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Research Title

The impacts of Vision 2030 on the Ductwork Manufacturing Sector in Riyadh, Saudi Arabia: Challenges, opportunities

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عنوان البحث

**تأثير رؤية 2030 على قطاع تصنيع مجاري الهواء في الرياض، المملكة العربية السعودية:
التحديات والفرص.**

طارق عبد الحليم سليمان الخولي

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كلية الإدارة

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Abstract

This research Indicate and investigates the challenges, opportunities and impacts that Vision 2030 in Saudi Arabia on the Manufacturing Sector especially on the HVAC System – Duct work and Duct accessories Manufacturer. This research aims to analyze the goals and strategies of Vision 2030 – such as diversifying industries, bringing new technologies to the industry, encourage to be more environmentally friendly that will affect the growth and development of the manufacturers for the Duct work and Duct accessories HVAC system Manufacturers in Riyadh Saudi Arabia.

The study used a descriptive and analytical approach. A questionnaire was used to collect initial data. The questionnaire was given to a random sample of managers, engineers, accountants and procurements etc. Working on HVAC Manufacturer in Riyadh, Saudi Arabia. A total of 584 questionnaires were received, and after checking, 232 were found to be valid for analysis. The data was analyzed, and the hypotheses were tested using the SPSS program.

The results shows that Vision 2030 of Saudi Arabia impact the schedule pressure on HVAC Manufacturer, project performance and cash flow of the HVAC companies. Also, the results showed that there is an impact on duration, cost, scope, quality, and stakeholder satisfaction. The study offered several recommendations to improve schedule pressure management and reduce negative impacts.

Key Words used in the research: Vision 2030 Saudi Arabia, HVAC Manufacturer, Saudi Arabia Projects performance, develop the project performance and Riyadh City.

المخلص

هذه الدراسة تشير وتحقق في التحديات، الفرص والتأثيرات التي يحملها رؤية 2030 في المملكة العربية السعودية على قطاع التصنيع، وخصوصاً على الشركات المصنعة لأنظمة تكييف الهواء – أنظمة القنوات وملحقاتها. تهدف هذه الدراسة إلى تحليل أهداف واستراتيجيات رؤية 2030، مثل تنويع الصناعات، إدخال تقنيات جديدة إلى الصناعة، وتشجيع الممارسات الصديقة للبيئة، والتي ستؤثر على نمو وتطوير الشركات المصنعة لأنظمة القنوات وملحقاتها في مجال تكييف الهواء في الرياض، المملكة العربية السعودية.

استخدمت الدراسة منهجاً وصفيًا وتحليليًا. تم جمع البيانات الأولية عن طريق استبانة. تم توزيع الاستبانة على عينة عشوائية من المديرين، المهندسين، المحاسبين، وموظفي المشتريات العاملين في شركات تصنيع أنظمة تكييف الهواء في الرياض. استُلمت 584 استبيانًا، وبعد التحقق، تبين أن 232 استبيانًا كانت صالحة للتحليل. تم تحليل البيانات واختبار الفرضيات باستخدام برنامج اس بي اس اس.

أظهرت النتائج أن رؤية 2030 في السعودية تؤثر على ضغط الجدول الزمني على شركات تكييف الهواء، وأداء المشاريع، والتدفق النقدي لشركات التكييف. كما أظهرت النتائج وجود تأثير على مدة المشروع، التكاليف، النطاق، الجودة، ورضا أصحاب المصلحة. قدمت الدراسة عدة توصيات لتحسين إدارة ضغط الجدول الزمني وتقليل الآثار السلبية.

الكلمات المفتاحية المستخدمة في البحث: رؤية 2030 السعودية، انابيب التدفئة والتكييف، أداء المشاريع، مدينة الرياض.

1 Introduction

In recent decades, global economies have undergone significant transformations driven by technological advancements, shifts in resource dependency, and changing market dynamics. Countries are increasingly recognizing the importance of economic diversification to ensure sustainable growth and resilience against external shocks. Saudi Arabia, historically reliant on oil exports, faces the urgent need to transition its economy to a more diversified and sustainable model.

Since 2016, Saudi Arabia has embarked on a comprehensive reform agenda known as Vision 2030, introduced by Crown Prince Mohammed bin Salman. This ambitious plan aims to reduce the kingdom's dependence on oil revenue by developing new sectors such as tourism, technology, renewable energy, and manufacturing. The manufacturing sector, in particular, is viewed as a key driver for economic diversification, job creation, and technological advancement.

Existing literature highlights that successful implementation of such strategic visions can significantly impact national economic sector. For example, studies by the World Bank (2020) emphasize that diversification efforts can enhance economic resilience and competitiveness. However, transitioning traditional industries to modern, innovative sectors also presents challenges, including infrastructural limitations, workforce readiness, and regulatory frameworks.

This research focuses specifically on the ductwork manufacturing sector in Riyadh, Saudi Arabia, exploring how Vision 2030 influences this industry. While previous studies have analyzed broader economic impacts of Vision 2030, limited research has examined its direct effects on specialized manufacturing sectors such as ductwork production. Therefore, this study aims to identify the opportunities created by Vision 2030 for this sector, as well as the challenges faced in adapting to new standards and market demands.

By providing an in-depth analysis of the ductwork manufacturing industry within Riyadh, this research offers valuable insights into the practical implications of national economic reforms. It contributes to the existing body of knowledge by evaluating the sector's readiness for change, the impact of policy initiatives, and proposing strategies to overcome obstacles, thus adding a novel perspective to the ongoing discourse on Saudi Arabia's economic transformation.

2 Problem statement

The Kingdom is currently moving towards local manufacturing as one of the most strategically sound options, and it represents the fastest route to achieving the country's economic goals. However, as this future economic landscape develops—characterized by openness, intense competition, and rapid global economic changes, several challenges and obstacles have emerged that affect all economies and business sectors worldwide. Consequently, the industrial sector in the Kingdom faces significant barriers that need to be addressed.

To navigate these challenges, the industrial sector must confront them with resilience across multiple dimensions. This article will identify these challenges and explore potential solutions for overcoming them.

The main challenges facing the national industry in the Kingdom of Saudi Arabia can be summarized as follows:

1. What are the primary challenges confronting the industrial sector in Saudi Arabia?
2. How does dependence on oil and gas influence the diversification and sustainability of the Saudi industrial sector?
3. What weaknesses exist within the current industrial structure, including managerial and physical aspects—that hinder growth?
4. How do government regulations and policies impact the development of the industrial sector?
5. What are the causes of the labor shortage, particularly among Saudi nationals, and what strategies can address this issue?

3 Study importance

This study is important because it helps us understand how the manufacturing sector in Saudi Arabia can grow and improve, especially as the country works towards its Vision 2030 goals. It adds new ideas to both what we know about managing industries and how they can become more sustainable and innovative.

The research allows us to learn the following theoretical insights:

Better Management: The study shows ways that factories and companies can manage their work better to be more productive and efficient.

Using New Technologies: It explains how factories can adopt new technologies and make them work locally, which is helpful for developing countries.

Protecting the Environment: It highlights ways to run industries that are good for the environment, helping to create a sustainable future.

Practically, we can apply the insights from the research as follows:

For Policymakers: The study gives ideas on how the government can support industry growth, innovation, and sustainability.

For Business Owners and Managers: It offers useful tips on managing their companies better, using new technologies, and protecting the environment.

For Researchers and Students: It provides a solid base for future studies in industrial management and sustainability.

For Society and the Economy: Overall, the study aims to help the country develop its industries, create jobs, and build a stronger, more diverse economy.

4 Study purposes

Here are the keys of the objectives of the study that solve the challenges that Saudi Arabia faces on manufacturing sector in 2030 vision

Main Objectives:

To understand how Saudi Arabia's Vision 2030 affects the air duct industry in the country.

Sub-Objectives:

- 1. To determine the production levels and market share of air duct factories in Saudi Arabia:** measure the current production volume of local factories and their contribution to the Saudi market.
- 2. Looking at what makes it hard for more factories to open or grow:** identify the problems that stop new factories from starting or existing ones from expanding and suggest ways to fix them.
- 3. To see how Vision 2030 helps increase earnings and bring in new technologies:** check if the policies and plans are helping companies make more money and use better technology.
- 4. To find out if Vision 2030 affects jobs in the air duct industry:** see if more jobs are being created or if employment levels are changing because of the industry's development.
- 5. To understand the quality standards and new techniques factories are using:** see if factories follow quality rules and how this influences their ability to compete in the market.
- 6. To identify the main challenges that prevent industry from relying less on oil and growing more sustainably:** figure out what obstacles stop the industry from diversifying and growing in a sustainable way.

5 Literature review

Saudi Arabia's Vision 2030 is a plan to improve the country's economy and make it like developed countries such as the USA, Canada, and the UK. The goal is to find new ways to grow the economy, moving away from relying only on oil by developing other industries, especially manufacturing.

One important industry in this plan is HVAC manufacturing, which makes ductwork and accessories for big building projects. The success of this industry is important because it helps with city development and fits into the country's bigger goals of economic growth and diversification.

In this chapter, I look at what researchers, industry experts, and professionals in HVAC are saying about the challenges and chances this industry has. I explore how new technology, better skills, and smarter policies can help the industry grow and succeed in line with Saudi Arabia’s Vision 2030.

Another key part of the vision is to help local factories produce better quality products that meet international standards. The literature talks about how technology, innovation, and workforce training can improve industry performance. It also discusses how adopting new tools and methods can help the industry grow faster and more efficiently.

By reviewing all this information, we can better understand how the ductwork industry in Riyadh is doing now and what it might look like in the future as part of Saudi Arabia’s bigger plans for development.

6 Summary of Past Studies

English Version

(Saudi Arabia HVAC Ductwork Market Size, 2025)

The HVAC ductwork market in Saudi Arabia is growing fast. Back in 2024, it was worth about USD 989 million, and experts think it will reach around USD 2.36 billion by 2033. That means every year, the market will grow by roughly 9%. The main reasons for this are the need for energy-saving ventilation systems and smarter building technology. Big projects under Saudi Arabia’s Vision 2030 are also helping the market grow in both offices, malls, and homes.

The industry is also using new technology to improve systems. For example, in April 2025, a company called AFICO started using AI technology from nano precise Sci Corp. This technology helps monitor HVAC systems all the time and predicts when maintenance will be needed. This way, companies can fix problems early, save energy, and avoid expensive repairs. Using smart sensors and AI makes HVAC systems more efficient and better for the environment.

Report Attribute	Key Statistics
Base Year	2024
Forecast Years	2025-2033
Historical Years	2019-2024
Market Size in 2024	USD 989.10 Million
Market Forecast in 2033	USD 2,363.13 Million
Market Growth Rate 2025-2033	9.10%

Figure 1: Saudi Arabia HVAC Ductwork Market Overview

There's also a focus on creating greener and better systems that use less energy. At the ISH Expo 2025, a company called VTS Group showed new products like the VENTUS Platinum, which is very energy-efficient and has smart features to improve air quality inside buildings. These kinds of eco-friendly systems will help Saudi Arabia reach its goal of building sustainable and energy-efficient places.

The study also looked at different types of ducts and where they are used, like in homes, offices, and factories. Knowing this helps companies sell the right products and find new chances to grow. Overall, the market is competitive but full of opportunities. With new technology and support from the government, the future of HVAC ductwork in Saudi Arabia looks very promising.

This report gives a simple picture of how the HVAC ductwork market in Saudi Arabia has grown and what to expect in the future, up to 2033. It looks at what's driving growth, challenges, and new opportunities. **The goal of the research is** to give an easy overview of the market, its competition, and future potential, by analyzing market data and company strengths.

Main conclusion:

The market is competitive but full of opportunities, especially with new technology and government support helping it grow.

Arabic Research

(Al-Ghamdi, 2024)

Many recent studies have looked at how Saudi Arabia is working to develop its industries and trade as part of its Vision 2030 plan. These studies try to understand what the country is doing, how they're doing it, and what results they're seeing.

For example, one study looked at the petrochemical industry, which includes chemicals made from oil. It found that Saudi Arabia is now one of the top producers in the world, thanks to companies like SABIC and Aramco. The study used industry reports and data analysis to see how much this industry has grown and how many jobs it creates.

Another study focused on industrial cities like Jubail and Yanbu. Researchers talked to industry leaders and analyzed how these cities attract big factories and chemical plants. They found that these cities are very successful and help boost the local economy and create jobs.

There was also a study about small and medium-sized businesses (SMBs). They used surveys of business owners and banks to see how government programs like Musharakah help small companies get funding. The results showed that these programs are helping many small businesses grow and contribute to the economy.

Some research investigated Saudi Arabia's efforts to boost trade with other countries by signing new trade agreements and joining the World Trade Organization (WTO). Using trade data and

policy reviews, they found that these steps are opening new markets for Saudi exports and attracting foreign investments, which helps the economy grow.

Other studies examined how the country is focusing on sustainability and new technologies. They looked at projects like NEOM and the use of AI and robots in industries. The findings show that Saudi Arabia is making good progress in green energy and tech, which will help modernize its industries and make them more sustainable.

Finally, many reports summarized how all these efforts are paying off. They show that industry is making a bigger part of the economy, Saudi Arabia is becoming a key logistics hub for trade, and more jobs are being created. Overall, these studies show that Saudi Arabia's plans are working and helping the country grow in new and exciting way

Comparison of past studies and my research

In my review of previous studies, I looked at two reports. One was in English about the HVAC ductwork market in Saudi Arabia. The other was in Arabic and explained Saudi Arabia's plans under Vision 2030. Both reports say that industries in Saudi Arabia are growing quickly. They mention that new technology and government support are helping this growth. They also say that industries like petrochemicals and factories are expanding, creating more jobs and helping the economy. Both reports also talk about the importance of being eco-friendly and using new tech like AI and green energy, which are part of Saudi Arabia's future.

The main difference is that the first report talks only about the ductwork market, how big it is, how fast it grows, and the new tech used. The second report looks at the whole country and talks about big projects and overall development. My research is more focused. I want to study specifically how the ductwork manufacturing industry in Riyadh is affected by Vision 2030. I want to find out what problems local companies face and what new chances they have.

What makes my study different is that I'm looking closely at the local ductwork makers in Riyadh, not the whole country. I want to see how new policies, market changes, and projects are helping or hurting these companies. While the previous studies give a general idea of Saudi Arabia's growth, my research will focus on how Vision 2030 is changing the ductwork industry in Riyadh, including the challenges and opportunities for local businesses.

7 Research Methodology

7.1 Introduction

In this study, I am using a mix of different methods to get a complete picture of how Vision 2030 is affecting the ductwork manufacturing industry in Riyadh. I am combining two main approaches:

Descriptive approach: This involves collecting numbers and facts through surveys. The goal is to see how many people think in a certain way, what challenges they face, and what opportunities they see. It helps us understand what's happening overall.

Analytical approach: This involves talking to people more deeply through open questions and interviews. It helps us understand why people feel a certain way and what their experiences are like.

Both methods are used because each one gives different but useful information. The numbers show the big picture and patterns, while the conversations give us details and reasons behind those patterns. Using both makes the study stronger and helps us understand the topic better from different angles.

7.2 Research Design

The research employs a combination of methods, as shown in Figure 6. This study will study both numbers-based (quantitative) and words-based (qualitative) data. The numbers will show how people sense things, the challenges they face, and the opportunities available. The words will help us understand people's thoughts and feelings more deeply. Using both methods together makes studying stronger and more reliable.

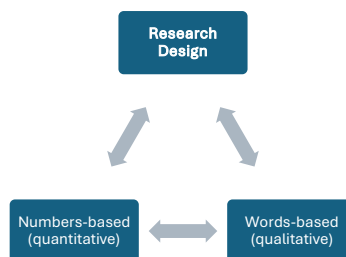


Figure 2: Research Design

7.2.1 Quantitative

Quantitative methods include collecting and analyzing numerical data. The method that will be used is a survey with questions that have ratings or multiple-choice answers, which will help us measure how many people share certain opinions, what challenges they face, and what opportunities they see. This method allows us to see patterns and generalize based on the numbers using SPSS.

7.2.2 Qualitative methods

This method focusses on collecting information through open-ended questions, interviews, or discussions. This helps us understand people's thoughts, feelings, and experiences more deeply. Instead of just numbers, we learn why people feel a certain way or what their specific challenges and ideas are.

7.3 Population of the study

Since 2023, the number of factories in Saudi Arabia went up by 10%, now totaling around 11,600. There are also 37 companies that focus on making HVAC ductwork. In Riyadh, there are about seven factories and companies that produce and supply duct systems. These factories come in all different sizes. Keep in mind, this info doesn't include workshops. (HVAC in Saudi Arabia, n.d.)

The Study was done to the following factories/Company names:

- 1- Arabian Thermal Aire Industries Company Limited (known as ATAI)
- 2- Safid Company,
- 3- Al Mabani Company
- 4- Technical duct Factory
- 5- Sharqawi Company.
- 6- ALAFCO
- 7- Zahra Duct Factory (known as ZDF)

The previous companies have different Organizational size in leading manufacturer& supplier of HVAC (Duct work and Duct accessories) in Riyadh Saudi Arabia. (ATAI, 2025) (SAFID, 2025) (Sharqawi, 2025) (Almabani Co, 2025)

7.4 Sample Characteristics

The sample will include participants representing various roles and organizational levels within the sector to ensure a comprehensive understanding. Characteristics include:

- Age range: 20-60 years
- Gender: Both male and female participants
- Education: From technical diplomas to advanced degrees
- Experience: Minimum of 1 year in the ductwork manufacturing industry
- Organizational size: Small, medium, and large enterprises
- Organization size
- Position
- Organizational level
- Industry Perspectives

7.5 Sample Size Determination

In Riyadh, there are 7 companies that make and sell duct systems. Each company has around 200-300 workers, with about 250 workers on average. About one-third of these workers are engineers. (HVAC in Saudi Arabia, n.d.). Each factory has 200-300 staff (250 as average) Note($1 \div 3$ of them are engineers) (The study did not cover the workshops)

$$7 \text{ Factories} \times \left(250 * \frac{1}{3} \right) = 584 \text{ Engineers in 9 Factoreis in Riyadh}$$

Based on Cochran's formula: $n_0 = (Z^2 \times p \times (1-p)) / e^2$

Where:

- $Z=1.96$ (for 95% confidence)
- $p=0.5$ (maximum variability)
- $e=0.05$ (margin of error)

Result:

We need about 232 people to get reliable results, with a 95% confidence level and a 5% margin of error, based on a total of 584 engineers. Basically, the study focuses on 7 companies (ATAI, Safid, Al Mabani, Technical Duct Factory, Sharqawi, ALAFCO, and ZDF), with 232 people participating. We randomly picked engineers working on construction projects in Riyadh to take part. The survey was turned into an online form using Google Drive, and we shared the link through social media apps.

We received 584 responses in total, but after checking and cleaning the data, 232 responses were valid and used for analysis. Since there are 584 engineers working in duct factories in Riyadh, according to HVAC Saudi Arabia, our minimum needed sample size is 232. So, we met and even exceeded our target with the responses we got.

The distribution of the sample based on demographic characteristics was as follows, as illustrated below:

Table 1: Demographic Information

Demographic Information	Perspectives	Number s	Percentage %
Gander	Male	201	86.64
	Female	31	13.36
	Total	232	100%
Age	25 - 30	27	0.12
	31 - 35	51	0.22
	36 - 40	59	0.25

	41 - 45	73	0.31
	46 - 50	15	0.06
	51 and more	7	0.03
	Total	232	100%
Degree	Technical Diploma	8	3.45
	Bachelor's Degree	183	78.88
	Master's Degree	35	15.09
	Doctorate or higher	6	2.59
	Total	232	100%
Years of Experience in Ductwork Manufacturing Industry:	1-2 years	25	10.78
	3-5 years	70	30.17
	6-10 years	106	45.69
	11+ years	31	13.36
	Total	232	100%
Employer/Organization	ATAI Co	48	20.69
	Safid Co	39	16.81
	Al Mabani Co	31	13.36
	Sharqawi Co	46	19.83
	Technical duct Factory	27	11.64
	ALAFCO	22	9.48
	ZDF	19	8.19
	Total	232	100%
Organizational Size:	Small (1-100 employees)	41	17.67
	Medium (101-200 employees)	58	25.00
	Large (201+ employees)	133	57.33
	Total	232	100%
Your current role within the organization:	Factory Production Engineers / Worker	73	31.47
	Factory Supervisor/Team Leader	27	11.64
	Factory Manager	7	3.02
	Factory Executive/Director	23	9.91
	Factory Sales	46	19.83
	Factory Technical Engineer	56	24.14
	Total	232	100%

To Sum up the above table:

- **Mostly Men:** About 87% of the people are men, and only around 13% are women.
- **Age Groups:** Most people are between 31 and 45 years old. Very few are younger than 30 or older than 50.
- **Education:** Most have a bachelor's degree. Some hold a master's degree, while some possess a technical diploma or a doctorate.
- **Work Experience:** Many people have been working in the industry for 3 to 10 years. Fewer have less than 2 years or more than 11 years of experience.
- **Where They Work:** The biggest companies are ATAI Co, Safid, and Sharqawi Co. Other companies have fewer workers.
- **Size of the Company:** Most workers work in large companies with over 200 employees. Some work in medium-sized companies, and a few are in small companies.
- **Jobs:** The largest group works as factory technicians or workers. Others are in sales, as supervisors or managers. Few are in top management roles.

In short, the workforce is mainly made up of experienced, middle-aged men working in larger companies, primarily in hands-on jobs such as manufacturing and supervision.

7.6 Processing and Statistical Tools Used:

We used many statistical methods and tools with the IBM SPSS version 25 software. These helped us check the goals of the study and answer the research questions. The main tools included:

1. Frequency and percentages to describe the sample, such as gender, age, education level, years of experience, workplace, and type of client.
2. Pearson's correlation coefficient to see if the tool used in the study was consistent internally.
3. Cronbach's Alpha to check if the tool was reliable and stable.
4. Calculating averages, standard deviations, scores, relative weights, levels, and rankings to answer the research questions.
5. ANOVA (Analysis of Variance) test to examine research hypotheses.

7.7 Data Collections procedures

To collect data and achieve the research objectives, the questionnaire was chosen as the main tool because of its ease of application, low cost, accuracy of results, and ability to gather diverse data. The questionnaire was also tested on a small sample of participants before being widely

distributed, to ensure its effectiveness and the reliability of the results. After collecting the data, the results were analyzed and processed using SPSS software (Zoubi, 2023)

7.8 Study Determinants

The research was conducted on a purposive sample of seven leading manufacturing companies specializing in ductwork and duct accessories, based in Riyadh, Saudi Arabia. This study aims to provide an in-depth analysis of the key challenges and opportunities facing the sector, as well as the strategic impacts of Saudi Arabia's Vision 2030 on ductwork manufacturing. By focusing on these prominent industry players, the research offers valuable insights into the sector's current dynamics, prospects, and alignment with national economic diversification goals, thereby contributing to a comprehensive understanding of the sector's transformative journey within the framework of Vision 2030.

7.9 Method of Analysis

Step One: The researcher challenged the main objective of the study, which is to identify the Challenges, opportunities, and the impacts of Vision 2030 on the Ductwork Manufacturing Sector in Riyadh, Saudi Arabia

Step Two: Identifying measurement areas for the research tool: The measurement areas for the research tool consisted of two parts:

A- Demographic characteristics (gender, age, educational level, years of experience, Employer/Organization, Organizational Size, and current role within the organization).

B- The impact of Vision 2030 on the Ductwork Manufacturing Sector, on the main points of the study, which are mentioned below:

- Production of ductwork factories level (5 Q&A)
- The share of ductwork factories in Saudi Arabia's market (5 Q&A)
- Increase the number of local factories. (5 Q&A)
- Revenue growth (5 Q&A)
- Innovation and adoption of new technologies (5 Q&A)
- Employment rates within the sector (5 Q&A)
- Quality standards that factories are complying with. (5 Q&A)
- Replace oil production growth with the industry's production growth. (5 Q&A)

Step Three: Formulating Preliminary Research Tool Statements. After identifying the survey areas, the statements were drafted by reviewing the theoretical framework and the tools used in

previous studies, including the current research. Each area's statements were formulated by the general definitions of the targeted survey domain.

Step Four: Scoring responses for the principal axes: Responses were graded using a five-point scale, strongly agree, agree, neutral, disagree, and strongly disagree, with scores assigned as follows: 5, 4, 3, 2, 1, respectively

Step Five: Formulating Instructions for the Research Tool: The survey instructions were drafted to inform the sample respondents about the purpose of the study tool, ensuring clarity of the statements and their suitability for the respondents' level of understanding. Additionally, the study variables' data were presented, with an emphasis on the confidentiality and privacy of the information provided.

Step Six: Finalizing the questionnaire in its final form and administering it to the targeted sample. This involved converting the questionnaire into an electronic format and then sending the electronic link (via Google Drive) to the target sample through either hard or soft copy.

7.10 Truth of the research tool's paragraphs.

7.10.1 Validity of the Research Tool (Judges' Validity):

The researcher showed the first version of the questionnaire to a group of experts. They reviewed it and gave their feedback. The researcher asked them if the questions accurately measure the goals, if the questions are clear, if each question fits with its topic, and if all important areas are covered. They also suggested some changes, like rephrasing, deleting, or adding questions. The researcher made the changes that most experts agreed on. As a result, the questionnaire was finalized and included in the appendices.

7.10.2 Internal Consistency

We checked if the questionnaire is reliable by measuring how well each question relates to its group. We used a simple method called Pearson's correlation. To do this, we tested it on 57 engineers working on building projects in Riyadh, Saudi Arabia. The results are shown on the table below.

Table 2: Pearson Correlation

Topic – Part	Perspectives NO	Pearson Correlation	The Topics	Perspectives NO	Pearson Correlation
Industry Perspectives - Part 1	1	.783**	Industry Perspectives - Part 2	1	.868**
	2	.760**		2	.811**
	3	.703**		3	.665**
	4	.744**		4	.703**
	5	.710**		5	.759**
	1	.803**		1	.840**

Industry Perspectives - Part 3	2	.754**	Industry Perspectives - Part 4	2	.798**	
	3	.605**		3	.697**	
	4	.680**		4	.738**	
	5	.727**		5	.749**	
Industry Perspectives - Part 5	1	.823**	Industry Perspectives - Part 6	1	.852**	
	2	.800**		2	.795**	
	3	.689**		3	.753**	
	4	.790**		4	.731**	
	5	.721**		5	.761**	
Industry Perspectives - Part 7	1	.899**	Projects (Site) - Perspectives - Part 1	1	.874**	
	2	.840**		2	.830**	
	3	.656**		3	.662**	
	4	.598**		4	.664**	
	5	.767**		5	.770**	
Projects (Site) - Perspectives - Part 2	1	.834**	Projects (Site) - Perspectives - Part 3	1	.872**	
	2	.803**		2	.810**	
	3	.660**		3	.662**	
	4	.742**		4	.719**	
	5	.739**		5	.757**	
Projects (Site) - Perspectives - Part 4	1	.855**				
	2	.792**				
	3	.702**				
	4	.715**				
	5	.798**				

The above table shows the Pearson correlation coefficients between each statement of the study axes and the total score for the axes. We find that all correlation coefficients between each statement and the score of the first axis are high and varied as shown in the table above.

This indicates that the study axes in the questionnaire possess internal consistency validity, and their statements are strongly correlated with the axes. Therefore, they effectively measure what they were designed to assess.

7.10.3 Reliability

To assess the reliability of our research tool, we calculated Cronbach's alpha using a sample of 60 engineers working on construction projects in Riyadh, Saudi Arabia. Overall Cronbach's alpha for the questionnaire was **0.90**, which indicates high internal consistency.

Generally, an alpha of 0.70 or above is considered acceptable. Since ours is way above that, we can be confident that the questionnaire is reliable, and the results are solid.

The results are shown on the table below.

Table 3: Reliability

Topic – Part	Perspectives NO	Alpha Cronbach	The Topics	Perspectives NO	Alpha Cronbach
Industry Perspectives - Part 1	1	0.787	Industry Perspectives - Part 2	1	0.814
	2			2	
	3			3	
	4			4	
	5			5	
Industry Perspectives - Part 3	1	0.74	Industry Perspectives - Part 4	1	0.815
	2			2	
	3			3	
	4			4	
	5			5	
Industry Perspectives - Part 5	1	0.813	Industry Perspectives - Part 6	1	0.83
	2			2	
	3			3	
	4			4	
	5			5	
Industry Perspectives - Part 7	1	0.81	Projects (Site) - Perspectives - Part 8	1	0.745
	2			2	
	3			3	
	4			4	
	5			5	
Projects (Site) - Perspectives - Part 9	1	0.803	Projects (Site) - Perspectives - Part 10	1	0.818
	2			2	
	3			3	
	4			4	
	5			5	
Projects (Site) - Perspectives - Part 11	1	0.825	Total Perspectives	55	
	2		Alpha Cronbach	0.9	
	3				
	4				
	5				

7.10.4 Correction standard:

The reason we do this correction is to find a clear and even way to group the responses. It makes it easier to analyze the data accurately because the scale points are spread out evenly. This helps us trust the results more.

The Likert five-point scale was used to evaluate the answers. To find the correct cell size, to determine the correct cell size we follow the below:

- 1- Deduct the difference between the limits ($3 - 2 = 1$)
- 2- Divide it on the No of the Cell ($2/3 = 0.66$)
- 3- Add it to the lowest value of limit

The table below shows the above practice to determine the cell size

Table 4: Correction standard:

The mean value	Result	Percentage of relative weight	Level (degree
From 1 - 1.66	Agree	67% to 100%	Very High
1.67 - 2.32	Neutral	34% to 66%	Medium
2.33 - 3	Disagree	0% to 33%	Low

Note: Agree = 1 - Neutral = 2 - Disagree = 3

8 Result

This chapter presents the results from the statistical analysis of the data collected through the questionnaire. It aims to answer the questions raised in the study. It also reviews the hypothesis testing. Additionally, it shows some findings and offers recommendations and suggestions.

8.1 Data Analysis

Using the figure below to study the mean, Standard Deviation & Range. The below figure shows that if the mean value from 1 to 1.80 the result will be strongly Agree, if the mean value from 1.181 to 2.60 the result will be Agree, if the mean value 2.61 to 3.40 the result will be Neutral, if the mean value is between 3.41 and 4.20 the result will be Disagree and if the mean value is between 4.21 and 5 the result will be Strongly disagree.

8.1.1 Industry Perspectives - Part 1: The share of Ductwork Factories in Saudi Arabia's Market

Table 5: The Mean and Standard Deviations of share of Ductwork Factories in Saudi Arabia's Market

Industry Perspectives - Part 1 The share of Ductwork Factories in Saudi Arabia’s Market								
Perspectives NO	Perspectives	The Scale	Agree	Neutral	Disagree	The Means	Standard Deviations	Result
1	The market share of local ductwork factories has significantly increased due to government support	Frequency (Repeat NO)	113	87	32	1.65	0.711	Agree
		Percentage in %	48.7	37.5	13.8			
2	International competitors continue to hold a larger portion of the market, limiting local factory growth.	Frequency (Repeat NO)	84	107	41	1.81	0.712	Neutral
		Percentage in %	36.2	46.1	17.7			
3	The rise of local factories has replaced imports, strengthening domestic manufacturing.	Frequency (Repeat NO)	146	71	15	1.44	0.614	Agree
		Percentage in %	62.9	30.6	6.5			
4	The share of local ductwork factories remains stable amid fluctuating global demand	Frequency (Repeat NO)	179	42	11	1.28	0.544	Agree
		Percentage in %	77.2	18.1	4.7			
5	Market dominance by local factories has led to better pricing and quality control.	Frequency (Repeat NO)	195	29	8	1.19	0.476	Agree
		Percentage in %	84.1	12.5	3.4			
Result of the Total Perspectives (Industry Perspectives - Part 1 The share of Ductwork Factories in Saudi Arabia’s Market)						1.47	0.454	Agree

Overall Result: Most people believe that government support is helping ductwork factories in Saudi Arabia grow. They think it's a good thing but aren't so sure that letting local factories control prices and quality would make things better. Overall, folks support the government's help but are a bit uncertain about giving more control to local companies.

From my point of view, Saudi Arabia Vision gives more projects to the market which lead to give more share of duct work factories in the market. Also, this action gives the chance to reduce work factories to improve the quality of the material since these projects are complying with internation standards. On the other hand, it will help to increase the capacity of production and give

8.1.2 Industry Perspectives - Part 2 Increase in the Number of Local Factories

Table 6: The Mean and Standard Deviations of Increase in the Number of Local Factories

Industry Perspectives - Part 2 Increase in the Number of Local Factories								
Perspectives NO	Perspectives	The Scale	Agree	Neutral	Disagree	The Means	Standard Deviations	Result
1	The number of local ductwork factories has significantly grown over the past five years.	Frequency (Repeat NO)	90	102	40	1.78	0.718	Neutral
		Percentage in %	38.8	44	17.2			
2	New factory establishments are declining due to market saturation.	Frequency (Repeat NO)	118	81	33	1.63	0.72	Agree
		Percentage in %	50.9	34.9	14.2			
3	Government incentives have played a key role in boosting factory numbers.	Frequency (Repeat NO)	142	81	9	1.43	0.569	Agree
		Percentage in %	61.2	34.9	3.9			
4	The increase in factories has led to more competitive pricing in the local market.	Frequency (Repeat NO)	164	61	7	1.32	0.529	Agree
		Percentage in %	70.7	26.3	3			
5	The overall number of factories has remained steady with little recent growth.	Frequency (Repeat NO)	191	37	4	1.19	0.438	Agree
		Percentage in %	82.3	15.9	1.7			
Result of the Total Perspectives (Industry Perspectives - Part 2 Increase in the Number of Local Factories)						1.48	0.458	Agree

This summary talks about what people think about the growth of local ductwork factories in Saudi Arabia over the last five years. Most people agree that government help has led to more factories opening. This idea got the highest average support score of 1.43, meaning many people agree with it. The least agreed idea is that the total number of factories has stayed the same with little recent growth, which had the lowest score of 1.19, so fewer people agree with that. On average, people agree with these ideas, but there are some differences in what they believe. In

simple words, most think the government has helped increase the number of factories, and fewer think the number has stayed the same. Overall, most opinions are similar, but some ideas are more popular than others.

In my opinion, increasing of local factories opens big chances for more job creation which means more factories more opportunities for local. Also, it will increase the economic growth of the market and increase production and sales. The above result also will affect the price of the product and there will be no monopolistic. Lastly, increasing the local factories develop the factories by encouraging innovation and improving the overall quality.

8.1.3 Industry Perspectives Part 3- Revenue Growth

Table 7: The Mean and Standard Deviations of Revenue Growth

Industry Perspectives Part 3- Revenue Growth								
Perspecti ves NO	Perspecti ves	The Scale	Agree	Neutral	Disagree	The Means	Standard Deviation s	Result
1	Revenue in the ductwork sector has significantly increased due to higher demand.	Frequency (Repeat NO)	115	88	29	1.63	0.697	Agree
		Percentage in %	49.6	37.9	12.5			
2	Manufacturers are experiencing a decline in revenue as competition intensifies.	Frequency (Repeat NO)	138	86	8	1.44	0.563	Agree
		Percentage in %	59.5	37.1	3.4			
3	Revenue growth is driven by large infrastructure projects across the country.	Frequency (Repeat NO)	86	112	34	1.78	0.685	Neutral
		Percentage in %	37.1	48.3	14.7			
4	Recent technological innovations have helped factories increase their revenue.	Frequency (Repeat NO)	191	37	4	1.19	0.438	Agree
		Percentage in %	82.3	15.9	1.7			
5	Revenue levels have remained stable with little recent change.	Frequency (Repeat NO)	205	25	2	1.13	0.357	Agree
		Percentage in %	88.4	10.8	9			
Result of the Total Perspectives (Industry Perspectives - Part 3- Revenue Growth)						1.43	0.394	Agree

Overall Result: Most experts think that revenue from ductwork companies has stayed steady or gone up a bit. Many believe demand and new technology help increase earnings. Some say competition causes losses, and others feel big projects don't strongly affect revenue. Overall, opinions are similar, with most agreeing that revenue is stable or slightly higher.

In my opinion, the reason ductwork companies are doing okay or even making a little more money is because there's more demand for things like ventilation and air conditioning, especially with cities growing and new buildings going up. Plus, companies have gotten better at making their products with new technology, which helps them save money and improve quality.

8.1.4 Industry Perspectives Part 4 Innovation and Adoption of New Technologies

Table 8: The Mean and Standard Deviations of Innovation and Adoption of New Technologies

Industry Perspectives Part 4 Innovation and Adoption of New Technologies								
Perspectives NO	Perspectives	The Scale	Agree	Neutral	Disagree	The Means	Standard Deviations	Result
1	Factories have significantly adopted new technologies to improve efficiency.	Frequency (Repeat NO)	115	83	34	1.65	0.723	Agree
		Percentage in %	49.6	35.8	14.7			
2	The industry has been slow to implement automation and digital tools.	Frequency (Repeat NO)	88	103	41	1.8	0.719	Neutral
		Percentage in %	37.9	44.4	17.7			
3	Innovation has led to better product quality and customer satisfaction.	Frequency (Repeat NO)	151	71	10	1.39	0.571	Agree
		Percentage in %	65.1	30.6	4.3			
4	Recent technological advancements have not significantly impacted manufacturing processes.	Frequency (Repeat NO)	172	51	9	1.3	0.536	Agree
		Percentage in %	74.1	22	2.9			
5	The industry is actively investing in new technologies to stay competitive.	Frequency (Repeat NO)	196	31	5	1.18	0.435	Agree
		Percentage in %	84.5	13.4	2.2			
Result of the Total Perspectives (Part 4 Innovation and Adoption of New Technologies)						1.46	0.46	Agree

Overall Result: Most people believe that the industry is investing in new technologies and that innovation helps make products better. Many also agree that factories have started using new tech to work more efficiently. However, when it comes to how fast the industry is adopting automation and digital tools, opinions are mixed, and a lot of folks stay neutral. Overall, people think the industry is actively using new technology, but some feel adoption is happening a bit slowly.

In my opinion, putting money into new tech and that innovation helps make products better. I also believe many factories are using new tools to be more efficient. But it might be happening a little slowly. So, it needs more time and more experts to use the new tools and techniques to improve the quality of materials.

8.1.5 Industry Perspectives Part 5 Employment Rates within the Sector

Table 9: The Mean and Standard Deviations of Employment Rates within the Sector

Industry Perspectives Part 5 Employment Rates within the Sector								
Perspectives NO	Perspectives	The Scale	Agree	Neutral	Disagree	The Means	Standard Deviations	Result
1	Employment in the ductwork industry has significantly increased due to sector growth.	Frequency (Repeat NO)	111	76	45	1.72	0.771	Neutral
		Percentage in %	47.8	32.8	19.4			
2	Job opportunities have declined as factories automate production lines.	Frequency (Repeat NO)	89	89	54	1.85	0.772	Neutral
		Percentage in %	38.4	38.4	23.3			
3	The sector has created many skilled jobs for Saudi nationals.	Frequency (Repeat NO)	129	89	14	1.5	0.61	Agree
		Percentage in %	55.6	38.4	6			
4	Employment levels have remained relatively stable over recent years.	Frequency (Repeat NO)	174	46	12	1.3	0.562	Agree
		Percentage in %	75	19.8	5.2			
5	The industry is facing challenges in attracting qualified workers.	Frequency (Repeat NO)	193	34	5	1.19	0.445	Agree
		Percentage in %	83.2	14.7	2.2			
Result of the Total Perspectives (Part 5 Employment Rates within the Sector)						1.51	0.487	Agree

Overall Result: Most people agree that attracting qualified workers is a major challenge for the industry. Fewer believe that employment has increased significantly due to sector growth. Overall, respondents see workforce attraction as a key issue, with moderate variation in opinions.

In my opinion, finding qualified workers is tough right now. There aren't enough skilled people available, and companies are having a hard time filling certain jobs with the right experience. Even though the industry is growing, it doesn't seem like there are a lot more jobs for skilled workers, maybe because of a skills gap or not enough training.

8.1.6 Industry Perspectives Part 6 Quality Standards Factories Are Complying With

Table 10: The Mean and Standard Deviations of Quality Standards Factories Are Complying With

Industry Perspectives Part 6 Quality Standards Factories Are Complying With								
Perspectives NO	Perspectives	The Scale	Agree	Neutral	Disagree	The Means	Standard Deviations	Result
1	Most factories are now complying with international quality standards like ISO.	Frequency (Repeat NO)	117	81	34	1.64	0.725	Agree
		Percentage in %	50.4	34.9	14.7			
2	Quality has decreased due to cost-cutting measures.	Frequency (Repeat NO)	167	59	6	1.41	0.603	Agree
		Percentage in %	72	25.4	2.6			
3	Strict adherence to quality standards has improved product durability.	Frequency (Repeat NO)	151	67	14	1.31	0.515	Agree
		Percentage in %	65.1	28.9	6			
4	Regulations on quality standards are becoming more stringent.	Frequency (Repeat NO)	84	108	40	181	0.708	Neutral
		Percentage in %	36.2	46.6	17.2			
5	Some factories are still struggling to meet international quality benchmarks.	Frequency (Repeat NO)	188	41	3	1.2	0.434	Agree
		Percentage in %	81	17.7	1.3			
Result of the Total Perspectives (Part 6 Quality Standards Factories Are Complying With)						47	0.468	Agree

Overall Result: industry professionals generally believe that most factories are complying with international quality standards, though concerns remain about a subset still working to meet these benchmarks. While adherence to quality standards is increasing, some differences in perception persist.

In my opinion, duct work factories have good quality that follow the international standards but still have more room for improvement and using different ways and methods to improve it. In my suggestion, duct work factories can use the chinees or Jaban experience and technologies to improve the quality of the material.

8.1.7 Industry Perspectives Part 7 Replacing Oil Production Growth with Industry's Production Growth

Table 11: The Mean and Standard Deviations of Replacing Oil Production Growth with Industry's Production Growth

Industry Perspectives Part 7 Replacing Oil Production Growth with Industry’s Production Growth								
Perspectives NO	Perspectives	The Scale	Agree	Neutral	Disagree	The Means	Standard Deviations	Result
1	Growth in manufacturing is significantly reducing dependence on oil revenues.	Frequency (Repeat NO)	88	107	37	1.7	0.729	Neutral
		Percentage in %	37.9	46.1	15.9			
2	Oil production remains the main contributor to Saudi Arabia’s economy despite industrial growth.	Frequency (Repeat NO)	79	113	40	1.83	0.698	Neutral
		Percentage in %	34.1	48.7	17.2			
3	The shift from oil to manufacturing is happening gradually but steadily.	Frequency (Repeat NO)	146	80	6	1.4	0.541	Agree
		Percentage in %	62.9	34.5	2.6			
4	Industrial growth has had little impact on oil sector revenues.	Frequency (Repeat NO)	148	78	6	1.39	0.539	Agree
		Percentage in %	63.8	33.6	2.6			
5	Diversification efforts are successfully replacing oil sector growth with industry expansion.	Frequency (Repeat NO)	185	43	4	1.22	0.455	Agree
		Percentage in %	79.7	18.5	1.7			
Result of the Total Perspectives (Part 7 Replacing Oil Production Growth with Industry’s Production Growth)						1.5	0.453	Agree

Overall Result: most people agree that efforts to replace oil are effective (opinion 5). However, people are less certain about whether oil remains the main part of the economy (opinion 2).

In my opinion, Oil dependence can be replaced with increased industrial production by strategic multi-accompanying approaches such as economic diversification where the government can focus on manufacturing, mining, logistics, tourism, and renewable energy. Invest in industries city to build a hug city that can increase the income of KSA. Also, by using natural resources, we can develop the raw material locally.

8.1.8 Projects (Site) - Perspectives - Part 1 Impact on Quality

Table 12: The Mean and Standard Deviations of Impact on Quality

Projects (Site) - Perspectives - Part 1 Impact on Quality								
Perspectives NO	Perspectives	The Scale	Agree	Neutral	Disagree	The Means	Standard Deviations	Result
1	The Vision 2030 has led to improvements in the quality of materials supplied for ductwork projects.	Frequency (Repeat NO)	145	79	8	1.41	0.559	Agree
		Percentage in %	62.5	34.1	3.4			
2	The focus on local manufacturing under Vision 2030 has positively affected the quality standards of deliveredmaterials.	Frequency (Repeat NO)	157	69	6	1.35	0.529	Agree
		Percentage in %	67.7	29.7	2.6			
3	The quality assurance processes for materials have improved.	Frequency (Repeat NO)	191	38	3	1.19	0.425	Agree
		Percentage in %	82.3	16.4	1.3			
4	The emphasis on sustainability and innovation in Vision 2030 has enhanced the quality of materials used in projects.	Frequency (Repeat NO)	82	115	35	1.66	0.728	Neutral
		Percentage in %	35.3	49.6	15.1			
5	The technological advancements promoted by Vision 2030 have improved the quality of materials used in ductwork projects.	Frequency (Repeat NO)	93	99	40	1.77	0.723	Neutral
		Percentage in %	40.1	42.7	17.2			
Result of the Total Perspectives (Projects (Site) - Perspectives - Part 1 Impact on Quality)						1.4	0.457	Agree

Overall Result: most people think that Vision 2030 has improved materials. However, they are less sure about how much local factories have contributed to making the materials better.

In my opinion, Vision 2030 has really helped improve the duct work factories in Saudi Arabia, especially in Riyadh. Because of the new standards and big projects, these factories had to step up their game to match international quality. Since the ongoing projects follow global standards, the factories had to find ways to improve their quality, whether that's using better technology or training their staff more. This has led to better materials being made locally, which is good for the whole construction scene

8.1.9 Projects (Site) - Perspectives - Part 2 Impact on Project Timeline

Table 13: The Mean and Standard Deviations of Impact on Project Timeline

Projects (Site) - Perspectives - Part 2 Impact on Project Timeline								
Perspectives NO	Perspectives	The Scale	Agree	Neutral	Disagree	The Means	Standard Deviations	Result
1	Vision 2030 has contributed to faster project completion times in ductwork manufacturing and installation.	Frequency (Repeat NO)	79	115	38	1.67	0.743	Neutral
		Percentage in %	49.6	34.1	16.4			
2	Since Vision 2030, I have experienced fewer delays in project timelines due to new policies and initiatives.	Frequency (Repeat NO)	90	98	44	1.8	0.735	Neutral
		Percentage in %	38.8	42.2	19			
3	The support for local manufacturing under Vision 2030 has reduced lead times for material delivery.	Frequency (Repeat NO)	134	86	12	1.47	0.595	Agree
		Percentage in %	57.8	37.1	5.2			
4	The frequency of project delays has decreased since the implementation of Vision 2030.	Frequency (Repeat NO)	177	47	8	1.27	0.518	Agree
		Percentage in %	76.3	20.3	3.4			
5	Vision 2030 has significantly influenced the scheduling and planning of ductwork projects in my experience.	Frequency (Repeat NO)	159	33	4	1.18	0.425	Agree
		Percentage in %	84.1	14.2	1.7			
Result of the Total Perspectives (Projects (Site) - Perspectives - Part 2 Impact on Project Timeline)						1.478	0.46	Agree

Overall Result: The responses suggest a consensus that Vision 2030 has positively impacted project timelines and material quality, especially by reducing delays and enhancing manufacturing support. Overall, the project perspectives lean strongly toward agreement that the initiative has been beneficial.

In my opinion, using new technologies and hiring more experts in the duct work factories really helps projects finish on time. New tech like automation and better tools make production faster and reduce mistakes. This means the ducts are made more quickly and of good quality.

Having experienced specialists on board also makes a big difference. They know how to solve problems early and ensure everything is done right the first time. This helps avoid delays and keeps things running smoothly.

8.1.10 Projects (Site) - Perspectives - Part 3 Impact on Project Cost

Table 14: The Mean and Standard Deviations of Impact on Project Cost

Projects (Site) - Perspectives - Part 3 Impact on Project Cost								
Perspectives NO	Perspectives	The Scale	Agree	Neutral	Disagree	The Means	Standard Deviations	Result
1	Vision 2030 has increased the overall costs of ductwork projects.	Frequency (Repeat NO)	119	82	31	1.62	0.711	Agree
		Percentage in %	51.3	35.3	13.4			
2	Policies introduced under Vision 2030 have affected the costs related to material procurement.	Frequency (Repeat NO)	134	88	10	1.47	0.58	Agree
		Percentage in %	57.8	37.9	4.3			
3	The promotion of local manufacturing under Vision 2030 has reduced material costs.	Frequency (Repeat NO)	91	103	38	1.77	0.711	Neutral
		Percentage in %	39.2	44.4	16.4			
4	The focus on quality and innovation driven by Vision 2030 has impacted project costs.	Frequency (Repeat NO)	166	58	8	1.32	0.536	Agree
		Percentage in %	71.6	25	3.4			
5	Vision 2030 has contributed to cost savings or overruns in my projects.	Frequency (Repeat NO)	191	36	5	1.2	0.45	Agree
		Percentage in %	82.3	15.5	2.2			
Result of the Total Perspectives (Projects (Site) - Perspectives - Part 3 Impact on Project Cost)						1.475	0.4612	Agree

Overall Result: The combined responses yield an **average score of 1.475** with a **standard deviation of 0.4612**, indicating a general agreement that Vision 2030 has impacted project costs positively or negatively.

In my opinion, as shown in the table above, the cost of the material decreased significantly since the new technologies entered the duct work factories. These technologies help to increase the quality and reduce the cost of the materials. In general, the project of 2030 and vision gives the support and advantages for the contractors by decreasing the cost of the materials following the international standards.

8.1.11 Projects (Site) - Perspectives - Part 4 Impact on Owner Satisfaction

Table 15: The Mean and Standard Deviations of Impact on Owner Satisfaction

Projects (Site) - Perspectives - Part 4 Impact on Owner Satisfaction								
Perspectives NO	Perspectives	The Scale	Agree	Neutral	Disagree	The Means	Standard Deviations	Result
1	The emphasis on quality and sustainability in Vision 2030 has increased owner satisfaction.	Frequency (Repeat NO)	115	81	36	1.66	0.733	Neutral
		Percentage in %	49.6	34.9	15.5			
2	Project owners perceive that Vision 2030 has positively impacted project outcomes.	Frequency (Repeat NO)	78	112	42	1.84	0.704	Neutral
		Percentage in %	33.6	48.3	18.1			
3	Owners are more satisfied with the durability and quality of ductwork materials since Vision 2030 initiatives started.	Frequency (Repeat NO)	151	70	11	1.4	0.579	Agree
		Percentage in %	65.1	30.2	4.7			
4	Transparency and communication with project owners have improved due to the initiatives under Vision 2030.	Frequency (Repeat NO)	167	56	9	1.32	0.544	Agree
		Percentage in %	72	24.1	3.9			
5	Vision 2030 has increased owner satisfaction in ductwork projects.	Frequency (Repeat NO)	194	31	7	1.19	0.467	Agree
		Percentage in %	83.6	13.4	3			
Results of the Total Perspectives (Projects (Site) - Perspectives - Part 4Impact on Owner Satisfaction)						1.482	0.47047	Agree

Overall Result: The combined responses yield an average score of 1.482 with a standard deviation of 0.47047, indicating a general agreement that Project (Site) – Perspectives – Part 4 has positively impacted owner satisfaction.

In my opinion, Vision 2030 has really helped owners be happier with their projects. By focusing on better quality and lowering costs, it makes sure that the materials used are good and the project doesn't go over budget. When owners see they're getting good quality at a fair price, they feel more confident and satisfied with the whole process.

So, overall, I believe the vision's focus on quality and cost savings has a big positive impact on owner satisfaction because it leads to better, more affordable results that owners can trust.

8.2 Recommendations and Suggestions

1. **Hire more Saudi workers** and focus on local talent to support Vision 2030 goals.
2. **Use new technology** like automation and smart machines to make better and faster ductwork.
3. **Work with other companies and organizations** to share ideas and improve products.
4. **Improve how materials are delivered** so products are made and sent on time, saving money.
5. **Make eco-friendly and sustainable products** that are good for the environment.
6. **Train workers regularly** so they have the skills needed for modern manufacturing.
7. **Use government support and programs** to help grow the business.
8. **Find new markets** inside and outside Saudi Arabia to sell more products.
9. **Plan your business** to match the goals of Vision 2030 for a stronger future.
10. **Keep checking market trends and rules** so your business stays updated and competitive.
11. **Enhance communication** and coordination among all stakeholders.
12. **Continuous monitoring** of project progress.
13. **Allocate sufficient time** to ensure quality and inspection to avoid errors and defects.
14. **Adherence to standards** and technical specifications to ensure the quality of the completed work.
15. **Working to enhance trust among all stakeholders** through transparency in project management.

8.3 Future Research that can Identify gaps and opportunities:

Given the limited time and scope of this study, I cannot dive deeply into every aspect of the ductwork manufacturing scene in Riyadh

The following aspects to provide a more comprehensive understanding of the industry and its dynamics that can contribute to this article:

- 1- Eco-friendly practices
- 2- Training programs
- 3- Export Opportunities
- 4- New Technologies from different countries such as China and Japan.
- 5- Supply chain management
- 6- Provide stakeholders
- 7- Product Development

9 References

- Abousaq, J. b. (2024, December 16). *National Committee for Industry: Challenges and Solutions to Support the Industrial Sector in Light of Saudi Vision 2030*. Retrieved from <https://alphabeta.argaam.com/article/detail/110846>
- Al-Ghamdi, A.-H. (2024, December 17). *Saudi Arabia's efforts in developing industry and commerce and their outcomes*. Retrieved from <https://www.almrsal.com/post/1457730>
- Almabani Co.* (2025). Retrieved from www.almabani.com
- Alotaibi, N. (2025, May 29). *Kingdom of Saudi Arabia Launches Next Phase of Industrial Revolution Under Vision 2030*. Retrieved from FOX4.
- ATAI.* (2025). Retrieved from <https://ataiksa.com/>
- HVAC in Saudi Arabia.* (n.d.). Retrieved from <https://ensun.io/search/hvac/saudi-arabia>
- SAFID.* (2025). Retrieved from <https://www.safid.com/>
- Saudi Arabia HVAC Ductwork Market Size. (2025). *Saudi Arabia HVAC Ductwork Market Size, Share, Trends and Forecast by Type, Shape, Application, and Region, 2025-2033*. Retrieved from <https://www.imarcgroup.com/saudi-arabia-hvac-ductwork-market>
- Sharqawi.* (2025). Retrieved from <https://www.sharqawi-co.com/>
- Thompson, S. K. ((2012). *Sampling (3rd ed.)*.
- Zoubi, F. A.-J. (2023). *The Impact of Applying Operations Management Practices on Construction Project Performance: A Case Study of the Housing Sector Investors Association in Jordan*. (Vol. 38). Jordan: F. A., Ras Ali Khalifa, and Al-Jughbir, Muhammad Ismail Muhammad. Retrieved from <http://search.mandumah.com/Record/1410351>