

Entrepreneurial Intention among Female Industrial Product Designers in Saudi Arabia: A Theory of Planned Behavior Perspective

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ABSTRACT

Entrepreneurship has gained significant attention across innovation, community development, and economic growth, particularly among creative and innovative organisations. However, its specific implications for industrial design, particularly regarding intention and behaviour, remain underexplored. This study focuses on understanding the attitudes, subjective norms, and perceived behavioural control as outlined in the Theory of Planned Behaviour (TPB) and their impact on entrepreneurship among young female designers in Saudi Arabia. To conduct this research, a cross-sectional survey design was utilised, targeting 311 young female designers. Participants were selected through convenience sampling, including both graduates and current students in the field. The survey was administered online, and a paper-based version was distributed to respondents in January and February 2025, enabling wider participation, increasing the response rate, broadening the survey's reach, and enhancing the generalizability of the results. The findings highlighted a significant influence of attitude and perceived behavioural control on the intention to engage in entrepreneurship. Interestingly, while participants showed strong entrepreneurial intentions, subjective norms did not appear to have a supportive role in this context. The results underline the psychological drivers that encourage young female designers to consider entrepreneurship but also point out how social support systems can be a barrier to realising these ambitions. Overall, this study sheds light on the entrepreneurial landscape for young female designers in Saudi Arabia, emphasising the importance of fostering a supportive environment that aligns with their entrepreneurial aspirations.

1. INTRODUCTION

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Empowering women in the economy is of great significance. With women's involvement in many sectors, opportunities expand, and the country's economic growth increases. The data from the Saudi Arabia General Authority of Statistics highlight a noteworthy trend in the country's economy between 2017 and 2022: the Gross Domestic Product (GDP) growth rate rose impressively from 3.7% to a projected 7.4%. This growth reflects a robust economic environment that is not only creating new business opportunities but also enhancing consumer power. It's encouraging to see such positive developments in the Saudi economy, indicating a promising future for businesses and consumers alike. Additionally, the World Bank reported in 2022 that the Saudi economy is moving away from dependence on the oil and gas sector, diversifying to generate income from sectors such as tourism, entertainment, and pilgrimage, and fostering creative environments for diverse businesses, including design firms and related fields. Furthermore, the General Authority of Statistics (GASTAT) shows that over 60% of the Saudi population is under 35, providing a tech-savvy consumer base and a large, growing market for innovative design products and services.

According to global rankings, women make up 67% of the Saudi population, compared to 55% for men. Saudi Arabia is the largest economy in the Middle East and North Africa (MENA). Meanwhile, creative industries and small business ventures are enhancing women's business performance. Vision 2030 highlighted that one of its key pillars is the engagement of women in the communication and professional sectors. Moreover, in Saudi Arabia, there has been a notable rise in the number of female entrepreneurs and business proprietors. In the realm of industrial and product design, specialised design education programmes have been established for female students since late 2014 to attract and retain skilled design talent. Saudi universities have worked to enhance design curricula and create programs that develop design skills and an entrepreneurial mindset among graduates. For instance, in Riyadh, Dammam, and Jeddah, design programs have been established that offer industrial product design courses and have successfully produced several cohorts from both public and private institutions. The growth in employment and freelancing within the creative industries and industrial product design sectors has led to increased business activity and opportunities. According to the Industrial Design Society of Saudi Arabia (IDSSA), there were 1,369 registered designers in 2022 (Ismail, 2022).

1.1 Entrepreneurship

Entrepreneurship is now the most important, combined with innovation, having a completely different impact on the global community. According to Pradhan et al. (2020), entrepreneurship is the foundation and backbone of the country's economy, a catalyst for change and development, particularly for developing countries. In developing countries, entrepreneurship is becoming a trend and a popular career choice among the current generation. Entrepreneurship was seen as a career for a certain community, but in fields such as engineering, architecture, or surveying, as a profession with social status, a different view, according to Nooh (2022). According to Anjum et al. (2022), Entrepreneurship is an initiative to create employment opportunities for individuals, and according to Jiatong et al. (2021), entrepreneurship has been shown to help develop nations by bolstering a country's economic well-being. Through its Vision 2030, the Kingdom of Saudi Arabia has positioned entrepreneurship as a key driver of its economic growth.

1.2 KSA Vision 2030

The detail pillar in Vision 2030 has identified that economic and educational factors play a role in a country's economic growth. Vision 2030 is designed around three themes: an ambitious nation, a thriving economy, and a vibrant society. According to statistics, one of Vision 2030's main targets is to reduce the unemployment rate. Vision 2030 aims to reduce the unemployment rate from 12.9% to 7% unemployment and to increase the contribution of the small and medium enterprises sector to 35% of GDP by 2030. While also generating six million additional jobs by the end of 2030.

1.3 Industrial Design

Industrial design is the field of design related to products and consumer services globally. Industrial design offers skills and knowledge to solve emerging problems and improve market presence and customer service. Industrial and

Product Design involve designing products and providing solutions. In the Saudi context, industrial design is monitored by the Minister of Culture, within the Architecture and Design division. However, industrial and product design also involve integrating visual design with culture and product innovation. According to Al Madani (2023), recognising the importance of protecting and promoting industrial designs as valuable intellectual property assets, and the role industrial design plays in shaping the aesthetic and functional aspects of products, influences consumer choice and market competitiveness. In addition, growing design in the past years. Industrial Design in Saudi Arabia was established around 2015, with the first program offering the course to females only in one public institution in Dammam. The first cohort was graduates in 2019, with 18 graduates. Currently, there are several batches of graduates, more than twenty per year, as a record.

1.5 Female Industrial Product Design Entrepreneurial Intentions

According to Nguyen et al. (2022), entrepreneurship is a career path chosen by individuals. It demands specific, involving attributes encompassing internal, external, contextual, and personal factors. As a result, not everyone will embark on their entrepreneurial journey Muhammad Fadhli, (2022) and Boahemaah et al. (2020) found that entrepreneurial education plays a crucial role in the journey, and positivity influences individuals' intentions to start their own ventures by equipping them with essential skills and confidence. According to Ajzen (1991), entrepreneurial intention is most influenced by an individual's attitude. In a study of female students from a design background in Saudi Arabia, the findings showed a positive correlation between the level of entrepreneurial intent and attitude toward entrepreneurship, perceived behavioural control, and social norms of entrepreneurial behaviour, as evidenced by Basaffar (2024). In light of previous studies and recommendations from Basaffar (2024), using the Theory of Planned Behavior in conducting descriptive research to understand and interpret individuals' behaviours and their intention to modify their behaviour, the study focuses on female designers addressing the underrepresentation of females in entrepreneurship, particularly in the industrial design and product design fields. Understanding female designers' entrepreneurial attitudes and the role of the internet is crucial for promoting gender diversity in entrepreneurship. The research is conducted in the context of industrial design education. This is important as it explores the link between academic disciplines (industrial design) and entrepreneurial attitudes. Insight from this study can inform educational institutions on how to foster an entrepreneurial mindset among female industrial product design students.

- i. To identify the influence of attitude on entrepreneurial intention among female industrial product designers in the Saudi context.
- ii. To identify the influence of subjective norms on entrepreneurial intention among female industrial product designers in the Saudi context
- iii. To identify the influence of perceived behavioural control on entrepreneurial intention among female industrial product designers in the Saudi context.

2. LITERATURE REVIEW

2.1 Theory of Planned Behavior (TPB)

The TPB is an extension of the Theory of Reasoned Action (TRA). This theory is commonly used in behavioural and psychological research. For example, studies by Aloulou (2017), determinant factors that affect intentions of final year Saudi business students to become entrepreneurs, Guo et al. (2022) investigate female students' entrepreneurship intention in the UK and Pakistan, and a study by Sadat A and Lin M (2020) to find factors that influence student entrepreneurial intention used theory. The theory of Planned Behaviour includes variables that explain an individual's intention, which in turn predicts behaviour. Predicting behavioural intention: namely, the first attitude, subjective norms, and perceived behavioural control. Furthermore, TRA explains that a person's intention to engage in a behaviour is formed by two main factors: attitude towards the behaviour and subjective norms (Ajzen & Fishbein, 2000). In contrast, TPB adds one more factor: perceived behavioural control (Ajzen, 1991). TPB is well-suited to explain various entrepreneurial behaviours.

The predicting attitude is a factor that determines whether a person learns to respond positively or negatively to evaluations of things in their surroundings. Ajzen, (1991) suggested that attitude toward behaviour refers to the degree to which a person has a favourable or unfavourable evaluation of a behaviour, and that it depends on the individual's assessment of the expected behavioural outcomes. For example, if someone believes entrepreneurship is beneficial, they will respond positively; if they believe it is not, they will respond negatively. A subjective norm is a person's perception of others' thoughts about whether they will support or oppose doing something (Ajzen, 1991). Essentially, it implies the gravity of social pressure imposed on individuals to fulfil or refrain from certain actions. An individual is more likely to engage in a behaviour if they are motivated by others who share the same intention. Finally, perceived behavioural control refers to the perceived ease or difficulty of performing a behaviour (Ajzen, 1991). In entrepreneurship, perceived behavioural control is associated with beliefs about accessible support and resources, as well as perceived barriers that impede the ability to perform entrepreneurial behaviour. Consequently, it can be assumed that perceived behavioural control can be assumed as the barometer of an individual's ability and efficacy.

2.2 Entrepreneurial Intention

Entrepreneurial intention is a state of mind that influences an individual's ambitions, desires, and goals, ultimately shaping their decision to become an entrepreneur (Al-Mamary et al. 2020). The characteristics of entrepreneurs include hard work, optimism, a strong work ethic, motivation, the ability to organise ideas, responsibility, a profit orientation, and quality (Hassan et al. 2024). The results of Margaça et al. (2021), and Mohd Noor and Malek (2021) also show that attitude, personal characteristics, family, entrepreneurial curriculum and content, and the role of the university are significant in influencing students' entrepreneurial intentions.

2.3 Attitude

Behaviour and intentions are considered the underlying elements that shape attitude in entrepreneurship. A positive attitude can enhance motivation and relationships, while the opposite can lead to poor outcomes, significantly influencing decisions and actions. Studies by Ibrahim & Afifi (2018) and Ambad & Damit (2016) indicate that if a person perceives entrepreneurship as a profitable career, they will develop a positive attitude towards it. A student with a favourable, optimistic attitude is likely to develop a strong entrepreneurial intention. This heightened intention can drive the student to actively engage in entrepreneurial activities, fostering both personal growth and contributions to innovative ventures. However, Amentie and Negash (2014) found that different female students have varying entrepreneurial attitudes, influenced by multiple factors that shape their inclination to engage in entrepreneurship. Zanabazar and Jigjiddorj (2020) stressed that an individual's attitudes can be affected by outcomes, personality, characteristics, and skills. They identified that when female university students avoided taking risks, they would not venture into entrepreneurship. There are also challenges and barriers that even male entrepreneurs find overwhelming. Studies have indicated that attitudes are critical to entrepreneurial intentions (Krueger et al., 2000). Positive attitudes towards entrepreneurship often translate into entrepreneurial action. According to Fayolle et al. (2006), exposure to entrepreneurial concepts and role models can positively influence students' choices, further supporting the authors' conjecture regarding the first hypothesis.

H1: There is a relationship between attitudes and female industrial product designers' entrepreneurial intentions.

2.4 Subjective Norms

Ajzen (1991) established that the subjective norm is an individual's perception of the thoughts of others who will or will not support them. Hence, it is also viewed as the social pressure a person feels when deciding whether to perform a behaviour. It influences an individual's decision because they need to feel motivated by others, especially those who share the same intention. According to Fishbein and Ajzen (1975), these perceptions are subjective in nature, and this factor is termed a subjective norm. Studies by Gou et al. (2022) and Chin et al. (2024) revealed a significant positive correlation

between SN and entrepreneurial intention. Nevertheless, Karimi (2020) and Alzamer et al. (2020) found that subjective norms have a significantly negative relationship with entrepreneurial intention, particularly in the context of Saudi Arabia. Other scholars have also highlighted positive and significant relations between SN and EI (Mahmood et al., 2019; Li et al., 2020; Al-Jubari, 2019; Al-Jubari et al., 2019; Ahmed et al., 2020; Yarimoglu & Gunay, 2020; Shi et al., 2020). Grounded by the aforementioned rationale, the authors proposed the second hypothesis.

H2: There is a relationship between subjective norms and female industrial product designers' entrepreneurial intentions.

2.5 Perceived Behavioral Control

Perceived behavioural control refers to the likelihood of successfully performing a specific task. Ajzen (1991) defined perceived behavioural control as the perceived ease or difficulty of performing a behaviour. Additionally, perceived behaviour control also refers to the extent to which individuals perceive factors that facilitate or complicate their actions. The theory of planned behaviour, developed by Ajzen in 1991, builds upon the earlier theory of reasoned action by introducing the concept of perceived behavioural control (PBC). This model suggests that PBC, in combination with behavioural intention, can effectively predict an individual's success in a specific area. By understanding both intentions and the perceived ability to act, studies can gain better insights into how likely individuals are to achieve their goals. The current study by Majeed et al. (2020), Karimi (2020), Shi et al. (2020), and Amofah et al. (2024) indicated that perceived behavioural control strongly influenced entrepreneurial intention. According to the literature mentioned above, the following hypotheses can be posited:

H3: There is a relationship between perceived behavioural control and female industrial product designers' entrepreneurial intentions.

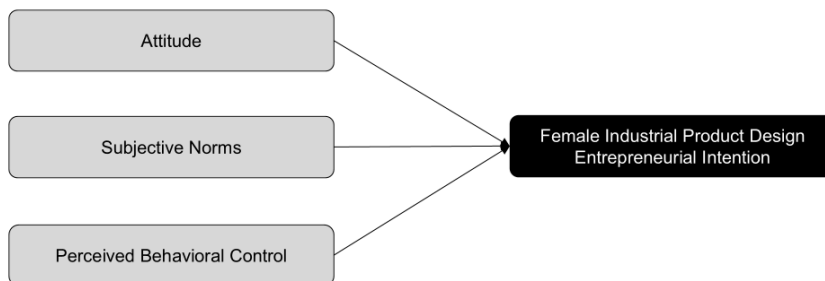


Fig.1. Conceptual Framework

3.0 METHODOLOGY

To test the proposed hypotheses, this research utilised a quantitative approach. Data were gathered from young female designers and students in Saudi Arabia through an online and paper questionnaire. The data collection spanned over two months, from January to February 2025. Participants were contacted both online and in person. Prior to data collection, participants provided consent on the first page of the survey cover. The choice of Saudi Arabia for this study is due to its large population, estimated at 34,200,000 in 2023. Saudi Arabia's geographic position provides significant access to major trade routes, enhancing its geopolitical relevance in both regional and global contexts. The focus of this study was on Riyadh, Dammam, and Jeddah because of the dynamic entrepreneurial activities and creative programs underway, as well as the greater involvement of women in business. Riyadh, the capital of the Kingdom of Saudi Arabia, is home to a product design program at a public university. Dammam, known for its urban lifestyle and industrial city experience, drives consumer demand in the Eastern Province, facilitating entrepreneurial activities; it also introduced the first female

industrial design program in this sector. Lastly, Jeddah's strategic position in the West Region, situated between Mecca and Medina, provides opportunities for business growth and cultural richness and serves as a gateway for international engagement in Saudi Arabia. Additionally, private institutions offer industrial product design programs to both men and women. Overall, 311 questionnaires were completed, with 6 responses excluded for missing data or incomplete answers. The response rate 82% with no significant non-response bias. The sample size is considered adequate, ranging from 30 to 500, as supported by Hair et al. (2010).

Table 1. Response Rate

	Number of questionnaires	Percentage (%)
Total questionnaires distributed	378	100
Completed questionnaire answered	311	82.0
Unusable questionnaire	6	1.6
Not Returned	61	16.1

3.1 Measures and Statistical Methods

The present study measured the following four latent variables using 18 questions. Attitude was assessed using four questions, subjective norms using three, perceived behavioural control using five, and entrepreneurial intentions using six. All were adapted from Linan et al. (2013). The authors used a standardised 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Table 2. Measurement Items

Variable	Items	CA
Female Industrial Product Design Entrepreneurial Intention (FEMIDE) Adapted: Liñán, et al., 2013	1. FEM1- I am ready to be an industrial product design entrepreneur	0.803
	2. FEM2- I will make every effort to start my own business	
	3. FEM3- I am determined to create a business venture in the future	
	4. FEM4- My professional goal is to be a female designer entrepreneur	
	5. FEM5- I intend to become an entrepreneur in the future	
	6. FEM6- I have seriously thought about starting a business venture	
Attitude Adapted: Liñán, et al., 2013	1. AT1- A career as an entrepreneur is attractive to me	0.745
	2. AT2- Being an entrepreneur would entail great satisfaction for me	
	3. AT3- Among various options, I would rather be an entrepreneur	
	4. AT4- If I had the opportunity and resources, I would like to start a business	
Subjective Norms Adapted: Liñán, et al., 2013	1. SNM1- My immediate family would approve of my decision to start a business	0.828
	2. SNM2- My friends would approve of my decision to start a business	
	3. SNM3- My colleagues would approve of my decision to start a business	
Perceived Behavioral Control Adapted: Liñán, et al., 2013	1. PBC1- To start a business and keep it working would be easy for me	0.830
	2. PBC2- I am prepared to start a viable business	
	3. PBC 3- I can control the creation process of the new business	
	4. PBC4- I know the necessary practical details to start a business	
	5. PBC5- If I tried to start a business, I would have a high probability of succeeding	

A partial least squares based on structural equation modelling is used to analyse the hypotheses and to validate the measurements, and the computer version 4.0 of Smart PLS software was selected for this purpose (Ringle et al., 2024) and structural model, as it does not require normality assumption and survey research is not normally distributed (Chin et al., 2003). Since data were collected from a single source, we first assessed the issue of Common Method Bias by following the suggestions of (Kock, 2015) by testing for full collinearity. In this method, all variables are regressed on a common variable, and if the $VIF \leq 3.3$, there is no bias from the single-source data. The analysis yielded a VIF less than 3.3; thus, single-source bias is not a serious issue with our data. The following are three main reasons why PLS should be used: a) The goal of this study is to forecast the dependent variables; b) the sample size ($n=311$) is good, and according to Reinartz et al. (2009), PLS can be used if the number of responses is less than 250; c) the model is complex in terms of both variable type and their relationship (Hair et al., 2011).

4. ANALYSIS AND RESULTS

4.1 Sample demographic Information

The demographic profile of the sample shows that all participants were female, with ages ranging from 18 to 30 years. Specifically, 46.3% fell within the 18 to 20 age range, 34.7% were between 21 and 22, 13.2% were 23 to 25 years old, 14.5% were 26 to 27, and 1.3% were aged 28 to 30. Regarding marital status, 91.3% of respondents reported being unmarried, while 8.7% were married. Regarding education, 87% of respondents were enrolled in graduate programs, and 13% had completed their programs. The area of residence was 69 % from the urban area, Township was 26.7%, and rural area 3.5%. Lastly, the study locations included 45% from Dammam, 51.8% from Riyadh, and 2.6% from Jeddah.

Table 3. Demographic Profile of Respondents

Variables	Category	N	%
Gender	Female	311	100
Age	18-20	144	46.3
	21-22	108	34.7
	23-25	41	13.2
	26-27	14	4.5
	28-30	4	1.3
Status	Unmarried	284	91.3
	Married	27	8.7
Place of Study	Dammam	141	45.3
	Riyadh	161	51.8
	Jeddah	8	2.6
	Other	1	0.3
Education Level	2 nd year level	133	42.8
	3 rd year level	77	24.8
	4 th year level	39	12.5
	5 th year level	24	7.7
	Graduated	38	12.2
Area of Residence	Suburb (Urban)	217	69.8
	Township	83	26.7
	Village (Rural Area)	11	3.5
Would you like to own a business in the foreseeable future?	Yes	121	89.1
	No	190	10.9
Have you previously started a business?	Yes	100	32.2
	No	211	67.8

4.2 Normality Test

In this study, the normality of the data was examined using Kurtosis and Skewness. Skewness reveals how the distribution of a variable's data is skewed (either to the left or to the right). Kurtosis, however, reveals how tall or steep the distribution of detailed data is. The table below shows the skewness and kurtosis results.

Table 4. Normality Test

	Mean	Std.Dev.	Excess kurtosis	Skewness
Attitude	4.159	0.812	1.708	-1.265
FEMIDE	4.168	0.726	0.410	-0.806
Perceived Behavioural Control	3.374	0.829	-0.469	0.120
Subjective Norms	4.507	0.705	5.652	-2.055

Table 5. Full Collinearity Testing

Variable	ATT	SNM	PBC	FEMIDE
VIF	1.553	1.175	1.457	1.717

Note: ATT = Attitude, SNM = Subjective Norm, PBC = Perceived Behavioral Control, FEMIDE = Female Industrial Product Design Entrepreneurial Intention

The study followed the suggestions of Anderson and Gerbing (1988) to test the model developed using a 2-step approach. First, we tested the measurement model to assess the validity and reliability of the instruments used, following the guidelines of Hair et al. (2022) and Ramayah et al. (2018). Then we ran the structural model to test the hypothesis we developed. For the measurement model, we assessed the loadings, average variance extracted (AVE), and the composite reliability (CR). The values of loadings should be ≥ 0.5 , the AVE should be ≥ 0.5 , and the CR should be ≥ 0.7 . As shown in Table 3, the AVEs are all higher than 0.5, and the CRs are all higher than 0.7. The loadings were also acceptable, with only 1 or 2 loadings below 0.708 (Hair et al., 2022). Since we have 4 constructs, the order is 1. Attitude, 2. Subjective Norms, 3. Perceived Behavioural Control and 4. Female Industrial Product Design Entrepreneurial Intention. valid and reliable. Then, in step 2, the study assessed the discriminant validity using the HTMT criterion suggested by Henseler et al. (2015) and updated by (Franke & Marko, 2019) The HTMT values should be ≤ 0.85 (the stricter criterion), and the lenient criterion is ≤ 0.90 . As shown in Table 7, the HTMT values were all below the stricter criterion of ≤ 0.85 ; thus, we can conclude that the respondents understood that the four constructs are distinct. Taken together, these two validity tests have shown that the measurement items are valid and reliable.

Table 6. Measurement Model for the Order Constructs

Constructs	Items	Loadings	AVE	CR
Attitude	AT1	0.846	0.718	0.910
	AT2	0.896		
	AT3	0.858		
	AT4	0.787		
Subjective Norms	SNM1	0.814	0.714	0.882
	SNM2	0.876		
	SNM3	0.844		
Perceived Behavioral Control	PBC1	0.756	0.584	0.875
	PBC2	0.810		
	PBC3	0.838		
	PBC4	0.687		
	PBC5	0.719		
FEMIDE Intention	FEM1	0.730	0.648	0.846
	FEM2	0.817		
	FEM3	0.752		
	FEM4	0.771		
	FEM5	0.740		
	FEM6	0.693		

Table 7. Discriminant Validity (HTMT Ratio)

Variable	1	2	3	4
1. Attitude				
2. FEMIDE	0.628			
3. Perceived Behavioural Control	0.488	0.568		
4. Subjective Norms	0.357	0.377	0.386	

4.3 Structural Model

As suggested by Hair et al. (2022) and Cain et al. (2017), we assessed the multivariate skewness and kurtosis. The results showed that the data we have collected were not multivariate normal, Mardia's multivariate skewness ($\beta = 8.06$, $p < 0.01$) and Mardia's multivariate kurtosis ($\beta = 39.609$, $p < 0.01$), thus following the suggestions of Becker et al. (2023), we reported the path coefficients, the standard errors, t-values, and p-values for the structural model using a 10,000-sample re-sample bootstrapping procedure (Ramayah et al. 2018). Also, based on the criticism by Hahn and Ang (2017) that p-values are not a good criterion for testing the significance of a hypothesis, they suggested using a combination of criteria, including p-values, confidence intervals, and effect sizes. Table 5 summarises the criteria we used to test the developed hypotheses.

First, we tested the effect of the 3 predictors on FEMIDE; the R^2 was 0.418, indicating that all 3 predictors explained 41.8% of the variance in FEMIDE. Attitude ($\beta = 0.404$, $p < 0.01$), Subjective Norms ($\beta = 0.093$, $p < 0.01$), and Perceived Behavioural Control ($\beta = 0.311$, $p < 0.01$) were positively related to FEMIDE; thus, H1 and H3 were supported, and H2 was not supported.

Table 8. Path Analysis

Hypothesis	Direct Paths	Path coefficient	t-values	Decision
H1	Attitude $\rightarrow$ FEMIDE	0.404	7.270	Hypothesis Supported
H2	Subjective Norms $\rightarrow$ FEMIDE	0.093	1.212	Hypothesis Not supported
H3	Perceived Behavioral Control $\rightarrow$ FEMIDE	0.311	6.044	Hypothesis Supported

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.000$ | n.s $\Rightarrow$ not significance path coefficient $\Rightarrow$ standardized beta | t value $= > 1.96$

Table 9. Hypothesis Testing Direct Effects

Hypothesis	Direct Paths	p-values	f ²	Decision
H1	Attitude $\rightarrow$ FEMIDE	0.000	0.220	Medium
H2	Subjective Norms $\rightarrow$ FEMIDE	0.113	0.013	No effect
H3	Perceived Behavioural Control $\rightarrow$ FEMIDE	0.000	0.128	Medium

Note value: 0.02 = Small, 0.15 = Medium, 0.35 = Large

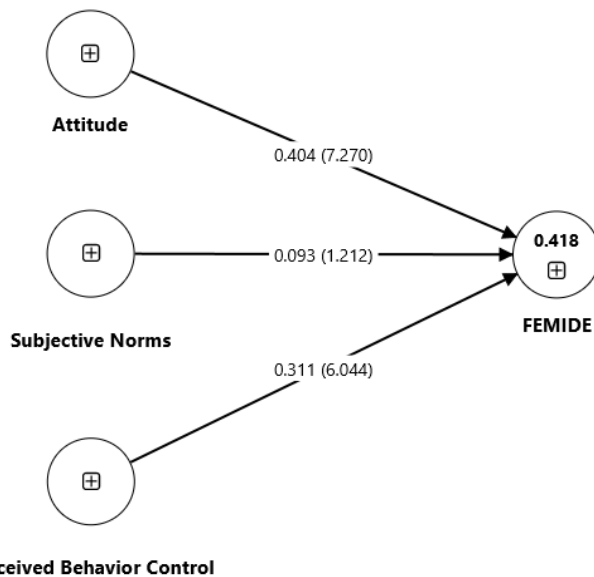


Fig. 2. Structural Model of Attitude, Subjective Norm, and Perceived Behavioural Control.

5. DISCUSSION

The presented hypotheses were tested using a bootstrapping approach to assess the significance of relationships among the study's constructs. As findings show in Tables 8 and 9. Only two hypotheses out of three were found to be significant and supported, while one path revealed insignificant results. In sequence, each path has been discussed, compared with previous studies, and its rationale has been provided in the Saudi Arabian context and in the field of industrial product design. The initial findings revealed two hypotheses: female industrial product design entrepreneurial intentions and attitudes, and perceived behavioural control. These results have been supported by previous studies. H1 states that Attitude shows a positive and significant result, and recent investigations support these findings, for example, Karimi (2020). The result of the influence of attitude on FEMIDE indicates that a positive attitude to starting a business can lead an individual or person to have a positive perception of business creation. These findings are consistent with early studies, such as those of Otache et al., (2019).

H3 related to Perceived Behavioural Control and FEMIDE. Table 8 demonstrates a positive, significant effect. PBC refers to an individual's or person's belief in the presence or absence of capabilities and resources required for performing a given task. Those who start a new business are more likely to act with conviction and become successful design entrepreneurs. Recent support studies and investigations by Amofah et al., (2024), Majeed et al., (2020), Karimi (2020), Al Jubari et al. (2019), and Shi et al. (2020). The relatively moderate path coefficient between Perceived Behavioural Control and FEMIDE suggests that respondents' beliefs about their abilities and confidence should be strengthened during their professional education and work. Subjective Norms, which stands for subjective norm, has demonstrated a negative impact and is not well-supported by Alzamer et al. (2020). The authors suggest that the insignificant results stem from a lack of positive recommendations from close individuals, such as family, friends, and colleagues, which affects one's intention to start a business. This contrasts with certain studies in the Saudi context, where a strong connection to influential others was highlighted by Al Jubari (2019) and Aloulou (2017). The study results can serve as a reference for other researchers interested in the field of behavior-intention entrepreneurship, who may continue their studies in the same field or related fields such as entrepreneurship or business.

5.1 Implication

The findings of this study indicate significant and insignificant differences between the core constructs of the TPB and Female Industrial Product Design Entrepreneurial Intention. Additionally, strongly recommend that industrial design product programs be oriented more toward fostering an entrepreneurial mindset. The results indicate that the attitude toward FEMIDE significantly influences the attitude toward industrial design education. This suggests that designers or practitioners should expand action-oriented approaches in industrial design education by integrating entrepreneurial and business elements to foster positive beliefs and mindsets in students and designers for starting their own businesses upon completing their studies. For example, the institution should consider integrating the entrepreneurship and business course at an early stage, either in short or long formats, to encourage positive beliefs about becoming designer entrepreneurs. Such courses might offer practical side learning and innovative real-world scenarios and represent an involved design project commercialized to pitch concepts to consumers. With this trend of technology and innovation, this course will motivate smart, encouraging intentions among freelancers and practitioners in the design field to start new ventures, small enterprises, and businesses. A weak, significant effect for subjective norm indicates that respondents should boost their confidence and intention through exposure and by referring to society. Society refers to family, friends, and close relatives. The low awareness and the tendency to think entrepreneurship is less important because of the insignificance of the results. Additionally, the factor of demographics that is most responsible is the undergraduate level, which is less and is influenced by family and peers to have references in choosing and pursuing becoming a designer entrepreneur or not.

5.2 Limitations And Future Research Directions

The present study provided insight into the entrepreneurial intention of female designers in the fields of product and industrial design, a population that has been rarely studied. This research has certain limitations. The first limitation is the selection of female designers who have graduated from industrial or product design programs at any institution in Saudi Arabia. Future studies could consider samples from other design fields such as art design, fashion, interior design, and others to reflect diverse backgrounds from public or private institutions inside local context with different cities. Additionally, future research should include data comparisons between the context of Saudi Arabia and other regions in the MENA on the large population of industrial product design respondents across regions for broader generalization of results. Secondly, this quantitative survey-based research explored the key elements of the Theory of Planned Behavior (TPB). The third, a qualitative study to explore in depth how family and peer-friend contextual factors and environmental factors affect the entrepreneurial intention of industrial product design students and young designers in the Saudi Arabian context, is recommended. The research model was found to be most effective when incorporating other factors, such as environmental considerations and design-related technical aspects.

6. CONCLUSION

Industrial product designers in Saudi Arabia have a significant effect on entrepreneurial intentions. Integration of real-life projects and collaboration. More interaction and exposure could help their intentions. Understanding these factors may help policymakers to provide a favorable environment to encourage entrepreneurship, starting a business, or a design firm.

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CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts, and declare the absence of conflicting interests with the funders.

AUTHORS' CONTRIBUTIONS

Nur Fadhilah Mohd Omar: conceptualization, methodology, investigation data curation and analysis, writing, and editing. **Wan Noor Faaizah Wan Omar:** Supervision and validation. **Hema Zulaikha Hashim.** Supervision and validation. **Azyyati Anuar:** Supervision and validation.

DECLARATION OF GENERATIVE AI IN THE WRITING PROCESS

During the preparation for submission of this work, the authors used Grammarly to improve the readability, grammatical accuracy, and language quality of selected parts of the manuscripts. After using the tool, the authors reviewed and edited, and took full responsibility for the accuracy, originality, integrity, and final content of the publication.

DATA AVAILABILITY/SUPPLEMENTARY MATERIALS

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

ETHICS STATEMENT

This study was reviewed and approved by the Institutional Ethics Committee of [University Teknologi MARA] (Approval No: REC/12/2024 (PG/MR/616). All procedures involving human participants/animal subjects were conducted in accordance with the ethical standards of the 1964 Declaration of Helsinki. Informed consent was obtained from all participants, and data anonymity was strictly maintained throughout the study.

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