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DIGITALIZATION AND ENTREPRENEURSHIP AWARENESS AMONG THE HIGHER EDUCATION STUDENTS IN SAUDI ARABIA

Jayashree Hareesh [(a)1] *Yousef Falah E Albalawi* [(b)]

[(a)] *Assistant Professor, College of Business and Management, Fahad Bin Sultan University, Tabuk, Saudi Arabia; E-mail: Jayashree@fbsu.edu.sa*
[(b)] *Student, College of Business and Management, Fahad Bin Sultan University, Tabuk, Saudi Arabia; E-mail: yousef34ope@gmail.com*

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ABSTRACT

Digitalization and the expansion of information and communication technology (ICT) are reshaping marketing and commerce, but the extent to which Saudi higher-education students understand digital entrepreneurship, digital marketing, and e-commerce remains underdocumented. This study examines digitalization and entrepreneurship awareness among students in Saudi Arabia. A mixed-method design was used, combining an online questionnaire survey of 122 undergraduate and postgraduate students from disciplines with focus-group discussions (focus-group size, procedures, and timing unspecified); the survey sample was 53.3% male and 46.7% female, and ages were <20 (47.5%), 20–22 (33.6%), 23–25 (6.6%), and >25 (12.3%). Quantitative analyses included summaries, independent-samples t tests, one-way ANOVA, correlations, and hierarchical regression (study period unspecified). The results show that 64% of students reported moderate awareness of digital marketing tools and e-commerce platforms, 23% high awareness, and 13% low awareness. General awareness scores were similar by gender (male M=16.68, SD=7.20; female M=15.61, SD=6.61; t(120)=0.845, p=0.400) and age (F(3,118)=1.311, p=0.274) but differed by field of study (F(4,117)=3.340, p=0.013), with higher means in management (M=18.86, SD=6.57) and science (M=17.81, SD=7.08) than in arts (M=13.20, SD=8.50). Field differences were also observed for channel awareness (F(4,117)=2.452, p=0.050) and operational awareness (F(4,117)=2.620, p=0.038). Awareness dimensions were strongly interrelated (r=0.825–0.851, all p<0.01). In regression, demographic/academic variables explained R^2=0.097 (F=1.750, p=0.104), with a management effect in Model 1 (B=5.088, p=0.012) that became nonsignificant in Model 2 (p=0.462), while adding general awareness (β=0.453, p<0.001) and channel awareness (β=0.471, p<0.001) increased explained variance to R^2=0.796 (F=48.441, p<0.001); confidence intervals and standardized effect sizes beyond β were unspecified.

INTRODUCTION

Digitalization has a big impact on business today, enabling entrepreneurs to leverage digital products, mobile technology, cloud computing, and social media to provide customers with unique and new value. The Study also found that digital transformation has influenced the male and female entrepreneurs. It was found that male entrepreneurs are more favourable toward and more adaptive to digital technologies than female entrepreneurs (Al-Ayed, 2024). For Saudi Arabia, where digital transformation is a key component of Saudi Vision 2030, this shift is especially significant. All of the Vision Realisation Programs (VRPs) have been assessed, modified, and synchronised as Vision 2030 moves into its next five-year phase (2021–2025) to meet the Kingdom's needs and maximise achievement within the allotted term (Ahmad et al., 2023).

A critical element of this vision is empowering youth through higher education and fostering an entrepreneurial culture (Ahmad et al., 2023). Universities are now recognized as essential catalysts for this change, tasked with equipping students with the digital competencies required for the modern labour market (Ahmad et al., 2023). Despite significant government efforts, such as the establishment of "Monsha'at" to support small and medium ventures, the development of digital entrepreneurial skills remains in its early stages. Research indicates that nascent entrepreneurs' ability to recognise digital opportunities is still in its "infancy" (Al-Ayed, 2024). Digitalization is perceived as an essential technological strategy that will drastically transform the industry by substantially improving the entire value chain. SMEs, however, require greater clarity on the complexity and costs of digitalization, so the implementation process needs to be streamlined (Tripathi & Singh, 2024). Digital technologies and digital competence significantly influence students' intention to engage in digital entrepreneurship and to create innovative businesses (Aljuani, 2023). Universities in Saudi Arabia increasingly promote entrepreneurship awareness among students through educational programs and innovation initiatives (Eid et al., 2023).

[1]Corresponding author: *ORCID ID: 0009-0002-2729-3547*

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Digital transformation is a key driver of innovation and entrepreneurship in modern economies and organisations. The study was conducted to understand the influence of digital transformation, especially in small and Medium Enterprises. It was found that digitalisation has improved business operations, helped the business adapt to a changing external environment, and enabled it to remain competitive amid evolving market trends (Almajali & Allah, 2025).

Digital capabilities and technological orientation can strengthen entrepreneurial development and innovation in organizations and entrepreneurial ecosystems. The findings show that digital capabilities have enabled green entrepreneurs, especially in Small and Medium Enterprises (SMEs), to adopt strategic agility across business operations (Satar et al., 2025).

Digital entrepreneurship is influenced by technological orientation, self-efficacy, and social support systems within the entrepreneurial ecosystem. This study helps to understand the role of developments and the literature on business digitalization by investigating how Information Technology Culture (ITC) and Technology Orientation (TO) influence entrepreneurial intentions through the mediating role of Entrepreneurial Self-Efficacy (ESE) and the moderating role of Social Support (SS) within the context of Saudi Arabia's Vision 2030. By combining psychological, cultural, and technological constructs, the research study offers a comprehensive framework for understanding the internal drivers of digital venture creation among youth (Al-Mamary et al., 2025).

Students' personal characteristics, such as creativity, digital innovativeness, and entrepreneurial alertness, significantly influence digital entrepreneurial intentions. The Study was conducted to examine whether entrepreneurial alertness and entrepreneurial digital innovativeness positively affect digital entrepreneurial intention among the student community. Moreover, the findings showed that entrepreneurial passion, entrepreneurial curiosity, and digital competence were positively associated with entrepreneurial alertness and digital innovativeness (Elnadi & Gheith, 2023).

The primary aim of this study is to examine levels of digital and entrepreneurial awareness among higher education students in Saudi Arabia and to analyze how digital technologies influence students' understanding of digital entrepreneurship, digital marketing, and e-commerce opportunities. The study aims to investigate the level of awareness of business digitalization among the student community in Saudi Arabia, focusing on students' understanding of the growing importance of digital transformation in modern business practices. It also seeks to explore students' understanding of key digital technologies, such as social media, e-commerce platforms, and digital marketing tools, and how these technologies are applied in real-world business contexts. Furthermore, the study intends to evaluate the relationship between students' awareness of traditional marketing methods and their understanding of digital marketing, highlighting how perceptions of both approaches influence their overall knowledge and readiness for contemporary business environments.

The Research Article comprises 5 sections. Section 1 outlines the Introduction to the topic, covering the Study's significance and importance. Section 2 reviews the existing literature on digitalization, entrepreneurship awareness, and digital entrepreneurship, particularly in the context of higher education within the student community. Section 3 outlines the research methodology adopted for the study, including the research design, data collection procedures, sampling technique, and methods of data analysis. Section 4 presents the empirical results and analysis of the data collected from higher education students in Saudi Arabia. Section 5 provides a discussion of the findings, and finally, Section 6 concludes the study by summarising the major findings, highlighting the practical and academic implications, and suggesting directions for future research.

LITERATURE REVIEW

Digital technologies have profoundly changed how businesses communicate with consumers and promote their products. Today, with the widespread use of digital platforms, mobile applications, and internet connectivity, businesses increasingly depend on digital platforms to reach their target customers and influence their purchasing decisions (Purnomo, 2023). Subsequently, e-marketing strategies have become increasingly important for enhancing online visibility, attracting, and retaining customers. These activities enable companies to engage directly with consumers and build strong relationships through personalized, interactive communication (Purnomo, 2023).

Research studies found that, among digital marketing tools, social media marketing has gained the greatest importance in recent years. E-Platforms, such as Facebook, Instagram, and other social networking websites, allow companies to interact with consumers in real time and share promotional content to encourage customer involvement in purchasing decisions. The research prioritizes the interactive nature of social media advertising, which helps companies strengthen brand relationships and increase consumers' purchase intentions. Applications like that gauge user-generated content, feedback, and direct messaging, enabling brands to create more customized marketing experiences (Alalwan, 2018).

Email marketing is another widely used digital communication channel that enables companies to deliver personalized messages to specific audiences. Unlike mass advertising methods, email campaigns enable businesses to tailor promotional content to customer preferences, needs, and behaviour. The research also demonstrates that well-designed email marketing tactics can predominantly influence customer purchase decisions and behaviour by providing the needed information and promotional discounts and offers (Kim & Kim, 2010).

Content marketing has also become a vital approach in the digital marketing landscape. This prioritises creating relevant, valuable information that attracts potential customers and builds long-term relationships with brands. The Study suggests that persuasive and informative content can mould consumer attitudes and therefore can increase purchase decisions in e-markets. By offering needful content rather than direct advertising, businesses can build credibility and gain customer trust and loyalty (Gutierrez et al., 2023).

Advertising on e-platforms is another crucial element of digital marketing strategies. Online advertisements may appear in various forms, including banner ads, sponsored search results, and video promotions. Moreover, these may capture users' attention and connect them directly to brand websites or business e-commerce platforms. The article says that

electronic advertising influences customer surfing behaviour and shapes their purchasing decisions and intentions when advertisements are relevant, appropriate, and well-targeted (Abdullah, 2024).

The main objective and focus of digital marketing is to build brand awareness. Brand awareness enables customers to remember and recognise the brand when they need a product. The concept was strongly emphasised by the cited author, who discussed the role of strong brand awareness in shaping customer purchase decisions and driving sales (Keller, 1993). Simultaneously, greater brand awareness can reduce perceived risk and strengthen long-term customer loyalty (Aaker, 1991).

Research shows that the implementation of e-platforms such as social media, search engines, and mobile apps has shaped customer behaviour and purchase decision processes by refining brand visibility and engagement (Pei, 2024; Rahul, 2025). Some studies have also focused on university contexts to prove that digital marketing strategies significantly affect students' online buying behaviour and exposure to marketing messages (Rajendran & Singh, 2026).

Research shows that digital marketing strategies have markedly reshaped consumer behaviour and decision-making processes by increasing brand visibility, engagement, and the likelihood of purchase in online environments. Reviews of the existing literature highlight how digital channels such as websites, social media, and search engines have become key drivers of consumer awareness and e-commerce behaviour (Mulyani & Hermina, 2023).

Various studies in digital marketing show that youth/young consumers, including university student age groups, respond strongly to digital marketing at various stages of e-marketing awareness, interest, and purchase decisions. These studies present multiple empirical findings and justifications indicating how e-marketing influences awareness, attitude, and involvement among the younger demographic that relies heavily on the internet and social media. Literature reviews also assess how digital marketing practices, such as email marketing, social media, and mobile channels, foster customer involvement and positively influence purchase decisions. In educational frameworks, studies have specifically examined how these practices shape student experiences, perceptions, and interactions with brands or services (Benchekroun et al., 2024).

Evidence-based studies examining digital marketing awareness among young college students found that electronic channels, especially social media, predominantly influence how students perceive marketing messages, find product information, and finally make buying decisions (Eum, 2025).

Studies by Kotler and his Marketing 4.0 framework show that the evolution from traditional to digital marketing mimics how corporations must integrate varied online channels to communicate with consumers and foster customer relationships and long-term bonding in today's digital economy (Kotler et al., 2017). E-marketing enables corporations to interact with customers across various platforms, enabling more dynamic, customized, and measurable communication than traditional one-way methods (Kotler et al., 2017).

A systematic review examining *digital integration in entrepreneurship education* found that digital entrepreneurship research is growing, but its educational dimension remains underrepresented. The review analyzed articles from 2019 to 2024. It highlighted major research areas, such as digital entrepreneurial ecosystems and pedagogical models in higher education, showing that digitalization is increasingly linked to students' entrepreneurial learning and awareness (Yulastri et al., 2025).

Additional research on digital literacy and entrepreneurship education found that *digital business literacy* and *digital financial literacy* enhance entrepreneurial intention, showing that digital competencies are important for students' understanding and awareness of business opportunities in the digital age (Hasan et al., 2025).

A systematic literature review finds that digitalization in education plays a vital role in developing students' entrepreneurial skills. The study investigates various elements, including digital awareness, digital creativity, and digital literacy, as core competencies students need to thrive in digital entrepreneurship environments, alongside traditional interpersonal and personal skills (Maulida et al., 2024).

A systematic review of entrepreneurial competencies highlights that *digital transformation* fundamentally reshapes education and competence development, emphasizing *digital literacy, problem-solving, and collaboration* as essential components for students' entrepreneurial awareness and effectiveness in digital environments (Park & Kim, 2025).

Studies in the digital economy context find that *digital capability* significantly influences *entrepreneurial intention* among university students, with *entrepreneurial alertness* as a mediating factor. This review bridges digital competencies, cognitive traits, and intention formation within the digital entrepreneurship paradigm (Zhao et al., 2025).

According to Kamaruddin et al. (2021), all students in Malaysia are at the perfect time to adapt to the connectivity, speed, breadth, and depth of the fourth industrial revolution. The Malaysian government has introduced learners to the fourth industrial revolution content in business skills training, equipping them with the skills needed to adapt to market changes and survive in the entrepreneurship field. The Malaysian government has introduced massive open online courses (MOOCs) to equip students with business skills learned on the global stage. Such online programs have contributed to the acquisition of business skills and technological expertise that will assist students after graduation in finding business jobs to support their survival and improve their economic well-being (Kamaruddin et al., 2021). The more they try to be as realistic as possible about entrepreneurship, the better students are equipped to manage, especially in the entrepreneurial sector.

Saudi Arabia's prominent position in international trade and business is due to the current socio-political and economic changes brought about by climate change, which are highlighted by the geopolitical dynamics that have further enhanced the country's trade and investments. Moreover, technological advancements and the emergence of new start-up companies highlight the critical role. The government initiatives and policies highlighted herein form a triangle of cooperation, vision, and inventiveness, while providing dynamic insights into an adaptable mode (Mani et al., 2023).

To accomplish Saudi Arabia's Vision 2030 and to identify the challenges through appropriate mechanisms for follow-up and performance evaluation, the National Transformation Program (NTP) 2020 was launched in 2016 to give

Saudi Arabia a leading position in all fields and to figure out the general direction, policies, goals and objectives to accomplish the goals for the 2030 vision. To expedite this transformation, the Kingdom is investing more in entrepreneurship education (Khan & Khan, 2020).

Digital entrepreneurship learning can be designed using experiential learning approaches or the Internet of Things (IoT) and technology approaches. The implementation affects business opportunities, entrepreneurial intention, innovation, entrepreneurial attitude, and student problem-solving. This study provides an overview of learning models that can be replicated or modified in future Research (Aysi et al., 2024).

Although extensive research has been conducted on the digital economy, digitalisation of businesses, etc., the researchers found a gap, with very few articles covering students' understanding and contributions in the selected areas of the topic. Hence, this determines the Research gap in the Saudi Arabian higher education context. Most existing research focuses more on consumer purchasing behaviour than on the broader issue of digital entrepreneurship awareness among the student community, which this article addresses. Therefore, this study addresses this research gap by examining the level of awareness and understanding of digital entrepreneurship and e-commerce channels among university students in Saudi Arabia.

The primary objective of this study is to examine the extent of students' awareness of business digitalization in Saudi Arabia, particularly in relation to the evolving digital landscape of modern enterprises. It further aims to assess students' comprehension of various digital technologies, including social media, e-commerce platforms, and digital marketing tools, and to examine how these are utilized in business operations. In addition, the study seeks to analyze the connection between students' awareness of traditional marketing practices and their understanding of digital marketing, thereby identifying how both forms of marketing shape their overall perception of business strategies in the digital age. The following are the hypotheses of the study:

H_0: There is no significant difference in the mean General Awareness scores between male and female students.
H_0: There is no significant difference in General Awareness scores among students from different fields of study.

MATERIALS AND METHODS

The Research paper aims to understand the level of awareness among the students in the e-commerce channel. 122 undergraduate and postgraduate students were selected as the study's sample. The research combines qualitative and quantitative methods.

The Research study employs a mixed-methods design combining quantitative and qualitative approaches to examine students' awareness of digitalization in entrepreneurship and e-commerce channels.

The numerical data, which served as the primary source of information, was gathered through an online survey distributed to undergraduate and postgraduate students studying at various universities and colleges in Saudi Arabia. Responses received were from 122 students. The questionnaire consisted of structured questions designed to measure students' general awareness of e-commerce, familiarity with digital marketing channels, and operational understanding of digital platforms.

Secondary source of information was collected from websites, previous studies, etc.

Descriptive statistics were used to examine respondents' demographic characteristics and levels of awareness. The analysis focused on identifying patterns of awareness across gender, age, academic level, and Field of study.

RESULTS AND DISCUSSIONS

Personal Information

Table 1. Gender

Items	No. of respondents	Percent
Male	65	53.3
Female	57	46.7
Total	122	100.0

Table 2. Age

Items	No. of respondents	Percent
Under 20	58	47.5
20–22	41	33.6
23–25	8	6.6
Above 25	15	12.3
Total	122	100.0

The age profile of respondents shows that almost half (47.5%) were under 20 years old, and one-third (33.6%) were between 20 and 22 years old, reflecting a predominance of early college-age students. Only 6.6 percent were between 23 and 25 years and 12.3 percent were above 25 years. The distribution suggests that the study primarily captured perceptions of late adolescents and early adults, who represent the typical age group for undergraduate studies and are increasingly exposed to online media.

Table 3. Year of study

Items	No. of respondents	Percent
1st	66	54.1
2nd	20	16.4
3rd	21	17.2
4th	9	7.4
Postgraduate	6	4.9
Total	122	100.0

Table 4. Field of Study

Items	No. of respondents	Percent
Arts	10	8.2
Science	21	17.2
Engineering & Technology	36	29.5
Management	36	29.5
Others	19	15.6
Total	122	100.0

The field-wise composition of respondents reveals a broad disciplinary proportion. Nearly one-third of the participants were drawn from Engineering and Technology (29.5%) and Management (29.5%), while Science students accounted for 17.2 percent. Smaller proportions represented Arts (8.2 percent) and other disciplines (15.6 percent).

This distribution shows that the sample is dominated by professionally oriented programs such as management and engineering, which typically emphasise technology and business applications. The inclusion of students from Arts and Science streams nevertheless provides a measure of disciplinary diversity, allowing comparisons across groups that differ in their exposure to marketing and digital tools.

Table 5. General Awareness

Items		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	total
I have heard about e-commerce or online marketing	No.	28	15	19	19	41	122
	%	23.0	12.3	15.6	15.6	33.6	100.0
I know that companies use digital platforms to promote their products.	No.	18	16	28	25	35	122
	%	14.8	13.1	23.0	20.5	28.7	100.0
I can identify examples of e-commerce campaigns.	No.	23	20	28	22	29	122
	%	18.9	16.4	23.0	18.0	23.8	100.0
I can differentiate between online and traditional marketing.	No.	25	21	17	21	38	122
	%	20.5	17.2	13.9	17.2	31.1	100.0
I am aware that companies target specific audiences through online channels.	No.	25	19	20	16	42	122
	%	20.5	15.6	16.4	13.1	34.4	100.0

Table 5 presents the respondents' levels of general awareness about e-commerce. The data show that most students have at least a basic familiarity with the concept. One-third (33.6%) of respondents strongly agreed that they had heard of e-commerce or online marketing, and a similar proportion (28.7%) strongly agreed that companies use digital platforms to promote their products. Awareness of more applied aspects, such as identifying e-commerce campaigns or distinguishing between online and traditional marketing, was comparatively moderate, with strong agreement around 23–31%.

Overall, the distribution indicates a moderate level of general awareness. Most students may possess basic knowledge of e-commerce principles, but few demonstrate a deeper conceptual understanding. This pattern suggests that exposure to e-commerce ideas may occur informally, through everyday online activity, rather than through structured academic learning.

Table 6. Awareness of Channels

Items		Very low	Low	Moderate	High	Very high	total
Company websites	No.	36	11	22	11	42	122
	%	29.5	9.0	18.0	9.0	34.4	100.0
Social media marketing (Instagram, Snapchat, X)	No.	19	24	23	8	48	122
	%	15.6	19.7	18.9	6.6	39.3	100.0
Email marketing	No.	21	24	29	10	38	122
	%	17.2	19.7	23.8	8.2	31.1	100.0
Influencer marketing	No.	22	19	24	14	43	122
	%	18.0	15.6	19.7	11.5	35.2	100.0
Mobile app notifications	No.	31	19	20	10	42	122
	%	25.4	15.6	16.4	8.2	34.4	100.0
Search engine ads (Google Ads)	No.	23	21	26	10	42	122
	%	18.9	17.2	21.3	8.2	34.4	100.0

Table 7. Operational Awareness

Items		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	total
I am aware that companies use social media ads to increase brand visibility.	No.	33	14	17	13	45	122
	%	27.0	11.5	13.9	10.7	36.9	100.0
I know that search engine ads help companies appear at the top of search results.	No.	22	20	22	19	39	122
	%	18.0	16.4	18.0	15.6	32.0	100.0
I am aware that influencer marketing is a strategy to reach younger audiences.	No.	21	21	25	14	41	122
	%	17.2	17.2	20.5	11.5	33.6	100.0
I know that email marketing is often used to maintain customer relationships.	No.	18	25	24	19	36	122
	%	14.8	20.5	19.7	15.6	29.5	100.0
I understand that mobile notifications are used for timely offers and promotions.	No.	27	18	19	21	37	122
	%	22.1	14.8	15.6	17.2	30.3	100.0

Table 8. Analysis of General Awareness

Items		General Awareness Score		
		Mean	S.D	No.
Gender	Male	16.68	7.20	65
	Female	15.61	6.61	57
total		16.18	6.92	122

The comparison of mean general awareness scores by gender, shown above, indicates that male respondents (Mean = 16.68, SD = 7.20) had slightly higher scores than female respondents (Mean = 15.61, SD = 6.61). The scores for each respondent were obtained by summing the ratings for the 5 items in the General Awareness section. Ratings were assigned based on respondents' choices (1-Strongly Disagree to Agree 5-Strongly). Although the difference in mean values appears minimal, it provides a preliminary indication that both groups possess a comparable level of general awareness about e-commerce. The overall sample mean (Mean = 16.18) indicates a moderate level of awareness among students. The null hypothesis is framed as follows.

H_0: There is no significant difference in the mean General Awareness scores between male and female students.

Table 9. t-test for Equality of Means

T	df	Prob.	Sig.
0.845	120	.400	Ns

An independent-samples t-test was conducted to examine gender differences in general awareness of e-commerce. The t-test statistic was 0.845, with p = 0.400, which is greater than the 0.05 level of significance.

Therefore, the difference between the male and female mean scores is not statistically significant. This suggests that both male and female respondents show comparable levels of awareness about e-commerce concepts. The results indicate that gender does not significantly shape students' e-commerce awareness. Since p = 0.400 > 0.05, the null hypothesis (H_0) is accepted that there is no significant difference in general awareness between male and female respondents.

As shown in the table, male respondents (Mean = 16.68, SD = 7.20) recorded marginally higher mean general awareness scores than female respondents (Mean = 15.61, SD = 6.61). The independent-samples t-test indicated that this difference was statistically not significant (t = 0.845, p = .400). Hence, gender does not appear to influence students' general awareness of e-commerce. This outcome suggests that both male and female students have comparable familiarity with online marketing concepts, possibly due to similar exposure to digital technologies and to social media.

Table 10. General Awareness Score

Items		General Awareness Score		
		Mean	S.D	No.
Age	Under 20	15.43	6.75	58
	20–22	16.95	7.26	41
	23–25	19.88	5.77	8
	Above 25	15.00	6.95	15
Total		16.18	6.92	122

Table 11. ANOVA for General Awareness Score by Age

Items	Sum of Squares	df	Mean Square	F	Prob.	Sig.
Between Groups	187.031	3	62.344	1.311	.274	Ns
Within Groups	5613.002	118	47.568			
Total	5800.033	121				

Ns- Not significant * - Significant at 5% level **-Significant at 1% level

The comparison of mean scores indicates that the highest mean General Awareness score was observed among students aged 23–25 years (Mean = 19.88, SD = 5.77), followed by those aged 20–22 years (Mean = 16.95, SD = 7.26). Respondents below 20 years and above 25 years recorded lower means (15.43 and 15.00, respectively). Although a visible difference exists between groups, particularly between the 23–25-year-old group and the others, statistical testing was required to verify its significance, and the following null hypothesis was formulated.

H_0: There is no significant difference in mean General Awareness scores among different age groups.

The one-way ANOVA test results show that the F-value (F(3, 118)) is 1.311 and p = 0.274, which are not significant at the 0.05 level. Hence, the observed differences among the age groups were not statistically significant, and the null hypothesis was therefore accepted. This means that age does not significantly influence general awareness of e-commerce among the sampled students.

Although older students (aged 23–25) exhibited slightly higher mean scores, this variation may reflect greater academic exposure rather than a genuine age-related difference. The finding suggests that e-commerce awareness is relatively consistent across age ranges, possibly because students of all ages share similar digital experiences and media environments within campus life.

As shown in the table, the mean general awareness scores varied slightly across age groups. Students aged 23–25 years recorded the highest mean (Mean = 19.88), whereas those aged under 20 years and above 25 years scored lower (Mean = 15.43 and 15.00, respectively). The results of the one-way ANOVA indicated that these differences were not statistically significant (F(3,118) = 1.311, p = .274).

This implies that awareness of e-commerce concepts does not differ significantly across age categories. Although older students exhibited marginally higher averages—perhaps due to slightly greater exposure to coursework or internships—the overall pattern shows that e-commerce awareness is broadly shared across age groups. This may be attributed to the widespread availability of digital content and social media platforms, which provide equal opportunities for learning about online marketing regardless of age.

Table 12. General Awareness Score

Items		**General Awareness Score**		
		Mean	S.D	No.
Year of study	1st	16.11	7.08	66
	2nd	15.75	6.54	20
	3rd	18.62	6.75	21
	4th	16.44	7.02	9
	Postgraduate	9.50	2.35	6
Total		16.18	6.92	122

Table 13. ANOVA for General Awareness Score by Year of Study

Items	**Sum of Squares**	**df**	**Mean Square**	**F**	**Prob.**	**Sig.**
Between Groups	397.351	4	99.338	2.151	.079	Ns
Within Groups	5402.682	117	46.177			
Total	5800.033	121				

Table 14. General Awareness Score

Items		**General Awareness Score**		
		Mean	S.D	No.
Field of Study	Arts	13.20	8.50	10
	Science	17.81	7.08	21
	Engg & Technology	14.58	6.56	36
	Management	18.86	6.57	36
	Others	13.89	5.46	19
Total		16.18	6.92	122

Table 15. ANOVA for General Awareness Score by Field of Study

Items	**Sum of Squares**	**df**	**Mean Square**	**F**	**Prob.**	**Sig.**
Between Groups	594.350	4	148.587	3.340	.013	*
Within Groups	5205.683	117	44.493			
Total	5800.033	121				

The table presents the mean general awareness scores across different fields of study. The results indicate that Management students (Mean = 18.86, SD = 6.57) reported the highest mean awareness, followed by Science students (Mean = 17.81, SD = 7.08). Relatively lower awareness levels were observed among Engineering and Technology (Mean = 14.58), Arts (Mean = 13.20), and Other disciplines (Mean = 13.89). These variations suggest that awareness of e-commerce concepts may differ across academic specialisations, warranting statistical validation. The following hypothesis was framed and tested.

H_0 (Null Hypothesis): There is no significant difference in General Awareness scores among students from different fields of study.

The one-way ANOVA test revealed a significant difference in mean general awareness scores among the five fields of study, $F(4,117) = 3.340$, $p = .013 < .05$. Hence, the null hypothesis was rejected, confirming that students' awareness of e-commerce varies significantly by academic discipline.

The result underscores the role of academic exposure. Students whose coursework or environment integrates marketing and technology concepts are more aware of digital promotional strategies. It further implies that e-commerce awareness is not purely a general digital skill but is partly shaped by disciplinary orientation. Since $p = .013 < 0.05$, the null hypothesis (H_0) is rejected.

Thus, the Field of study significantly influences general awareness of e-commerce.

As shown in the table given above, mean general awareness scores varied considerably across fields of study. The highest scores were recorded among Management (Mean = 18.86) and Science (Mean = 17.81) students, while Engineering & Technology (Mean = 14.58), Arts (Mean = 13.20), and Other disciplines (Mean = 13.89) showed lower levels of awareness.

The one-way ANOVA revealed that these differences were statistically significant ($F(4,117) = 3.340$, $p = .013$). This indicates that awareness of e-commerce concepts varies significantly by students' academic backgrounds. Students pursuing Management and Science programs reported higher understanding of e-commerce, likely because these disciplines provide greater exposure to marketing theories, data analytics, and digital business applications.

In contrast, students from non-business fields, such as Arts and Engineering, may have less formal exposure to marketing concepts, even though they use digital platforms daily.

Table 16. Analysis of e-commerce Channels

Items		**Channel Awareness Score**		
		Mean	S.D	No.
Gender	Male	20.02	8.52	65
	Female	18.35	8.25	57
Total		19.24	8.40	122

Table 17. t-test for Equality of Means

t	**df**	**Prob.**	**Sig.**
1.092	120	.277	Ns

Table 18. Channel Awareness Score

Items		**Channel Awareness Score**		
		Mean	S.D	No.
Age	Under 20	17.67	8.23	58
	20–22	21.29	8.28	41
	23–25	23.75	6.82	8
	Above 25	17.27	8.76	15
Total		19.24	8.40	122

Table 19. ANOVA for Channel Awareness Score

	Sum of Squares	**df**	**Mean Square**	**F**	**Prob.**	**Sig.**
Between Groups	536.410	3	178.803	2.635	.053	Ns
Within Groups	8007.697	118	67.862			
Total	8544.107	121				

Table 20. Channel Awareness Score

		Channel Awareness Score		
		Mean	S.D	No.
Year of study	1st	18.89	8.63	66
	2nd	19.90	8.18	20
	3rd	22.00	7.87	21
	4th	19.56	8.20	9
	Postgraduate	10.67	2.58	6
total		19.24	8.40	122

Table 21. ANOVA for Channel Awareness Score

	Sum of Squares	**df**	**Mean Square**	**F**	**Prob.**	**Sig.**
Between Groups	618.493	4	154.623	2.283	.065	Ns
Within Groups	7925.613	117	67.740			
Total	8544.107	121				

Table 22. Channel Awareness

		Channel Awareness Score		
		Mean	S.D	No.
Field of Study	Arts	15.10	9.31	10
	Science	20.19	8.99	21
	Engg & Technology	18.06	8.36	36
	Management	22.22	8.21	36
	Others	16.95	6.14	19
Total		19.24	8.40	122

Table 23. ANOVA for Channel Awareness Score

	Sum of Squares	df	Mean Square	F	Prob.	Sig.
Between Groups	660.910	4	165.227	2.452	.050	*
Within Groups	7883.197	117	67.378			
Total	8544.107	121				

Table 24. Analysis of Operational Awareness

		Operational Awareness Score		
		Mean	S.D	No.
Gender	Male	16.82	7.20	65
	Female	15.42	7.10	57
total		16.16	7.16	122

Table 25. t-test for Equality of Means

t	df	Prob.	Sig.
1.074	120	.285	Ns

Table 26. Operational Awareness Score

		Operational Awareness Score		
		Mean	S.D	No.
Age	Under 20	15.50	7.01	58
	20–22	16.71	7.63	41
	23–25	20.88	4.97	8
	Above 25	14.73	6.80	15
total		16.16	7.16	122

Table 27. ANOVA for Operational Awareness Score

	Sum of Squares	df	Mean Square	F	Prob.	Sig.
Between Groups	245.925	3	81.975	1.626	.187	Ns
Within Groups	5950.796	118	50.430			
Total	6196.721	121				

Table 28. Operational Awareness Score

		Operational Awareness Score		
		Mean	S.D	No.
Year of study	1st	16.09	7.37	66
	2nd	17.15	6.30	20
	3rd	17.81	7.30	21
	4th	15.56	7.26	9
	Postgraduate	8.83	1.83	6
total		16.16	7.16	122

Table 29. ANOVA for Operational Awareness Score

	Sum of Squares	df	Mean Square	F	Prob.	Sig.
Between Groups	402.423	4	100.606	2.031	.094	Ns
Within Groups	5794.298	117	49.524			
Total	6196.721	121				

Table 30. Operational Awareness Score

		Operational Awareness Score		
		Mean	**S.D**	**No.**
Field of Study	Arts	12.70	7.27	10
	Science	17.24	7.08	21
	Engg & Technology	15.64	7.12	36
	Management	18.53	7.05	36
	Others	13.32	6.22	19
total		16.16	7.16	122

Table 31. ANOVA for Operational Awareness Score

	Sum of Squares	**df**	**Mean Square**	**F**	**Prob.**	**Sig.**
Between Groups	509.429	4	127.357	2.620	.038	*
Within Groups	5687.293	117	48.609			
Total	6196.721	121				

Table 32. Relationship between Awareness dimensions
Correlations

	General Awareness Score	**Channel Awareness Score**	**Operational Awareness Score**
General Awareness Score	---		
Channel Awareness Score	.825**	---	
Operational Awareness Score	.845**	.851**	---

**. Correlation is significant at the 0.01 level.

The table shows strong positive correlations among the three dimensions of e-commerce awareness.

General Awareness was closely associated with both Channel Awareness (r = .825) and Operational Awareness (r = .845), and the relationship between Channel and Operational Awareness was equally strong (r = .851).

All correlations were significant at the 1% level, indicating that greater familiarity with one aspect of e-commerce is consistently associated with greater understanding of the others.

These findings imply that students' awareness of e-commerce develops holistic conceptual knowledge, recognition of digital channels, and understanding of operational functions, thereby strengthening awareness. Students who are more aware of online marketing strategies are also better equipped to identify specific tools and their real-world applications.

Table 33. Hierarchical Regression Analysis Predicting Operational Awareness
Dependent Variable: General Awareness Score

	Model 1						**Model 2**					
	B	S.E	β	t	Prob.	Sig.	B	S.E	β	t	Prob.	Sig.
(Constant)	15.849	3.112					.728	1.682				
Gender	-1.109	1.308	-.078	-.848	.398	Ns	-.248	.629	-.017	-.394	.695	Ns
Age	.179	.726	.025	.246	.806	Ns	.122	.349	.017	.348	.728	Ns
Year of study	-.586	.574	-.099	-1.021	.309	Ns	-.281	.276	-.047	-1.019	.310	Ns
Field of study												
-Arts	-.540	2.755	-.021	-.196	.845	Ns	.496	1.324	.019	.375	.709	Ns
-Science	3.521	2.246	.186	1.568	.120	Ns	.605	1.093	.032	.554	.581	Ns
-Engg & Technology	2.306	2.031	.148	1.136	.259	Ns	1.555	.976	.100	1.593	.114	Ns
-Management	5.088	1.989	.326	2.558	.012	*	.725	.982	.046	.739	.462	Ns
General Awareness Score	---	---	---	---	---	---	.469	.080	.453	5.864	.000	**
Channel Awareness Score	---	---	---	---	---	---	.401	.065	.471	6.163	.000	**
R	.311						.892					
R Square	.097						.796					
F	1.750						48.441					
Prob.	.104						.000					
Sig.	Ns						**					

B- Unstandardized regression coefficient, S.E.- Standard Error, β – Standardised regression coefficient
** - Significant at 1% level, Ns-Not significant

To identify the determinants of students' Operational Awareness of e-commerce, a hierarchical multiple regression was conducted. This technique enables predictors to be entered in logical stages, allowing the researcher to assess the additional explanatory power contributed by each new set of variables.
It is particularly useful when background variables are expected to exert indirect effects through cognitive or attitudinal factors.

Model 1: Personal and Academic Variables
The first model included gender, age, year of study, and field-of-study dummies (Arts, Science, Engineering & Technology, and Management; "Others" as the reference).
*[Field of study was dummy coded into four binary variables (Arts, Science, Engineering & Technology, and Management), with **"Others" as the reference category.** Regression coefficients for each dummy variable, therefore, represent the*

difference in mean operational awareness between that Field and the reference group. Gender was coded as 0 = Male and 1 = Female.]

The model explained only 9.7 % of variance ($R^2 = .097$) and was not statistically significant ($F = 1.75$, $p = .10$). Among independent variables, the Management group had a significant positive effect ($B = 5.088$, $p = .012$), indicating that management students reported higher operational awareness than other groups.

Other fields, such as Science ($B = 3.521$) and Engineering & Technology ($B = 2.306$), also showed small, positive, but nonsignificant effects. In contrast, Arts ($B = –.021$) was negative, suggesting slightly lower awareness relative to the reference group.

The coefficients for personal variables were weak: gender (coded 0 = Male, 1 = Female) showed a small negative association ($B = -1.109$), indicating that females had marginally lower awareness, though this was not significant ($p = .40$).

Age ($B = 0.179$) and year of study ($B = –0.586$) had little effect; that is, older or more senior students did not differ significantly in operational understanding.

Overall, Model 1 suggests that only academic specialisation, not demographic attributes, is associated with operational awareness.

Model 2: Adding Awareness Dimensions

When General Awareness and Channel Awareness were added, model performance improved sharply ($R^2 = .796$; R^2-difference = .699 (0.796-0.097); $F = 48.44$, $p < .001$).

Both variables were strong positive predictors—General Awareness ($\beta = .453$, $p < .001$) and Channel Awareness ($\beta = .471$, $p < .001$).

This means that students who understand e-commerce concepts well and recognise digital channels tend to have greater operational awareness.

After these additions, the previously significant Management effect became small and nonsignificant ($\beta = .046$, $p = .46$).

The weak negative direction for gender and year, and the tiny positive coefficients for age and other fields, remained unchanged. This shift indicates that once students' awareness levels are controlled, personal and academic variables contribute little direct explanatory power.

Relative Contribution of Predictors

Examination of the standardised regression coefficients (β) in the final model reveals that the two awareness dimensions contributed most strongly to the prediction of operational awareness.

Channel Awareness ($\beta = .471$) exerted the largest influence, followed closely by General Awareness ($\beta = .453$), indicating that both cognitive dimensions have almost equal and dominant impact on students' operational understanding of e-commerce. Among the personal and academic variables, the Management group initially showed a moderate positive effect ($\beta = .326$ in Model 1). However, its contribution diminished to a negligible level ($\beta = .046$) once awareness variables were introduced. The remaining predictors—gender ($\beta = –.017$), age ($\beta = .017$), and year of study ($\beta = –.047$)—had very small and statistically insignificant effects, suggesting that these characteristics play a minimal role in explaining differences in operational awareness.

Overall, the pattern of standardised coefficients indicates that cognitive awareness factors, rather than demographic variables, account for the largest share of the model's explained variance.

The findings reveal that field-of-study-based differences indirectly influence operational awareness by affecting students' general and channel awareness. In other words, management students appear to be more operationally aware because they already have stronger conceptual and channel familiarity, a pattern consistent with a mediation pathway: Field of Study (Management) -> General / Channel Awareness -> Operational Awareness.

Thus, operational proficiency depends primarily on knowledge-based variables rather than on gender, age, or year. This highlights the need to integrate digital-marketing learning experiences across non-management curricula to equalise awareness levels. Future work may confirm the indirect effects formally using mediation or path analysis.

The major findings of the study indicate that while the majority of students possess a basic level of knowledge regarding e-commerce principles, only a limited number demonstrate deeper conceptual understanding. This suggests that much of their exposure to e-commerce concepts is informal, often gained through everyday online activities rather than structured academic learning. The study further reveals that both male and female students exhibit similar levels of awareness, indicating that gender and age do not significantly influence e-commerce knowledge. Although students aged 23–25 show slightly higher mean scores, this difference is likely due to increased academic exposure rather than age itself, as awareness remains relatively consistent across age groups due to shared digital experiences within the campus environment.

Additionally, students whose academic programs incorporate marketing and technology tend to have greater awareness of digital promotional strategies. The findings also highlight that e-commerce awareness develops holistically, with conceptual knowledge, familiarity with digital channels, and understanding of operational functions collectively enhancing overall awareness. Students with a stronger grasp of online marketing strategies are better able to identify specific tools and their practical applications. Furthermore, differences in Field of study indirectly influence operational awareness; management students tend to demonstrate higher operational awareness because of their stronger conceptual and channel knowledge. This reflects a mediated relationship in which the Field of study affects general and channel awareness, which, in turn, enhances operational understanding. Overall, the study concludes that operational proficiency is primarily driven by knowledge-based factors rather than demographic variables such as gender, age, or academic year. Consequently, there

is a clear need to integrate digital marketing education into non-management curricula to ensure more balanced awareness levels among students, and future research may further validate these relationships through mediation or path analysis.

CONCLUSIONS

The main objective of this research study was to investigate and examine the level of e-commerce awareness among higher education students and to identify the influence of demographic and academic factors on their conceptual, channel, and operational understanding of digital business. The findings show that most students have only a basic understanding of the application of digital tools in business. The study also found that e-commerce awareness does not differ significantly by age or gender. However, students specialising in business and management studies possess greater awareness of digital marketing strategies and business tools through their academic curriculum, as well as stronger conceptual and channel familiarity. This study contributes to the literature by highlighting the multi-dimensional nature of e-commerce awareness and emphasising the role of academic exposure in shaping students' digital competencies. Universities should integrate digital marketing and e-commerce education across disciplines to better prepare students for the digital economy. The study contributes to policymakers and academics' understanding of the gap in digital awareness among the student community, which may serve as a basis for further research. However, the study's limitation is its small sample size, which provides scope for further research in the same area with larger samples and more robust analysis to conclude. Future research can also apply advanced statistical tools with larger sample sizes.

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