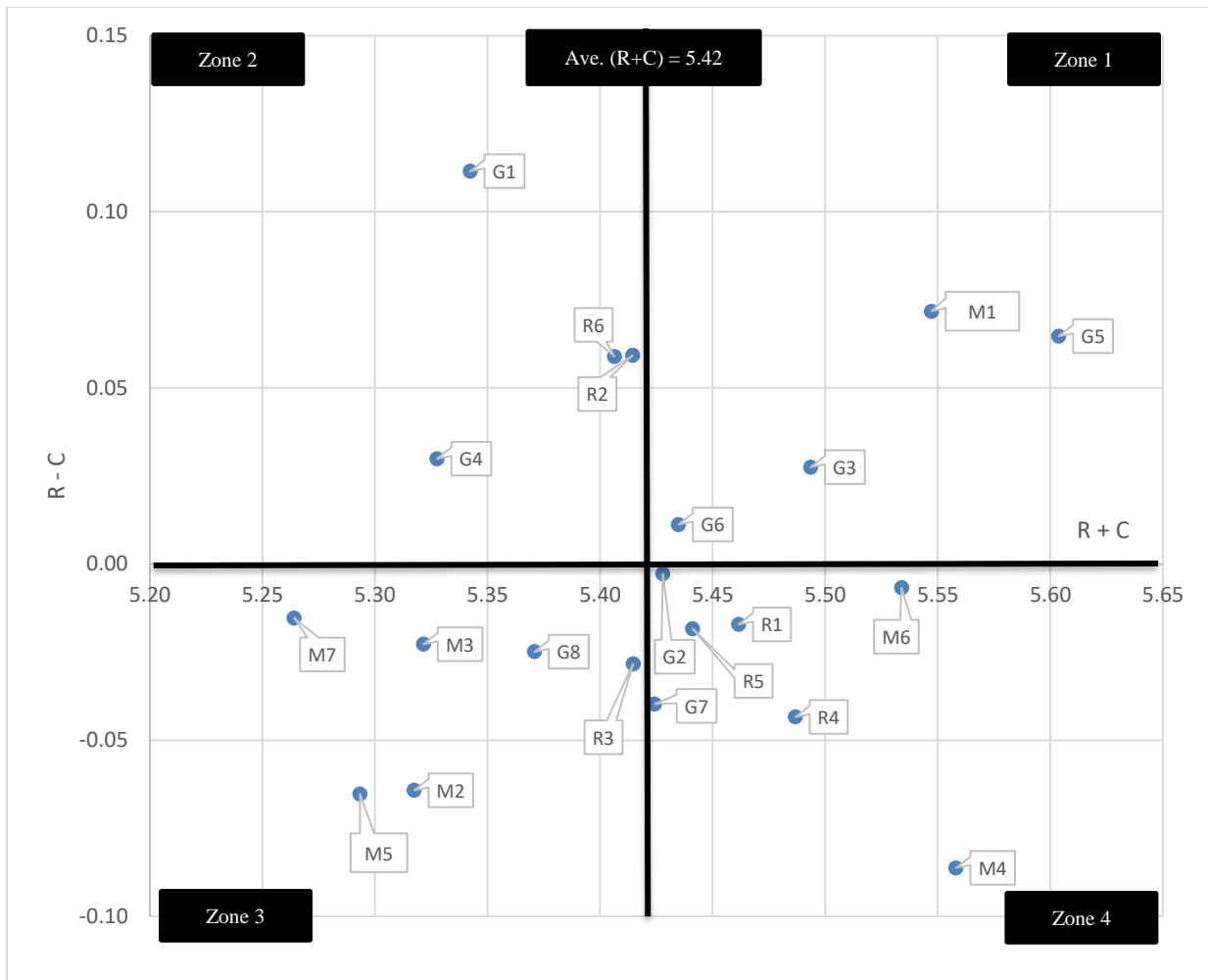


**Figure 4.8:** Interaction among variables ( $R + C$  values)



**Figure 4.9:** Cause and effect roles of variables ( $R - C$  values)

Based on the results of the cause-and-effect relationships shown in **Figure 4.9**, The research variables may be classified into four groups in four separate zones. Taxes, Property rights, financial capital, and raw materials comprised the first cause (influencing) factors. Lack of corruption, Ease of moving capital in and out of the country (R&D), and Incentives for investors made up the second cause variable. Under the (D + R) axis are the third and fourth groups of variables, including effect (influenced) variables.



**Figure 4.10:** Cause-and-effect relationships among variables

In **Figure 4.10**, according to the cause-and-effect relationships, the variable was influenced by the factors in Zones 1 and 2 while being impacted by the variables in the fourth group. The efficiency of legal systems, population, culture, infrastructure, and labor talent/skill were the most significant influence variables in the fourth zone. It is advised to concentrate on Zone 1 variables first, then Zone 2 variables, to increase FDI appeal. The variables in Zone 3 should be taken into consideration if problems continue. Zone 4's variables are influenced by those found in the

preceding zones and do not need immediate correction. The study's findings show that M4 - Population is the effect-factor affected by Cause-factors the most, whereas G5 - Government incentives for investors are the Cause-factor with the most impact on Effect-factors.

#### **4.4. Result of the DANP method**

Based on the impact network of the Total-Relation matrix T generated by the DEMATEL, the DANP approach was utilized in this study to determine the weights of the 21 criteria and three dimensions. Then, an unweighted supermatrix (**Table 4.7**) and a weighted supermatrix (**Table 4.8**) were created using the DANP to compare the criteria (**Table 4.8**). The weighted super-limiting matrix's power converged, becoming a stable supermatrix over a long period and attaining the weights of all criteria (**Table 4.9**). Each row shows the weights of each criterion. The weights assigned to the criteria by the DANP were significant.

Prioritized criteria are listed in **Table 4.8** as follows: Cost of labor (R4), quality of infrastructure (R1), Talent/skill level of labor pool (R5), availability of land/real estate (R3), availability of raw material (R3), availability of financial capital in the domestic market (R6), Population (M4), Culture (M6), R&D (M1), and Geographic (M2). The findings indicate that the majority of the ten topics given priority come under the Resource dimension. Also, the top two factors for choosing specialists are cost of labor (R4) and quality of infrastructure (R1).

*Table 4.7: Unweighted supermatrix based on DANP*

	G1	G2	G3	G4	G5	G6	G7	G8	M1	M2	M3	M4	M5	M6	M7	R1	R2	R3	R4	R5	R6
G1	0.098	0.132	0.135	0.134	0.134	0.131	0.136	0.133	0.134	0.131	0.135	0.137	0.126	0.133	0.119	0.130	0.129	0.126	0.132	0.133	0.129
G2	0.117	0.101	0.130	0.132	0.133	0.126	0.135	0.133	0.135	0.131	0.125	0.141	0.130	0.138	0.130	0.132	0.125	0.129	0.132	0.131	0.125
G3	0.126	0.134	0.103	0.135	0.139	0.131	0.131	0.134	0.133	0.130	0.125	0.129	0.134	0.139	0.128	0.138	0.131	0.132	0.137	0.136	0.133
G4	0.129	0.125	0.129	0.097	0.133	0.132	0.129	0.127	0.134	0.131	0.125	0.138	0.122	0.130	0.125	0.130	0.128	0.129	0.129	0.128	0.130
G5	0.128	0.136	0.139	0.139	0.107	0.133	0.136	0.134	0.136	0.135	0.136	0.141	0.132	0.141	0.134	0.139	0.135	0.140	0.139	0.138	0.136
G6	0.123	0.125	0.134	0.130	0.139	0.101	0.136	0.128	0.129	0.127	0.126	0.139	0.128	0.129	0.123	0.130	0.139	0.131	0.138	0.140	0.128
G7	0.131	0.133	0.133	0.120	0.124	0.133	0.100	0.130	0.137	0.133	0.127	0.135	0.128	0.128	0.129	0.128	0.127	0.129	0.135	0.124	0.127
G8	0.123	0.128	0.128	0.126	0.133	0.137	0.123	0.098	0.129	0.133	0.123	0.135	0.131	0.132	0.120	0.129	0.128	0.128	0.129	0.132	0.126
M1	0.131	0.132	0.141	0.128	0.134	0.138	0.139	0.133	0.105	0.133	0.137	0.142	0.137	0.138	0.136	0.141	0.128	0.133	0.136	0.136	0.131
M2	0.124	0.126	0.120	0.122	0.132	0.127	0.127	0.133	0.115	0.097	0.131	0.127	0.122	0.126	0.129	0.128	0.129	0.133	0.130	0.123	0.126
M3	0.122	0.130	0.130	0.124	0.128	0.122	0.125	0.128	0.128	0.133	0.097	0.135	0.130	0.130	0.125	0.134	0.121	0.129	0.125	0.127	0.125
M4	0.131	0.138	0.133	0.124	0.130	0.128	0.124	0.134	0.129	0.130	0.135	0.105	0.133	0.145	0.129	0.134	0.124	0.134	0.130	0.134	0.131
M5	0.124	0.130	0.129	0.122	0.123	0.127	0.126	0.122	0.127	0.129	0.123	0.130	0.096	0.124	0.123	0.125	0.132	0.123	0.129	0.128	0.122
M6	0.124	0.135	0.135	0.126	0.144	0.135	0.136	0.128	0.136	0.130	0.134	0.132	0.131	0.104	0.130	0.138	0.129	0.138	0.137	0.134	0.125
M7	0.128	0.123	0.130	0.124	0.124	0.126	0.131	0.119	0.125	0.124	0.126	0.131	0.125	0.132	0.095	0.124	0.124	0.129	0.128	0.132	0.124
R1	0.129	0.125	0.131	0.124	0.138	0.129	0.135	0.134	0.136	0.123	0.126	0.137	0.130	0.137	0.128	0.102	0.126	0.129	0.135	0.138	0.132
R2	0.124	0.134	0.128	0.127	0.136	0.136	0.130	0.136	0.134	0.124	0.126	0.140	0.128	0.136	0.125	0.131	0.100	0.139	0.135	0.135	0.132
R3	0.124	0.128	0.134	0.129	0.135	0.125	0.136	0.133	0.131	0.123	0.129	0.140	0.130	0.131	0.126	0.127	0.131	0.100	0.134	0.120	0.129
R4	0.130	0.129	0.137	0.130	0.133	0.126	0.130	0.127	0.138	0.135	0.123	0.137	0.130	0.135	0.131	0.132	0.130	0.128	0.103	0.130	0.129
R5	0.127	0.133	0.130	0.128	0.134	0.134	0.130	0.126	0.131	0.126	0.132	0.134	0.126	0.128	0.127	0.133	0.127	0.132	0.137	0.101	0.135
R6	0.122	0.139	0.123	0.127	0.139	0.133	0.134	0.125	0.136	0.132	0.130	0.137	0.131	0.134	0.127	0.134	0.135	0.131	0.135	0.129	0.100

*Table 4.8: Weighted supermatrix based on DANP*

	G1	G2	G3	G4	G5	G6	G7	G8	M1	M2	M3	M4	M5	M6	M7	R1	R2	R3	R4	R5	R6
G1	0.031	0.038	0.040	0.042	0.040	0.040	0.043	0.040	0.041	0.041	0.041	0.042	0.041	0.039	0.043	0.041	0.040	0.040	0.042	0.041	0.039
G2	0.042	0.033	0.042	0.041	0.042	0.040	0.043	0.042	0.041	0.042	0.043	0.044	0.043	0.043	0.041	0.040	0.043	0.041	0.042	0.043	0.045
G3	0.043	0.042	0.032	0.042	0.043	0.043	0.043	0.042	0.044	0.040	0.043	0.043	0.043	0.042	0.043	0.042	0.041	0.043	0.044	0.042	0.040
G4	0.042	0.043	0.043	0.032	0.043	0.042	0.039	0.041	0.040	0.040	0.041	0.040	0.041	0.040	0.041	0.040	0.041	0.042	0.042	0.041	0.041
G5	0.042	0.043	0.044	0.043	0.033	0.045	0.040	0.043	0.042	0.044	0.042	0.042	0.041	0.045	0.041	0.044	0.044	0.043	0.043	0.043	0.045
G6	0.042	0.041	0.041	0.043	0.041	0.032	0.043	0.045	0.043	0.042	0.041	0.041	0.042	0.043	0.042	0.042	0.044	0.040	0.041	0.043	0.043
G7	0.043	0.044	0.041	0.042	0.042	0.044	0.033	0.040	0.043	0.042	0.042	0.040	0.042	0.043	0.044	0.043	0.042	0.044	0.042	0.042	0.043
G8	0.042	0.043	0.042	0.041	0.042	0.041	0.042	0.032	0.041	0.044	0.043	0.043	0.041	0.040	0.040	0.043	0.043	0.043	0.041	0.041	0.040
M1	0.049	0.049	0.049	0.050	0.048	0.048	0.050	0.048	0.037	0.044	0.048	0.047	0.049	0.050	0.048	0.050	0.050	0.049	0.050	0.049	0.050
M2	0.048	0.047	0.048	0.049	0.048	0.048	0.049	0.049	0.047	0.037	0.050	0.047	0.050	0.047	0.047	0.045	0.046	0.046	0.049	0.047	0.048
M3	0.050	0.045	0.046	0.046	0.048	0.047	0.047	0.046	0.048	0.051	0.036	0.049	0.047	0.049	0.048	0.046	0.046	0.048	0.045	0.049	0.047
M4	0.050	0.051	0.047	0.051	0.050	0.052	0.049	0.050	0.050	0.049	0.050	0.038	0.050	0.048	0.050	0.050	0.052	0.052	0.050	0.050	0.050
M5	0.046	0.047	0.049	0.046	0.046	0.048	0.047	0.049	0.048	0.047	0.048	0.048	0.037	0.048	0.048	0.048	0.047	0.048	0.047	0.047	0.048
M6	0.049	0.050	0.051	0.048	0.050	0.048	0.047	0.049	0.049	0.049	0.049	0.052	0.048	0.038	0.050	0.051	0.050	0.049	0.049	0.048	0.049
M7	0.044	0.047	0.047	0.046	0.047	0.046	0.047	0.045	0.048	0.050	0.047	0.047	0.047	0.048	0.036	0.047	0.046	0.047	0.048	0.047	0.046
R1	0.056	0.057	0.058	0.057	0.057	0.055	0.056	0.056	0.059	0.056	0.059	0.057	0.055	0.058	0.055	0.044	0.055	0.056	0.057	0.057	0.057
R2	0.056	0.055	0.055	0.056	0.055	0.058	0.056	0.056	0.054	0.057	0.054	0.053	0.059	0.054	0.055	0.054	0.042	0.058	0.056	0.054	0.058
R3	0.054	0.056	0.055	0.056	0.057	0.055	0.056	0.056	0.056	0.058	0.057	0.058	0.055	0.058	0.057	0.055	0.059	0.044	0.056	0.056	0.056
R4	0.057	0.058	0.057	0.056	0.057	0.058	0.059	0.056	0.057	0.057	0.055	0.056	0.057	0.058	0.057	0.058	0.057	0.059	0.045	0.058	0.058
R5	0.058	0.057	0.057	0.056	0.056	0.059	0.054	0.057	0.057	0.054	0.056	0.057	0.057	0.056	0.059	0.059	0.057	0.053	0.056	0.043	0.055
R6	0.056	0.054	0.056	0.057	0.055	0.053	0.055	0.055	0.055	0.055	0.055	0.056	0.054	0.052	0.055	0.057	0.056	0.057	0.056	0.058	0.043

*Table 4.9: Influential weights of the stable matrix of DANP*

	G1	G2	G3	G4	G5	G6	G7	G8	M1	M2	M3	M4	M5	M6	M7	R1	R2	R3	R4	R5	R6
G1	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
G2	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042
G3	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042
G4	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041
G5	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043
G6	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042
G7	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042
G8	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041	0.041
M1	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
M2	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047
M3	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047
M4	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
M5	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047
M6	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.049
M7	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046
R1	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056
R2	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055
R3	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056
R4	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057
R5	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056
R6	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055



*Table 4.10: Ranking of criteria*

	Criteria	Weight	Rank
G1	Tax rates and ease of tax payment	0.040	21
G2	The efficiency of legal and regulatory processes	0.042	17
G3	Transparency of government regulations and lack of corruption	0.042	16
G4	Strength of investor and property rights	0.041	20
G5	Government incentives for investors	0.043	14
G6	Ease of moving capital into and out of the country	0.042	18
G7	General security environment	0.042	15
G8	Country's participation in regional/bilateral trade agreements	0.041	19
M1	Research and development (R&D) capabilities	0.048	9
M2	Geographic	0.047	10
M3	Technological and innovation capabilities	0.047	12
M4	Population	0.05	7
M5	Domestic economic performance	0.047	11
M6	Culture	0.049	8
M7	Domestic market size	0.046	13
R1	Quality of infrastructure	0.056	2
R2	Availability of raw materials and other inputs	0.055	5
R3	Availability of land/real estate	0.056	4
R4	Cost of labor	0.057	1
R5	Talent/skill level of the labor pool	0.056	3
R6	Availability of financial capital in the domestic market	0.055	6

## **CHAPTER 5: DISCUSSION AND CONCLUSION**

### **5.1. Summary Of Research Results**

This work proposes a three-phase method that uses the Fuzzy-Delphi, Fuzzy-DEMATEL, and DANP techniques to reveal the connections between pertinent factors in attracting FDI. The findings highlight the importance of considering these connections and provide valuable insights into the key factors affecting FDI attraction. The study's results can be a standard for future comparative studies and help businesses and policymakers improve their FDI attraction plans. The Fuzzy-Delphi and Fuzzy-DEMATEL methods effectively identified influential factors and their interrelationships. The research recommends further investigation into the relationships among these factors to identify the most critical factors for FDI in specific contexts and develop effective strategies for promoting FDI and maximizing its benefits for the host country.

### **5.2. Comparison Of Research Results**

#### **5.2.1. Comparison In The Aspect Of The Proposed Model**

The use of fuzzy data-driven MCDM models is not entirely new in the field of FDI research. Several studies have employed similar methods to explore the determinants of FDI attractiveness. However, the specific approach and methodology make this study stand out from other research in the field of FDI attractiveness as it incorporates the fuzzy data-driven approach. It allows for more nuanced, flexible decision-making and valuable insights.

Compared to other research in the field, the "Fuzzy Data-Driven MCDM Model" approach utilizes fuzzy set theory to handle the imprecision and uncertainty of the data in the model. This allows for a more accurate representation of the real-world complexity of FDI determinants, which can be difficult to quantify precisely. For example, a study by (Z. Cheng et al., 2018) used a fuzzy multi-criteria decision-making approach to evaluate the factors affecting FDI attractiveness in China. Another study by (Aryanfar et al., 2020) used a fuzzy MCDM method to assess the FDI attractiveness of Iran. The approach also utilizes a data-driven approach, which relies on existing data and data analysis techniques to identify the key determinants of FDI attractiveness. This departs from more theoretical approaches that rely on expert opinions or literature reviews.

In addition, another important feature of the "Fuzzy Data-Driven MCDM Model" approach is its ability to explore the interrelationships among the key determinants of FDI attractiveness. This is important because the determinants of FDI attractiveness are not independent and may interact in complex ways. For instance, a study (Zhang, 2019) explored the interrelationships between intellectual property protection and FDI attractiveness in China, while a study (Seyoum & Ramirez, 2019) examined the interrelationships between economic freedom, political stability, and FDI

attractiveness in OECD countries. Another example is a study by (Zhang et al., 2010) that used a TOPSIS-based approach to evaluate FDI attractiveness in China, while a study by (Pham et al., 2018) used an AHP approach to rank the factors influencing FDI in Vietnam. Additionally, a study by (Y. Wang et al., 2021) used a structural equation modeling (SEM) approach to explore the interrelationships between FDI attractiveness and various factors in China. By exploring these interrelationships, the model in this study can manage ambiguous and uncertain data, resulting in more precise and dependable outcomes that consider economic, social, and environmental factors and analyze the connections between these factors.

In summary, this research uniquely uses a fuzzy data-driven MCDM model to explore the interrelationship among a comprehensive set of key determinants of FDI attractiveness. Compared to traditional statistical and econometric methods used in previous studies, this approach provides a more nuanced and flexible decision-making framework that can account for uncertainties and imprecisions in the data, resulting in more accurate and reliable results.

### **5.2.2. Comparison In The Aspect Of Criteria Ranking**

FDI is an essential source of capital flow that has the potential to significantly contribute to the economic growth and development of a country. It is a vital source of capital, technology, and expertise that enables developing nations to improve their competitiveness and access international markets. However, attracting FDI is a complex task as it involves various factors that influence the decision of investors. These factors can vary depending on the context, so it is important to understand how different countries rank the determinants of FDI attraction. In our proposed work study, tax rates and ease of tax payment, cost of labor, transparency of government regulations and lack of corruption, and government incentives for investors were among the top factors that strongly impact attracting FDI in Vietnam. Hence, it is important to compare the crucial factors that attract FDI in our study and the similarities and differences that may exist with other countries.

Many studies have identified tax rates and ease of payment as significant factors in attracting FDI. For instance, a study by the World Bank found that tax rates were one of the top three factors that investors considered when deciding to invest in a country. A United Nations Conference on Trade and Development (UNCTAD) study found that investors were likelier to invest in countries with lower tax rates (UNCTAD, 2022). In our study, Vietnam offers tax incentives to investors who operate in the country's prioritized sectors, such as manufacturing, high-tech, and infrastructure. Furthermore, Vietnam has a relatively low corporate investors tax rate of 20% and simplified tax procedures, making it easier for foreign investors to conduct business there. However, some studies have also found that tax incentives or subsidies can have a greater impact on attracting FDI than low tax rates alone. For example, a study (Tang & Tan, 2018) on FDI

determinants in Malaysia found that tax incentives were more effective than low tax rates in attracting FDI. This differs from the findings of our study, which ranked tax rates and ease of tax payment as the top factor.

Previous studies have highlighted labor costs as another factor attracting FDI in Vietnam. A country with a large, young, and skilled labor force is relatively affordable compared to other countries in the region. For example, a study (Globerman & Shapiro, 2002) found that FDI tends to be attracted to countries with relatively low labor costs and good labor productivity. The minimum wage in Vietnam is among the lowest in Southeast Asia, and the labor force's productivity has increased steadily. As a result, Vietnam has become an attractive destination for labor-intensive industries such as garment and textile manufacturing, which require a large pool of low-cost labor. However, some studies have also highlighted the importance of other factors, such as human capital and the labor force's productivity. For example, a study (Asiedu, 2002) on FDI determinants in Africa found that human capital and labor productivity were important determinants of FDI. This differs from the focus of your study, which solely ranked the cost of labor as one of the top factors.

Similar to our research, several previous studies have identified the transparency of government regulations and lack of corruption as important factors in attracting FDI. For instance, a study by the Asian Development Bank found that investors were more likely to invest in countries with transparent and predictable regulatory environments. In addition, Vietnam has signed several international trade agreements, such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the EU-Vietnam Free Trade Agreement (EVFTA), which provide a more predictable and stable legal framework for foreign investors. Consequently, the Vietnamese government has made significant progress in fighting corruption, which has improved the country's reputation and made it a more attractive destination for foreign investors. However, some studies have also highlighted the importance of other institutional factors, such as property rights protection and the rule of law. For example, a study (Wijeweera & Mounter, 2008) on FDI determinants in Sri Lanka found that property rights protection and the rule of law were significant determinants of FDI.

Finally, our study also identified government incentives as crucial factors that attract FDI. It is known that the Vietnamese government has implemented various policies and incentives to encourage foreign investment, such as tax holidays, land rent exemption, and investment credits. Moreover, the government has established several industrial and export processing zones, providing investors with favorable conditions for doing business, such as infrastructure, utilities, and administrative support. However, some studies have also highlighted the importance of other factors, such as infrastructure development and political stability. For example, a study by (Azam

et al., 2019) on FDI determinants in Pakistan found that political stability and infrastructure development were important factors.

In conclusion, attracting FDI is a complex task involving various factors that vary depending on the context. Our study in Vietnam identified tax rates and ease of tax payment, cost of labor, transparency of government regulations and lack of corruption, and government incentives for investors as the most important factors that strongly impact FDI attraction. However, it is important to consider the context when identifying the most important factors for FDI attraction, as specific factors can vary depending on the country. For instance, a study by (Z. Cheng et al., 2018) on FDI in China found that infrastructure development was an important factor. In contrast, these factors were ranked lower in our current study. Overall, future research can build on these findings to further advance the field of FDI attraction and assist policymakers and investors in developing effective strategies to promote FDI capital flows and maximize the benefits of FDI for the host country.

### **5.3. Discussion**

The study's use of Fuzzy-Delphi, Fuzzy-DEMATEL, and DANP methods to answer research questions related to the factors affecting FDI attraction in Vietnam is a novel approach. While there is a lack of studies combining all three MCDM methods in the FDI field in a specific area, the study's findings can still be compared to previous research.

We have three research questions:

- (i) What are the critical criteria affecting FDI attraction?
- (ii) What are the network and interrelationships among the criteria of FDI attraction?
- (iii) What are the priorities of the selected criteria?

In this study we repeatedly used three methods: Fuzzy Delphi, Fuzzy DEMATEL and DANP. The results of these three methods address the three questions posed.

First about the question: "What are the critical criteria affecting FDI attraction?". From the original 24 variables, we reject the 3 variables considered by the response to be the least important, are G9- Checks and Balances, G10- The future orientation of government and M18- Trade openness. The 21 remaining variables continue to be analyzed by two next methods: Fuzzy DEMATEL and DANP. These 21 variables are also the 21 main variables to rank in the ranking of the results of the research paper.

Second on the question "What are the network and interrelationships among the criteria of FDI attraction?". Based on the resulting graph of the Fuzzy DEMATEL method (Figure 4.10), we divide it into 4 zones. Zone 1 and 2, which are above 0 value of  $R - C$  are Cause-factors, zone 3

and 4 which are under 0 value of  $R - C$  are Effect-factors. In other words, the variable in zone 3 and 4 was created by the variable in Zones 1 and 2. Cause-factors include: G1-Tax rates and ease of tax payment , G2-The efficiency of legal and regulatory processes , G3-Transparency of government regulations and lack of corruption, G4-Strength of investor and property rights, G5-Government incentives for investors, G6-Ease of moving capital into and out of the country, R2-Availability of raw materials and other inputs, R6-Availability of financial capital in the domestic market and M1-Research and development (R&D) capabilities. Effect-factor includes: the remaining variables.

Third, on the question "What are the priorities of the selected criteria?". Based on the impact network of the Total-Relation Defuzzified matrix generated by the Fuzzy DEMATEL, the DANP approach was utilized in this study to determine the weights of the 21 criteria. The findings indicate that the majority of the ten topics given priority come under the Resource dimension. Also, the top three factors for choosing specialists are cost of labor (R4), quality of infrastructure (R1) and Talent/skill level of the labor pool (R5)

Our study found that tax rates and ease of tax payment, cost of labor, transparency of government regulations and lack of corruption, and government incentives for investors were among the top factors that strongly impact attracting FDI in Vietnam. This is similar to the findings of studies (Ibrahim & Hassan, 2013), which found that political stability, legal and regulatory environment, and government support and incentives were critical determinants of FDI inflows in Africa. Additionally, (Sahoo, 2012) and (Chopani et al., 2014) found that government policies, regulatory environment, investment incentives, tax rates, labor cost, transparency of government regulations, and corruption as important factors affecting FDI attraction.

Another similarity is the recognition of tax rates and labor costs as key factors affecting FDI attraction. For instance, (Chopani et al., 2014) found that low tax rates, tax holidays, and exemption from customs duties were crucial determinants of FDI inflows to India. However, ranking factors that attract FDI can vary depending on the country's specific context. For instance, (Wei & Liu, 2001) identified the cost of labor and infrastructure as the most significant factors affecting FDI attraction in China. It can be explained by the country's emphasis on export-oriented manufacturing industries, which require good infrastructure and technology to produce goods efficiently.

In contrast, these factors were ranked lower in Vietnam. Vietnam's ranking factors, such as ease of tax payment and lack of corruption, can be explained by the country's effort to improve the business environment and reduce corruption to attract more FDI inflows. Another example (Aharoni & Nachum, 2000) argued that the quality of human capital, economic development, and

the degree of integration with the global economy were key determinants of FDI inflows in different regions. Hence, it is essential to consider the context when identifying the most important factors for FDI attraction.

Furthermore, it is important to note that the results of this study are based on the specific methods used to analyze the data and the context in which the research was conducted (Galán & González-Benito, 2001). These methods allowed for a more comprehensive analysis of the interrelationships between factors and their relative importance in attracting FDI. At the same time, other studies have primarily used regression analysis or other statistical techniques to identify the key determinants of FDI inflows. Therefore, future research must explore the interrelationships between the factors affecting FDI attraction and identify the most critical factors in specific contexts, as it can provide insights into how FDI can impact other areas such as employment, technology transfer, and economic diversification. This can assist policymakers and investors in developing effective strategies to promote FDI capital flows and maximize the benefits of FDI for the host country.

Our study offers a unique approach to analyzing the factors affecting FDI attraction and provides valuable insights for policymakers and investors. The findings can be compared to previous research to identify similarities and differences and advance the field of FDI attraction.

## **5.4. Research Implications**

### **5.4.1. Theoretical implications**

The theoretical implications of this study are significant for the field of FDI attraction. The integrated Delphi-DEMATEL-DANP model-based fuzzy theory provides a useful framework for analyzing the complex interrelationships among key determinants of attracting FDI. This approach provides policymakers and businesses with a more comprehensive understanding of the interrelationships among key determinants, enabling them to develop more effective FDI attraction strategies. Future research can further explore the effectiveness of this approach in other areas of FDI attraction.

Secondly, the study highlights the importance of considering contextual factors when identifying the determinants of FDI attraction. Neglecting one determinant can harm overall FDI inflows. Policymakers and businesses should consider the local economic, social, and political factors when developing FDI attraction plans. Future research can investigate the impact of different contextual factors on FDI attraction in various countries and regions.

Thirdly, identifying the top seven most important factors affecting FDI attraction provides valuable insights into the factors that policymakers and businesses should prioritize in their FDI

attraction plans. Future research can examine the impact of these factors on FDI attraction in different contexts and identify the most influential factors for specific industries and sectors.

Lastly, the study demonstrates the usefulness of fuzzy theory in incorporating ambiguity and uncertainty into the decision-making process for FDI attraction. This approach is particularly valuable when data is limited, or uncertainties exist about certain determinants' impact on FDI attraction. Future research can explore the application of fuzzy theory in other areas of FDI attraction, such as assessing the risk associated with FDI projects.

This study provides a more comprehensive understanding of the determinants influencing FDI attraction in various contexts. The findings of this study can inform future research and policymaking in this area, ultimately leading to more effective FDI attraction strategies and greater benefits for the host country.

#### **5.4.2. Managerial implications**

The theoretical implications of this study also have practical implications for policymakers, investors, and business managers seeking to attract FDI. The proposed model can guide policymakers in designing policies and incentives targeting the most influential factors and can assist investors and business managers in allocating their resources and investments more effectively.

The findings of this study can enable policymakers to focus on factors that are most crucial in attracting FDI, which can lead to higher FDI inflows and economic growth. Policymakers can develop policies and incentives that address the most influential factors, such as improving labor quality, lowering production costs, and enhancing property rights protection.

Investors and business managers can also benefit from this study's findings by focusing on the key determinants of FDI attraction. By focusing on the most influential factors, such as improving labor quality, lowering production costs, and enhancing property rights protection, they can increase their chances of success in their host country. Additionally, complying with government regulations is critical for investors and business managers, as failure can negatively impact their investment and business operations.

In conclusion, this study's findings can guide policymakers, investors, and business managers in developing more effective strategies and policies to attract more FDI flows to their region or country. By understanding the most influential factors and their interrelationships, they can allocate resources and investments more effectively and achieve sustainable economic growth.



## **5.5. Limitations and Future Research**

### **5.5.1. Limitations**

Several limitations to our study should be acknowledged. First, the study relied on the opinions of a group of experts to identify the most important factors affecting FDI attraction. While using expert opinions is a common method in this field, there may be subjectivity in selecting experts and their responses to the questionnaire, which could have affected the results. Second, the proposed hybrid model that integrates Fuzzy-Delphi, Fuzzy-DEMATEL, and DANP methods provides a more comprehensive and nuanced understanding of the factors affecting FDI attraction. However, there is a limited comparative analysis with other researchers that use alternative methods to explore the same topic. For example, the Fuzzy-Delphi Method relies on expert opinions and may be subjective, while selecting the initial set of variables and interpreting the relationships between them may influence the Fuzzy-DEMATEL analysis. Third, although the proposed methodology has the potential to make a significant contribution to the FDI attraction literature, there is insufficient empirical evidence to confirm its effectiveness and reliability when compared to other methods used to investigate the same subject. Fourth, the study did not consider the interrelationships between economic factors affecting FDI attraction. There is a narrow focus on non-economic factors, such as political stability, cultural factors, and regulatory environment, which could also impact FDI attraction.

Additionally, the proposed hybrid model does not consider the dynamic nature of FDI attraction, such as changes in investor preferences, global economic conditions, and technological advancements, which could impact the relative importance of the factors affecting FDI attraction over time. Finally, the study focused on a specific region and did not consider the potential differences in FDI attraction factors in other regions or countries. Thus, the findings may not be generalizable to other regions or countries.

To improve the rigour and validity of future research on this topic, efforts could be made to address some limitations. This may include using larger and more diverse expert panels representing a wider range of countries or regions, considering external factors that may impact the results, and employing more sophisticated modeling techniques better to understand the complex relationships between the studied factors.

In conclusion, this study has provided valuable insights into the factors influencing the phenomenon under investigation. However, it is important to consider the limitations of a study when interpreting its findings. Some possible limitations that may have affected the results of a study include small sample size, biased or unrepresentative sample, incomplete data, measurement error, and confounding factors that were not controlled for in the analysis.

### **5.5.2. Recommendations based on DANP results**

Based on the results of the DANP analysis for Vietnam, our study provides some potential recommendations on exploring the interrelationship among key determinants of FDI attractiveness.

First, given that the cost of labor has been ranked as the most critical determinant of FDI attractiveness in Vietnam, it is important for the government to maintain competitive labor costs while also ensuring that workers are compensated. These may include wages, productivity, and labor regulations. In addition, the government could consider providing tax incentives or subsidies to companies that invest in training their employees, which could help to increase the skill level of the workforce and potentially lead to higher wages in the long term. Further research could focus on analyzing the relationship between labor costs and the productivity of workers. This could help to determine the optimal wage level that balances the need for competitiveness with the need for fair compensation.

Secondly, to improve the quality of infrastructure, the government could consider investing in transportation, energy, and telecommunications networks. This could involve building new highways, expanding public transportation options, and upgrading power grids and internet connectivity. For example, in Singapore, the government has invested heavily in infrastructure, including transportation, communication, and energy, which has helped to create a world-class business environment and attract foreign investors (Edb, 2021). Additionally, the government could streamline the process for obtaining permits and licenses for construction projects, which could help to reduce the time and cost associated with infrastructure development.

Thirdly, the study should analyze the talent/skill level of the labor pool as a crucial determinant of FDI attractiveness in Vietnam. The government could invest in education and training programs, particularly in fields such as science, technology, engineering, and mathematics (STEM). For instance, in Finland, the government has invested heavily in education and training programs, which has helped to create a highly skilled workforce that is attractive to foreign investors (OECD, 2021). The government could also work with private companies to develop apprenticeship programs that provide on-the-job training and mentorship to young workers.

Finally, to improve the availability of land and real estate for FDI, the government could consider streamlining the process for acquiring land and obtaining permits for construction projects. Additionally, the government could invest in developing industrial parks and other types of business infrastructure that are specifically designed to attract foreign investment.

Further research could focus on analyzing the availability of land and real estate in different regions, as well as the factors that are most important to foreign investors when selecting a location

for their operations. This could help the government to identify which regions are most in need of investment and which types of infrastructure are most important for attracting FDI.

In summary, countries can use the findings of our study to develop strategies for attracting FDI. By focusing on these key factors, countries can create a more attractive business environment for foreign investors, driving economic growth and development.

### **5.5.3. Future Research**

Based on the limitations and significance of our study, we offer several recommendations for future research in foreign direct investment (FDI) attraction. One prospective avenue for future research would be to compare our suggested hybrid model with other conventional techniques used to study the same subject, such as factor analysis or regression analysis. This comparison would enable us to identify the strengths and weaknesses of different methods and generate more dependable and robust findings. Alternatively, utilizing a mixed methods approach that combines both qualitative and quantitative methods to scrutinize the factors that impact FDI attraction would be useful. This would result in a more comprehensive and nuanced comprehension of the subject matter, and policymakers would be able to develop more effective strategies for attracting FDI.

Another potential area for future research could be investigating the interrelationships between economic and non-economic factors, such as political stability, cultural factors, and regulatory environment, which could impact FDI attraction. Investigating such interrelationships would provide a complete understanding of the factors influencing FDI attraction and identify areas for policy intervention.

Furthermore, utilizing machine learning methods, such as neural networks and random forests, could be beneficial to investigate the factors that influence FDI attraction. This would aid in identifying complex relationships between variables and enable policymakers to create more accurate FDI attraction predictions.

Additionally, future research could investigate the dynamic nature of FDI attraction and how changes in investor preferences, global economic conditions, and technological advancements affect the relative importance of different factors over time. This would provide valuable insights into emerging trends and the future direction of FDI attraction.

Investigating the various factors that may impact FDI attraction in different regions or countries would be advantageous for future research. While our research was limited to a specific region, further investigation could determine if the factors we identified apply to other regions or countries. Such an inquiry would identify location-specific variables that could influence FDI attraction and provide policymakers with insights on designing targeted strategies to attract more investments.

In conclusion, by addressing the limitations of prior research and exploring new areas of study, future research could significantly contribute to the literature on FDI attraction, providing valuable insights for policymakers and practitioners.

## **5.6. Conclusion**

This study comprehensively analyzes the key determinants of attracting foreign direct investment (FDI). By utilizing an integrated Delphi-DEMATEL-DANP model-based fuzzy theory, the study identifies the interrelationships among these determinants and highlights the major factors influencing FDI attraction. The study's findings can serve as a valuable benchmark for future research in this field and provide policymakers and businesses with insights to improve their FDI attraction strategies and increase their competitiveness in the global market.

The study also demonstrates the usefulness of the Fuzzy-Delphi method and Fuzzy-DEMATEL analysis in identifying the most influential factors and their interrelationships in the context of FDI attraction. However, further research is needed to identify the most important factors for attracting FDI in specific contexts and develop effective strategies to promote FDI capital flows. The integrated Delphi-DEMATEL-DANP model-based fuzzy theory presented in this study can be useful for policymakers and investors seeking to enhance their FDI attraction efforts.

Overall, this study offers a valuable contribution to the field of FDI attraction and provides a foundation for future research.

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# APPENDIX

## Questionnaire 1

### Survey on level of importance of factors attracting FDI in Vietnam

We are a research group at FPT University. Currently, we are conducting a project on "important factors affecting FDI Attractiveness in Vietnam".

This survey aims to investigate critical determinants of FDI attractiveness in Vietnam.

We hope you can spare some time to help us complete this thesis. We guarantee that your opinions and information will be kept confidential and only used for research purposes.

We sincerely thank you!

#### Section 1: General Information

1. Please indicate what age you are in:

- Under 25
- From 25 - 40 years old
- From 40 - 60 years old
- Over 60 years old

2. Please indicate your gender:

- Male
- Female
- Other

3. Please indicate your current level of Education Qualification:

- Bachelor
- Master
- Doctor
- Others: .....

4. Please indicate what industry you are currently working in:

- Teaching/researching on FDI
- Working on FDI field
- Other: .....

5. Please indicate your experience in this field:

- Less than 5 years
- From 5 to 10 years
- From 10 to 20 years
- Over 20 years

6. Please indicate how much your monthly income is:

- Under 1000 dollars
- From 1000 to 2000 dollars
- From 2000 to 3000 dollars
- From 3000 to 4000 dollars

Over 4000 dollars

**Section 2: Determine the relative importance of possible factors affecting FDI attractiveness.**

Please rate the relative importance of a set of possible factors affecting FDI attractiveness according to the linguistic scales, including: **Equal Important = EQ, Moderate Important = M, Strong Important = S, Demonstrated Important = D, Extreme Important = EX**

	<b>Factors</b>	<b>EQ</b>	<b>M</b>	<b>S</b>	<b>D</b>	<b>EX</b>
<b>G O V E R N M E N T</b>	G1. Tax rates and ease of tax payment					
	G2. Efficiency of legal and regulatory processes					
	G3. Transparency of government regulations and lack of corruption					
	G4. Strength of investor and property rights					
	G5. Government incentives for investors					
	G6. Ease of moving capital into and out of the country					
	G7. General security environment					
	G8. Country's participation in regional/bilateral trade agreements					
	G9. Checks and Balances					
	G10. Future orientation of government					
<b>M A R K E T</b>	M1. Research and development (R&D) capabilities					
	M2. Geographic					
	M3. Technological and innovation capabilities					
	M4. Population					
	M5. Domestic economic performance					
	M6. Culture					
	M7. Domestic market size					
	M8. Trade openness					
<b>R</b>	R1. Quality of infrastructure					

<b>E S S O U R C E S</b>	R2. Availability of raw materials and other inputs					
	R3. Availability of land/real estate					
	R4. Cost of labor					
	R5. Talent/skill level of labor pool					
	R6. Availability of financial capital in domestic market					

## Questionnaire 2

### Survey on assessing the level of influence between factors attracting FDI in Vietnam

We are a research group at FPT University. Currently, we are conducting a project on "important factors affecting FDI attraction in Vietnam".

This survey was created to assess the level of influence between groups of factors on each other, and the level of influence between factors in the same group.

We hope you can spare some time to help us complete this thesis. We guarantee that your opinions and information will be kept confidential and only used for research purposes.

Sincerely thank you!!

#### Section 1: General Information

1. Please indicate what age you are in:

- Under 25
- From 25 - 40 years old
- From 40 - 60 years old
- Over 60 years old

2. Please indicate your gender:

- Male
- Female
- Other

3. Please indicate your current level of Education Qualification:

- Bachelor
- Master
- Doctor
- Others: .....

4. Please indicate what industry you are currently working in:

- Teaching/researching on FDI
- Working on FDI field
- Other: .....

5. Please indicate your experience in this field:

- Less than 5 years
- From 5 to 10 years
- From 10 to 20 years
- Over 20 years

6. Please indicate how much your monthly income is:

- Under 1000 dollars
- From 1000 to 2000 dollars
- From 2000 to 3000 dollars

- From 3000 to 4000 dollars
- Over 4000 dollars

Criteria	Sub-criteria	
<b>Government</b>	G1	Tax rates and ease of tax payment
	G2	Efficiency of legal and regulatory processes
	G3	Transparency of government regulations and lack of corruption
	G4	Strength of investor and property rights
	G5	Government incentives for investors
	G6	Ease of moving capital into and out of the country
	G7	General security environment
	G8	Country's participation in regional/bilateral trade agreements
<b>Market</b>	M1	Research and development (R&D) capabilities
	M2	Geographic
	M3	Technological and innovation capabilities
	M4	Population
	M5	Domestic economic performance
	M6	Culture
	M7	Domestic market size
<b>Resource</b>	R1	Quality of infrastructure
	R2	Availability of raw materials and other inputs
	R3	Availability of land/real estate
	R4	Cost of labor
	R5	Talent/skill level of labor pool
	R6	Availability of financial capital in domestic market



**Section 2: Please rate the level of influence between the following factors on the scale:  
 NE = No Effect, EW = Extremely Weak Effect, W = Weak Effect, S = Strong Effect, ES =  
 Extremely Strong Effect.**

	G1	G2	G3	G4	G5	G6	G7	G8	M1	M2	M3	M4	M5	M6	M7	R1	R2	R3	R4	R5	R6
G1	NE																				
G2		NE																			
G3			NE																		
G4				NE																	
G5					NE																
G6						NE															
G7							NE														
G8								NE													
M1									NE												
M2										NE											
M3											NE										
M4												NE									
M5													NE								
M6														NE							
M7															NE						
R1																NE					
R2																	NE				
R3																		NE			
R4																			NE		
R5																				NE	
R6																					NE