Chapter IV

Results and Discussions

The results of a research study entitled - Acquisition and Adoption of Digital Competency among Women Entrepreneurs in the Informal Sector are presented. The primary data collected are analysed using descriptive and inferential statistics, and results are presented under the following headings:

4.1 Socio-Demographic Profile of the select Women Entrepreneurs in the Informal Sector
4.2 Business Profile of the select Women Entrepreneurs in the Informal sector
4.3 Access and Usage of Digital Infrastructural Facilities for Technology Adoption
4.4 Ranking the Challenges of Digitalisation of select Women Entrepreneurs in the Informal Sector
4.5 Awareness and Use of Digital Applications for Business Operations before Digital Competency Training
4.6 Effectiveness of Digital Competency Intervention among Select Informal Women Entrepreneurs
4.7 Socio-Economic Profile and Digital Competency of select Women Entrepreneurs in the Informal Sector
4.8 Business Profile and Digital Competency of the select Women Entrepreneurs in the Informal Sector
4.9 Awareness and Use of Digital Applications for Business Operations after Digital Competency Training
4.10 Registration under e-shram Portal after Digital competency Training
4.11 Perception of Women Entrepreneurs in the Informal Sector towards antecedents influencing technology adoption.
4.12 Causal relationship of antecedents influencing technology adoption among select Women Entrepreneurs in the Informal Sector

4.1 Socio-demographic Profile of the Women Entrepreneurs in the Informal Sector

The Socio-economic characteristics significantly shape the ability and willingness to embrace technology (Ramasamy et al., 2025). Age, education, residential area, marital status, and nature of family affect the perception of technology, access to resources, and the perceived value of technological tools in business operations. These factors can either

facilitate or hinder technology adoption. Table 4.1 and Figure 6 depicts the socio-demographic profile of sample women entrepreneurs in the informal sector.

Table 4.1 Socio-Demographic Profile of Women Entrepreneurs in the Informal Sector

Variables		Number of Respondents n = 240	Percentage
Age (in Years)	Upto 30	178	74.16
	Above 30	62	25.84
Educational Level	Senior Secondary	18	07.50
	Higher Secondary	168	70.00
	Graduate	54	22.50
Residential Area	Rural	112	46.66
	Urban	128	53.34
Marital Status	Married	197	82.08
	Single	43	17.92
Family Structure	Nuclear	96	40.00
	Joint	144	60.00

Source: Primary Data

The table 4.1 and Figure depicts that Jan Shikshan Sansthan (JSS) trains women entrepreneurs in the informal Sector between age 15 and 45 years to participate in skill development, which are designed to enhance their capabilities and promote entrepreneurial growth. Of the sample respondents, majority of respondents were in the age group up to 30 years (74.16%), and the remaining 25.84 percent were above 30 years of age.

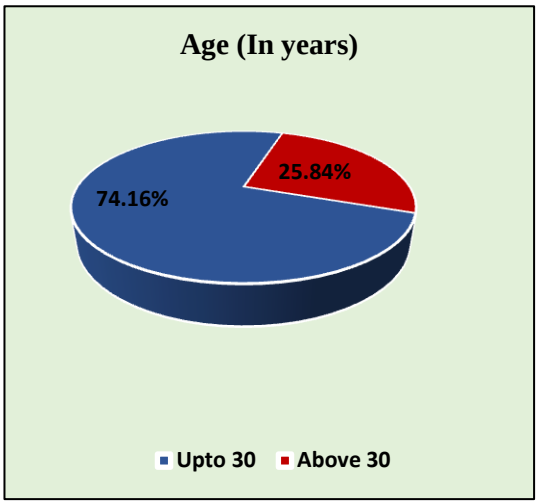
Regarding the educational qualification, the majority (70%) of the respondents have attained education up to the higher secondary school level, 7.50 percent of respondents have completed their Senior Secondary school education, while 22.50 percent hold a graduate degree.

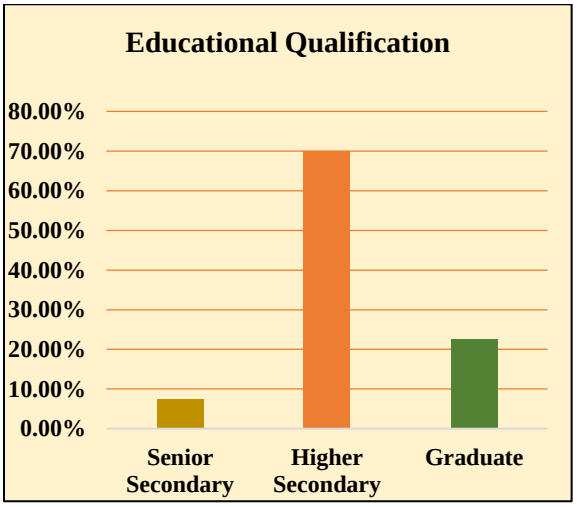
About the residential distribution of Women Entrepreneurs in the Informal Sector, the majority (53.34%) of the respondents reside in urban areas, whereas 46.66 percent were located in rural regions.

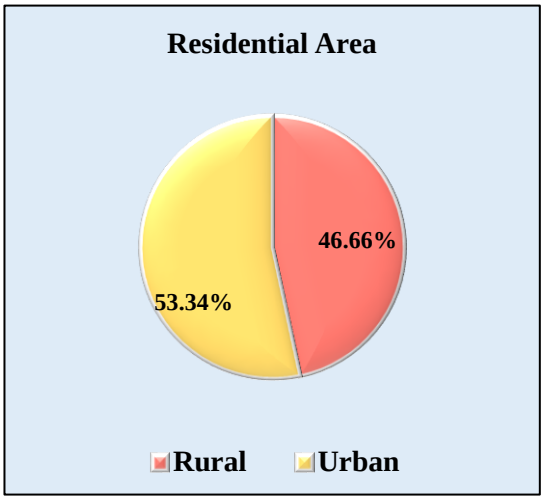
Concerning the marital status of respondents, the majority (82.08%) are married, while 17.92 percent remain unmarried.

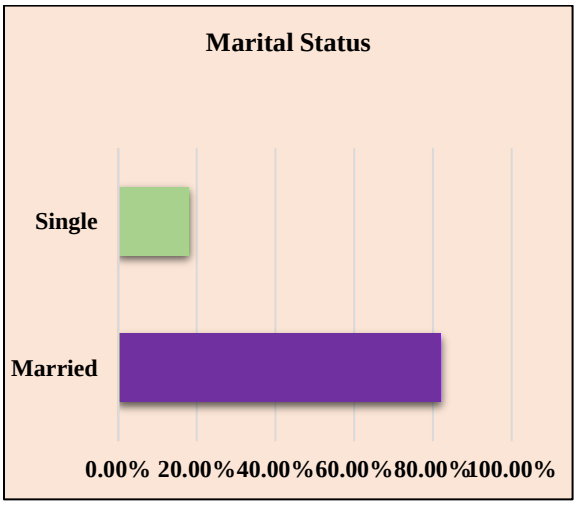
The family structure of the Women Entrepreneurs in the Informal Sector reveals that a majority (60%) live in joint families, whereas the remaining 40 percent live in nuclear families.

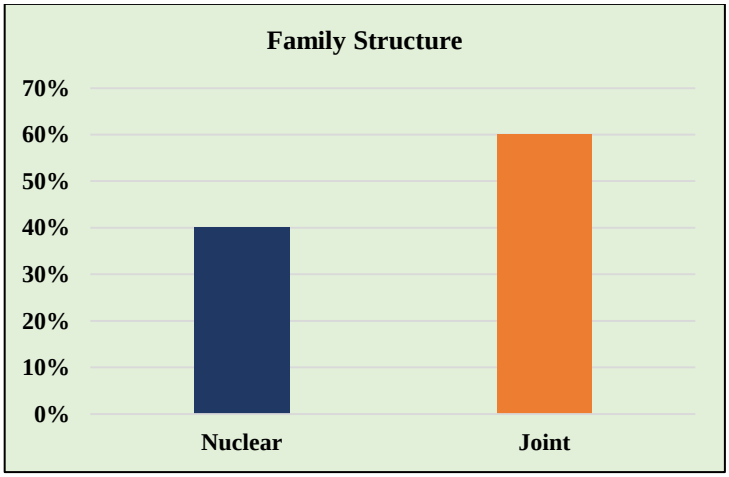
Figure 6 Socio-Demographic Profile of Women in Informal sector











The socio-demographic analysis of the Women Entrepreneurs in the Informal Sector included in the study reveals that the majority belong to a younger age group and possess educational qualifications up to the higher secondary level. A substantial proportion of the respondents reside in urban areas. Additionally, the findings indicate that a higher percentage of respondents are married and primarily live in joint families, with most households comprising more than five members.

4.2 Business Profile of the Women Entrepreneurs in the Informal Sector

Examining the business profiles, including their enterprises, scale of operations, income, and business activities, can enable an understanding of the barriers and drivers of success in informal sectors (Sherwani et al., 2022). Further, the business activities undertaken and their location significantly impact growth opportunities and market accessibility (Kabeer, 2021). Table 4.2 and the figure 7 present the business profiles of the women entrepreneurs in the informal sector.

Table 4.2 Business Profile of Women Entrepreneurs in the Informal Sector

Variables		Number of Respondents n = 240	Percentage
Nature of business	Manufacturing	150	62.50
	Trade	55	23.00
	Service	35	14.50
Ownership of business	Proprietorship	210	87.50
	Partnership	16	06.67
	SHG	14	05.83
Business Activities	Food and Beverages	112	46.66
	Beauty and personal care	51	21.25
	Handicraft and artisans	23	09.59
	Small Retail stores	54	22.50
Location of Business Activity	Home based	115	47.91
	Street side stall	78	32.51
	Kiosks	43	17.92
	Permanent structure	4	1.66
Location of the business unit	Panchayat	138	57.50
	Municipality	102	42.50
Workers in the Unit	Managed by self	216	90.00
	2 - 3	15	06.25
	4 - 5	9	03.75

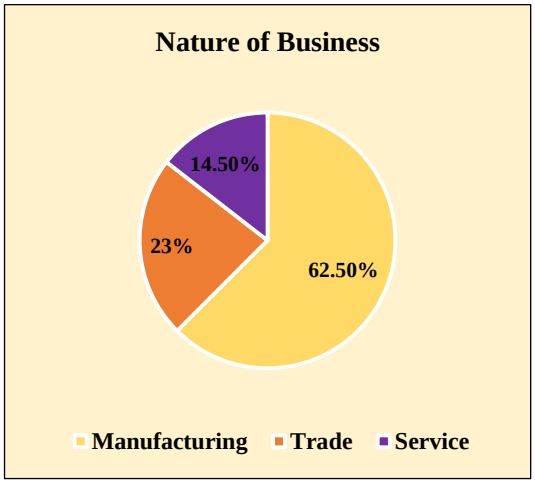
Variables		Number of Respondents n = 240	Percentage
Experience in Business in years	Up to 1	213	88.75
	2-5	13	05.41
	6-10	10	04.16
	11-15	4	01.66
Initial Capital Investment (₹)	>5000	63	26.25
	5000 - 10000	96	40.00
	10001 - 20000	60	25.00
	20001 - 30000	21	8.75
Monthly Business Income (₹)	Below 10000	93	38.75
	10001-20000	96	40.00
	20001-30000	31	12.91
	30001-40000	20	8.34
Registered under e- Shram Portal	Yes	31	12.92
	No	209	87.08
Prior digital Skill training attended	Yes	7	02.91
	No	233	97.09
Current State of Business	Thriving	19	07.92
	Growing	34	14.16
	Surviving	112	46.66
	Shutdown	75	31.26
Business Outlook	Formalise	4	01.67
	Expand	213	88.75
	Modernise	23	09.58

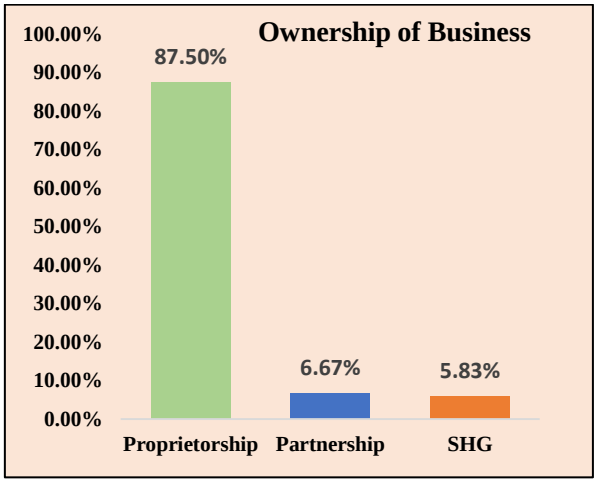
Source: Primary Data

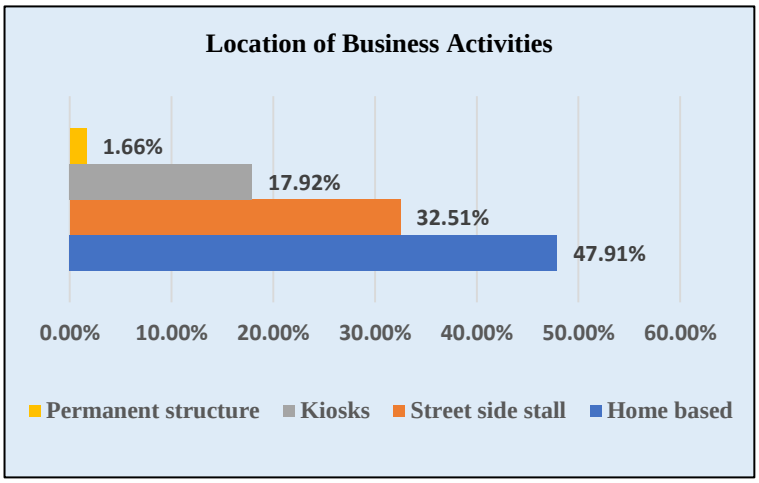
The nature of business is essential in understanding the distribution of entrepreneurial activities across different sectors, such as manufacturing, trade, and service. In the given data from table 4.2 and figure 7, manufacturing constitutes the majority (62.50%), indicating its dominance, while trade and service account for (23.00%) and (14.50%), respectively.

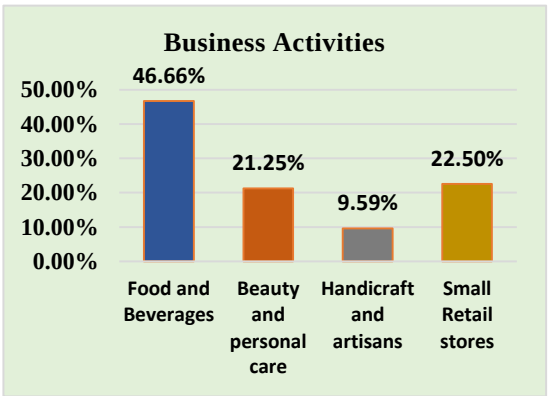
The ownership of businesses provides a structural and operational dynamics of women-led enterprises in the informal sector. The majority of women entrepreneurs in the informal sector operate as proprietors (87.50%), and 6.67 percent of respondents operate with the help of partners, while 5.83 percent of Women Entrepreneurs in the Informal Sector are engaged in self-help groups.

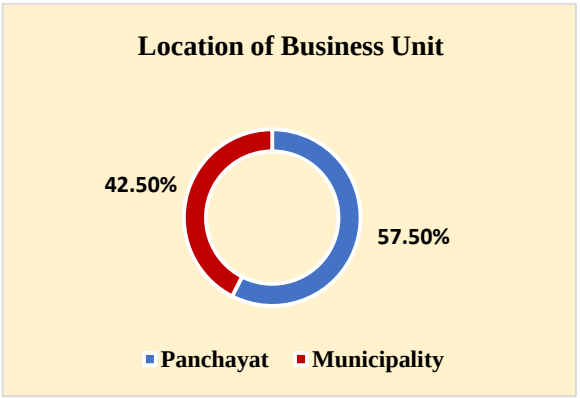
Figure 7. Business Profile of Informal Women Entrepreneurs

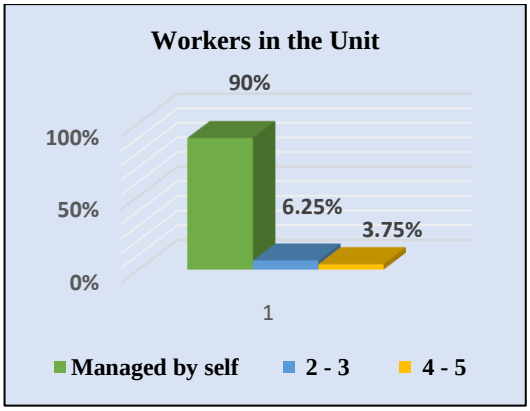


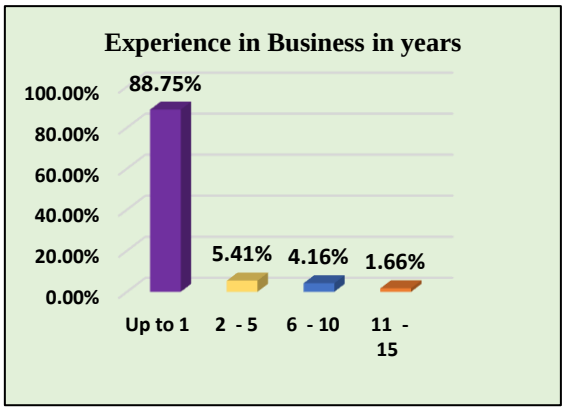


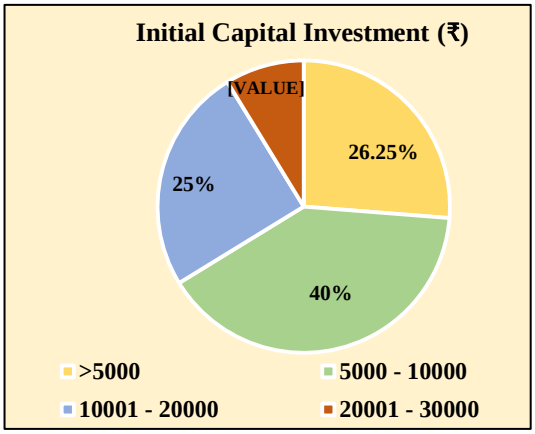


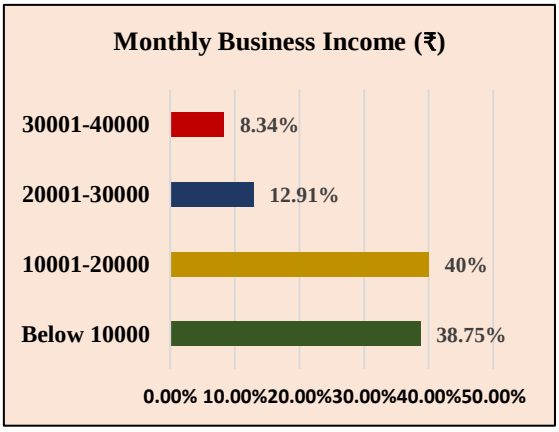


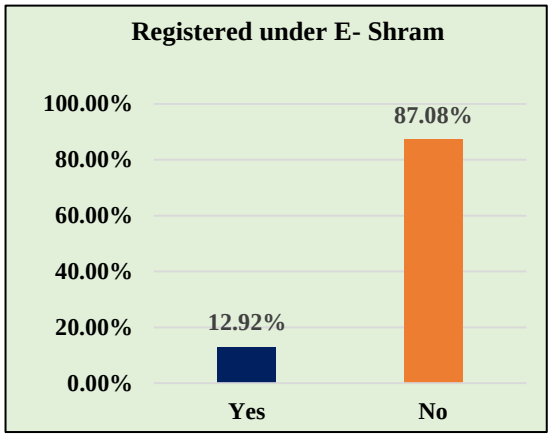


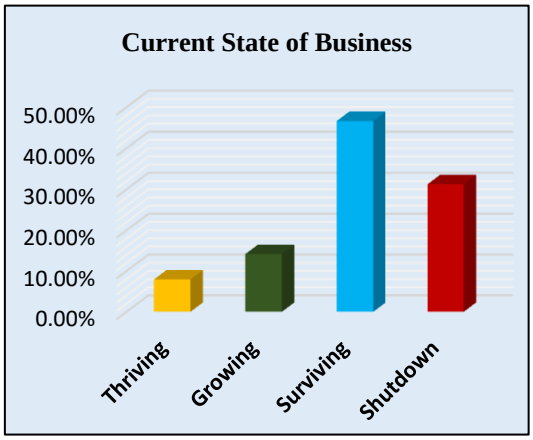

Workers in the Unit
90%
100%
50%
0%
6.25%
3.75%
1
Managed by self
2 - 3
4 - 5

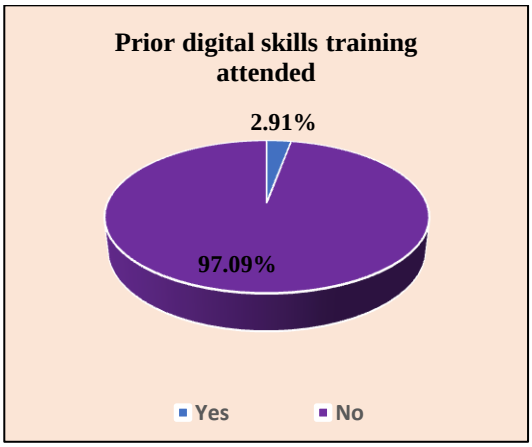

Experience in Business in years
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
88.75%
5.41%
4.16%
1.66%
Up to 1
2 - 5
6 - 10
11 - 15

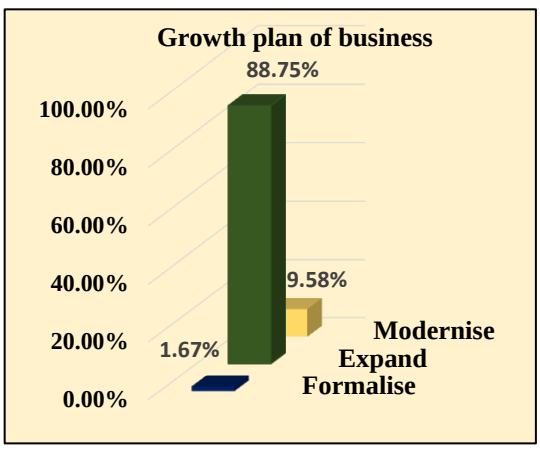

Initial Capital Investment (₹)
[VALUE]
26.25%
25%
40%
>5000
5000 - 10000
10001 - 20000
20001 - 30000


Monthly Business Income (₹)
30001-40000
8.34%
20001-30000
12.91%
10001-20000
40%
Below 10000
38.75%
0.00% 10.00%20.00%30.00%40.00%50.00%


Registered under E- Shram
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
87.08%
12.92%
Yes
No


Current State of Business
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Thriving
Growing
Surviving
Shutdown


Prior digital skills training attended
2.91%
97.09%
Yes
No


Growth plan of business
88.75%
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
9.58%
1.67%
Modernise
Expand
Formalise

Business activities are often shaped by the local economic environment, access to resources, and cultural norms. Most women entrepreneurs (46.66%) are involved in the making of food and beverages, followed by small retail stores constitute 22.50 percent and beauty and personal care (21.25%). Handicrafts and artisan businesses are the least common involving 9.59 percent.

The location of business activities is crucial in understanding how different setups influence accessibility, operational feasibility, customer engagement, and overall business success. The study reveals that most (47.91%) of women entrepreneurs operate from home, showcasing the prominence of home-based setups. The street-side stalls account for 32.51 percent, followed by kiosks (17.92%), while permanent structures include 1.66 percent.

The location of a business reflects local demand, resources, and cultural context. The majority of Women Entrepreneurs in the Informal Sector work in rural or semi-rural areas, with 57.50 percent concentrated in Panchayath. Meanwhile, 42.50 percent operate in urban or semi-urban areas, represented by Municipalities.

The scale and adaptability of a business unit are often reflected in its workforce composition. The study highlights that an overwhelming majority (90%) of business units are operated solely by the entrepreneurs, emphasizing the prominence of self-managed enterprises. Meanwhile, 6.25 percent of units employ 2-3 workers and a mere 3.75 percent have 4-5 workers.

Experience in the business of Women Entrepreneurs in the Informal Sector shows their level of expertise, business resilience, and ability to navigate challenges over time. The majority of Women Entrepreneurs in the Informal Sector (88.75%) have been in business for less than one year, highlighting the nascent stage of their entrepreneurial journey. 5.41 percent have accrued 2-5 years of experience, followed by 4.16 percent with 6-10 years of experience and 1.66 percent with 11- 15 years of experience.

Initial capital investment is a key indicator of the financial foundation of entrepreneurial ventures. The most entrepreneurs (40%) began their businesses with ₹ 5,000–₹ 10,000, indicating the dominance of small-scale ventures. Meanwhile, 26.25 percent started with less than ₹ 5,000, followed by 25 percent with ₹ 10,001–₹ 20,000, and 8.75 percent with ₹ 20,001–₹ 30,000, reflecting the limited presence of higher-capital investments.

Monthly business income highlights the financial stability and growth potential of enterprises. Most entrepreneurs (40%) earn between ₹ 10,001–₹ 20,000. Meanwhile, 38.75% earn less than ₹ 10,000, followed by 12.91% earning between ₹ 20,001–₹ 30,000, and 8.34% generating income within ₹ 30,001–₹ 40,000.

The registration under the E-Shram Portal is a government initiative launched by the Ministry of Labour and Employment in the year 2021, which aims to create a centralized database for unorganized workers in the age group of 16 -59 years.

Majority (87.08%) of the women entrepreneurs in the informal sector have not registered at the time of the survey, and only 12.92 percent have registered with the E-shram portal.

The current state of business evaluates the stability and advancement of enterprises. The analysis reveals that most of the business units (46.66%) are in the "surviving" stage, while 31.26 percent face "shutdown." In comparison, 14.16 percent are in the "growing" stage, and only 7.92 percent fall under the "thriving" category.

Growth Plans in the business of Women Entrepreneurs in the Informal Sector signify their aim to expand, formalize, or modernize their businesses. The data shows that the majority of Women Entrepreneurs in the Informal Sector (88.75%) plan to expand their businesses, followed by 9.58 percent have focused on modernizing their businesses, while only 1.66 percent of the respondents plan to establish a formal unit.

The business profile of the informal women entrepreneurs highlights key operational characteristics, financial stability, and growth potential of women entrepreneurs in the informal sector. Manufacturing remains dominant, with a strong presence in food and beverage enterprises. Proprietorship is the preferred ownership model, with the majority operating from home. Despite modest profitability and being in the survival stage, entrepreneurs have a desire for expansion. The majority of women entrepreneurs have not registered under E-Shram portal and possess low digital skills prior to the digital skills training.

4.3 Access and Usage of Digital Infrastructural Facilities and Technology Adoption among Women in the Informal Sector

Access to digital infrastructural facilities plays a vital role in enabling technology adoption, especially among women in the informal sector, who often face systemic barriers to digital inclusion. Reliable internet connectivity, availability of digital devices, and access

to training and support services are essential prerequisites for enhancing digital participation and technology-driven entrepreneurship (Chandrasekhar et al., 2021; Naidu & Raj, 2021). However, infrastructural deficits, coupled with socio-cultural constraints, continue to limit women's ability to adopt and effectively utilize technology for business development and market engagement (Hasin, 2025; Singh & Dey, 2020). Strengthening digital infrastructure and improving access to affordable and user-friendly technologies can significantly empower informal women entrepreneurs, thereby fostering inclusive digital transformation (Kadam & Ghosh, 2023)

4.3.1 Access and Usage of Digital Devices by Women Entrepreneurs in the Informal Sector

Digital tools such as smartphones, computers, and printers are pivotal for improving business efficiency, enhancing communication, internet connectivity and accessing digital markets (ILO, 2021). The research on access and usage of digital devices helps identify barriers such as cost, digital literacy, and infrastructure deficits that hinder the adoption of technology. In the informal sector, micro-women entrepreneurs increasingly rely on digital devices to manage their small-scale businesses and connect with customers (Banu et al.,2024). While these entrepreneurs often face resource constraints, access to digital tools can open up new opportunities for growth, efficiency, and market reach. Table 4.3.1 and Figure 8 show access and usage of digital devices by Women Entrepreneurs in the Informal Sector

Table 4.3.1 Access and Usage of Digital Devices by Women Entrepreneurs in the Informal Sector

Digital devices	Owned and used in business		Owned but not used in business		Not owned	
	Number of Respondents n = 240	Percent	Number of Respondents n = 240	Percent	Number of Respondents n = 240	Percent
Smartphone	123	51	117	49	-	-
Computer/ Laptop	36	15	21	9	183	76
Scanner	26	11	-	-	214	89
Printer	36	15	-	-	204	85

Source: Computed Data

Figure 8. Access and Usage of Digital devices in Business

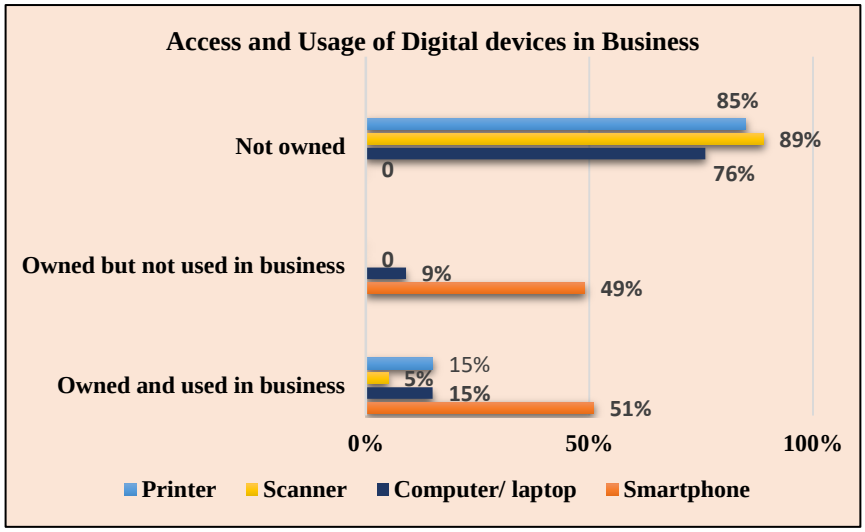


Table 4.3.1 shows that all the women entrepreneurs in the informal sector under the study have strong reliance on smartphones, but only 51 percent use them in business operations, while 49 percent didnot integrate them into business operations. This is due to their limited awareness, trust, and security concerns. The low ownership and usage of Laptops and Computers (15%) in business operations showcase their limitations in business scaling with digital tools. Similarly, scanners and printers have minimal adoption with 89 percent and 85 percent, respectively. This underscores the dependency on more accessible technologies like smartphones while more advanced equipment remains underutilised due to cost constraints, lack of necessity, or limited digital competency.

4.3.2 Access to Internet Connectivity by Women Entrepreneurs in the Informal Sector

Access to internet connectivity is a foundational enabler for technology adoption and digital participation among women entrepreneurs in the informal sector. Reliable and affordable internet access allows women to explore market opportunities, engage in digital marketing, connect with customers, and access financial and governmental services (Mehta & Rana, 2023; World Bank, 2021). However, gendered disparities in digital access especially in rural and semi-urban regions—persist due to factors such as affordability, digital illiteracy, and sociocultural norms that restrict women's mobility and digital engagement (Banu & Thomas, 2022; GSMA, 2022). Bridging the gendered internet gap is essential to empower women entrepreneurs with tools to expand their businesses, improve productivity, and enhance economic resilience in the informal economy (Chaudhary & Sharma, 2024). Access to Internet Connectivity by Women Entrepreneurs in the Informal Sector is shown in table 4.3.2 and Figure 9.

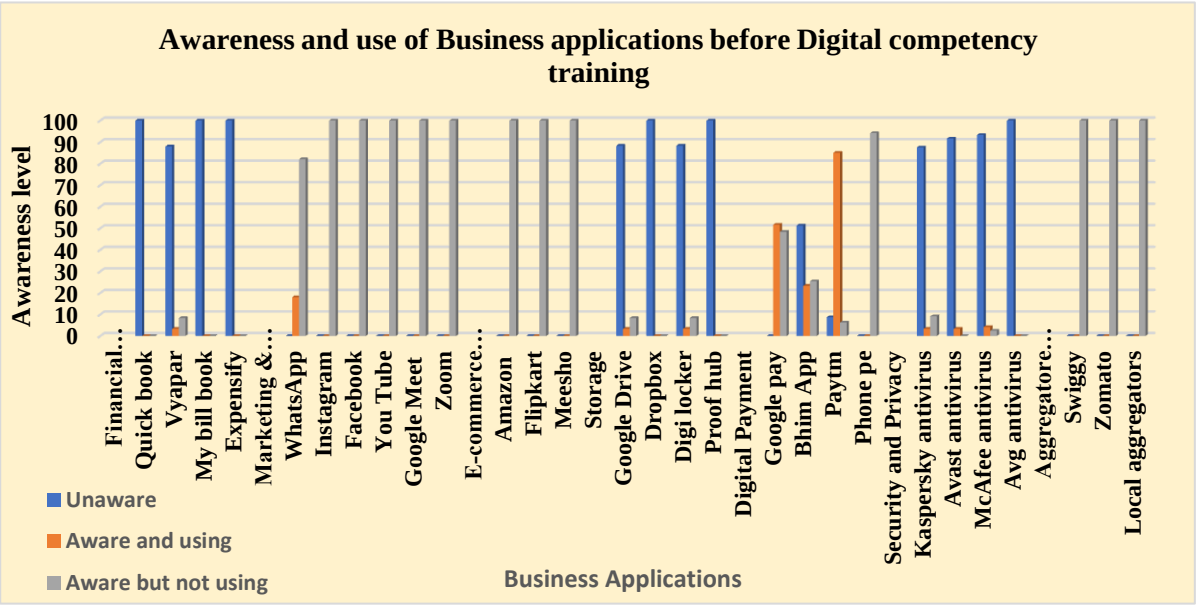
Table 4.3.2 Access to Internet Connectivity by Women Entrepreneurs in the Informal Sector

Access to Internet connectivity	Number of Respondents n = 240	Percent
Telephone line	7	2.91
Cable internet	5	2.08
Mobile Internet	227	94.58
Wi-fi connectivity	167	70
Public internet cafe	73	30.41

Source: Computed Data, *Multiple response

Table 4.3.2 and figure 9 reveals a predominant reliance on mobile internet with 94.58 percent among Women Entrepreneurs in the Informal Sector, underscoring its role as the primary mode of connectivity due to its accessibility, affordability, and ease of use. The second dominant connectivity is Wi-Fi, with 70 percent of respondents utilizing it, indicating its importance for business operations requiring more stable and faster connections. However, there is relatively low adoption of traditional wired options, with telephone lines used by 2.91 percent and cable internet used by 2.08 percent of respondents, reflecting infrastructure gaps, cost barriers, or a preference for more flexible solutions. About 30.41 percent of entrepreneurs depend on Public internet cafes 30.41 percent, which serve as an alternative for those without personal access but pose challenges in privacy and reliability.

Figure: 9 Awareness and use of Business applications before Digital Competency Training



Access to digital devices and reliable internet connectivity is fundamental for the efficiency of business operations. The overwhelming reliance on mobile internet demonstrates its importance, but the inconsistent quality of Wi-Fi and the limited availability of broadband services highlight gaps that hinder effective digital engagement.

4.4 Challenges in Digitalisation of Business among Select Women Entrepreneurs in the Informal Sector

The digitalization of Women Entrepreneurs in the Informal Sector presents a transformative opportunity to enhance business operations, expand market reach, and foster economic development (Chatterjee & Das, 2023). Digitalization is hindered by several challenges that limit its ability to use digital technology. The key barriers include the digital literacy gap, limited access to affordable and reliable internet connectivity, and the high cost of digital devices and services. Additionally, cultural and gender norms restrict their mobility and opportunities for training or networking. Further lack of mentorship, or supportive networks, also prevents women from investing in and effectively using digital tools to grow their businesses (Agarwal & Lenka, 2021). The challenges of Women Entrepreneurs in the Informal Sector to adopt digitization have been ranked based on the mean score and shown in Table 4.4 and Figure 10.

Table 4.4 shows the challenges in digitalization of business faced by Women Entrepreneurs in the Informal Sector. Ranking the challenges in digital transformation is essential to understanding and prioritizing the issues businesses face during this process.

The Lack of Digital Skills Training (M = 4.25, SD = 1.05, R =1) has the highest mean of 4.25, indicating that it is the strongest barrier to technology adoption and ranks first. The low standard deviation suggests a high consensus among entrepreneurs as they agree that digital skills training is a critical issue. This result aligns with numerous studies, which indicate that a lack of digital skills is a primary obstacle for women entrepreneurs in the informal sector (Jain & Ghosh, 2022). Without adequate training, they lack in effectively using digital tools to enhance their businesses.

The Lack of User-Friendly Tools (M = 4.24, SD = 1.30, R = 2) ranks second and a relatively low standard deviation suggests a strong agreement among respondents that the tools available to them are not easy to use. This finding supports the view that many digital tools are designed with a certain level of expertise in mind, making them inaccessible to

Women Entrepreneurs in the Informal Sector who might not have advanced technical skills (UNCTAD, 2022). Designing tools that are intuitive and easy to navigate is essential to improving adoption rates.

Table 4.4 Ranking of challenges in Digitalisation of business among select Women Entrepreneurs in Informal Sector

Challenges of Digital Transformation	SA		A		N		DA		SDA		SD	M	R
	n	%	n	%	n	%	n	%	n	%			
Lack of Digital Skills Training	128	53.3	78	32.50	8	3.33	18	7.50	8	3.33	1.05	4.25	1
Lack of user-friendly tools	158	65.8	40	16.67	6	2.50	14	5.83	22	9.17	1.3	4.24	2
High cost of technology adoption	26	10.8	140	58.33	12	5.00	44	18.33	18	7.50	1.13	3.47	5
Unreliable internet connectivity	33	13.8	115	47.92	7	2.92	56	23.33	29	12.08	1.29	3.28	7
Inconsistent power supply	7	2.91	25	10.42	8	3.33	70	29.17	130	54.17	1.1	1.79	10
societal norms	37	15.4	95	39.58	4	1.67	85	35.42	19	7.92	1.28	3.19	8
Language barriers	91	37.9	31	12.92	8	3.33	90	37.50	20	8.33	1.49	3.35	6
Underutilisation of business applications	114	47.5	55	22.92	11	4.58	40	16.67	20	8.33	1.38	3.85	4
Security and privacy concerns	120	50	55	22.92	20	8.33	15	6.25	30	12.50	1.4	3.92	3
Lack of awareness about digital opportunities	43	17.9	44	18.33	15	6.25	112	46.67	26	10.83	1.33	2.86	9

(SA- Strongly Agree, A-Agree, N- Neutral, DA- Disagree, SDA- Strongly disagree, %- - percent, n – number of respondents, M -Mean score, R-Rank**)**

Security and Privacy Concerns (M = 3.92, SD = 1.40, R =3) reflect significant agreement among respondents and a high standard deviation suggests that some entrepreneurs are less concerned than others. With the rise in cybercrimes and data breaches, it is unsurprising that many women entrepreneurs worry about the security of their digital transactions (ITU, 2023). Trust in digital platforms is crucial for their adoption, and security concerns can severely hinder their use.

Underutilization of Business Applications (M = 3.85, SD = 1.38, R =4) indicates a moderate level of agreement. The standard deviation shows greater variability in responses, meaning some entrepreneurs are using digital tools more effectively than others. This variability could be due to differences in business types or the level of digital engagement in utilising digital applications to streamline their operations, which is consistent with findings by UNCTAD (2022) that highlight the underuse of technology due to a lack of awareness or expertise.

The high Cost of Digital Adoption (M = 3.47, SD = 1.13, R 5) is recognized as a significant but not overwhelming challenge. The standard deviation shows the variation in how respondents view the financial barriers to digital adoption. The cost of acquiring digital tools (like smartphones and computers) and maintaining internet access can be prohibitive for women in the informal sector, especially in low-income communities (World Bank, 2022).

Language Barriers (M = 3.35, SD = 1.49, R=6) have a higher standard deviation indicating heterogeneity of responses. Language is often a significant barrier in accessing digital tools, especially in regions where most tools are designed in global languages like English. Entrepreneurs in non-English-speaking regions face challenges in using platforms that didnot support their native languages (CSIS, 2023)

Unreliable Internet Connectivity (M = 3.28, SD=1.29, R=7) suggests that some entrepreneurs had to experience more issues with connectivity than others. Internet connectivity is a known barrier to digital adoption in many low-income and rural areas (World Bank, 2022). Entrepreneurs in these regions struggle with inconsistent or slow internet, which will directly impacts their ability to leverage online platforms and tools.

Societal Norms (M = 3.19, SD = 1.28, R=8), particularly gender disparities, can limit women's access to technology and opportunities for digital entrepreneurship (World Bank, 2022). These norms can affect women's confidence, access to resources, and even societal approval for pursuing business ventures online.

Lack of Awareness About Digital Opportunities (M = 2.86, SD = 1.33, R =9) indicates heterogeneity of responses, where entrepreneurs have awareness regarding digital opportunities that can enhance their business. The gap in awareness suggests the need for education and outreach to inform women entrepreneurs about the opportunities in the digital space (UNCTAD, 2022).

Inconsistent Power Supply (M = 1.79, SD = 1.10, R =10) ranked as the least significant challenge for Women Entrepreneurs in the Informal Sector in digitalisation. Despite the lower ranking, it is important to note that inconsistent power supply can still cause disruptions in the use of digital tools and platforms, especially in regions with frequent power outages.

However, it seems that internet connectivity and digital skills are not more pressing concerns for most entrepreneurs in the sample. The previous research shows that power outages lead to reduced productivity, increased costs from backup generation, and damaged equipment, severely affecting small- and medium-sized enterprises (Saah & Mbohwa, 2024)

The challenges of Women Entrepreneurs in the Informal Sector in adopting digital technologies can be categorized into primary and subsidiary barriers. Primary barriers include the lack of digital skills training, lack of user-friendly tools, and high cost of technology adoption, as these are the most critical factors preventing digitalisation. On the other hand, subsidiary barriers such as unreliable internet connectivity, societal norms, and language barriers secondarily influence adoption.

4.5 Awareness and Use of Business applications among Women Entrepreneurs in the Informal Sector

Business applications have significantly transformed key business functions and processes by introducing automation, enhancing efficiency, and enabling better decision-making (Patil & Pawar, 2023). The major ways business applications have changed important business functions which include financial management, marketing, and communications, e-commerce applications, Digital payments, security privacy, and aggregator platforms (Verma & Das, 2023).

Business applications like accounting and budgeting tools help Women Entrepreneurs in the Informal Sector track their finances, manage cash flow, and generate financial reports, making it easier to stay organized and access funding (El Achari & Farih, 2024).

Digital marketing and e-commerce platforms allow entrepreneurs to reach a wider audience, promote their products, and engage with customers (Sharma & Nandini, 2020). This enables them to compete more effectively in the digital marketplace. Tools for

inventory management, customer relationship management (CRM), and cloud-based storage allow entrepreneurs to keep track of their operations and data in real time, improving business efficiency and reducing operational costs (Sheikh et al., 2019).

Table 4.5 Awareness and Use of Business applications before Digital competency training among Women Entrepreneurs in the Informal Sector

Business applications	Unaware		Aware and using		Aware but not using	
	Number of Respondents	Percent	Number of Respondents	Percent	Number of Respondents	Percent
Financial Management						
Quick book	240	100	-	-	-	-
Vyapar	212	88	8	3.33	20	8.33
My bill book	240	100	-	-	-	-
Expensify	240	100	-	-	-	-
Marketing & Communication						
What's app	-	-	43	18	197	82.08
Instagram	-	-	-	-	240	100
Facebook	-	-	-	-	240	100
You Tube	-	-	-	-	240	100
Google Meet	-	-	-	-	240	100
Zoom	-	-	-	-	240	100
E-commerce Application						
Amazon	-	-	-	-	240	100
Flipkart	-	-	-	-	240	100
Meesho	-	-	-	-	240	100
Storage						
Google Drive	212	88.33	8	3.33	20	8.33
Dropbox	240	100	-	-	-	-
Digi locker	212	88.33	8	3.33	20	8.33
Proof hub	240	100	-	-	-	-
Digital Payment						
Google pay	-	-	124	51.6	116	48.33
Bhim App	123	51.25	56	23.3	61	25.41
Paytm	21	8.75	204	85	15	6.25
Phone pe	-	-	-	-	226	94.16
Security and Privacy						
Kaspersky antivirus	210	87.5	8	3.33	22	9.16
Avast antivirus	220	91.66	8	3.33	-	-
McAfee antivirus	224	93.33	10	4.16	6	2.50
Avg antivirus	240	100	-	-	-	-
Aggregator platforms						
Swiggy	-	-	-	-	240	100
Zomato	-	-	-	-	240	100
Other Local aggregators	-	-	-	-	240	100

Source: Computed Data

Digital payment provides secure, convenient, and inclusive transactions, reducing reliance on cash and opening new avenues for customers to make payments, locally and internationally (Pan et al., 2024). With applications focused on security and privacy, women entrepreneurs can protect sensitive business and customer data from cyber threats, fostering trust and confidence in their business practices (Sharma & Nandini, 2020).

However, despite their potential, many Women Entrepreneurs in the Informal Sector remain unaware of or underutilize these digital tools hence it is necessary to study the awareness and use of business applications among Women Entrepreneurs in the Informal Sector is essential.

Table 4.4 analyses three levels of awareness, including awareness and awareness and using and unaware popular business applications which are useful across multiple categories of business operations among Women Entrepreneurs in the Informal Sector through percentage analysis. To identify the skill gap in awareness and use of business applications which will serve as basis for deciding the module and specific areas which requires skill competency training.

The table 4.5 and figure 10 shows awareness and use of business applications such as Financial Management Tools, Marketing &Communication applications, E-commerce Application, Storage, Digital payment applications, security and privacy and aggregator platforms before providing digital competency training among Women Entrepreneurs in the Informal Sector

Financial Management Tools

Financial management tools are crucial in supporting women entrepreneurs in the informal sector in managing their finances by tracking revenue and expenditures in real-time, ensuring that women can plan for cash shortages and avoid running out of funds. It can automate tasks including invoicing, expense categorization, and financial reporting, freeing up time for other important aspects of the business (Yusuf & Suhail, 2022). Further tools typically offer secure, encrypted platforms that protect sensitive financial information. This reduces the risk of theft and ensures that business owners can access and manage their finances safely (Rajan & Bhat, 2022).

In the present study, Women Entrepreneurs in the Informal Sector are not aware that QuickBooks, My Bill Book, Vyapar, and Expensify are related to financial management tools and are not used in business operations. This could reflect either a lack of popularity in the user base or these tools being more common in specific professional sectors.

About 88 percent of respondents are unaware of the Vyapar application, while 8.33 percent are aware but not using it, remaining 3.33 percent are aware and actively using it. This suggests that Vyapar has some recognition but limited adoption, possibly due to barriers to usage. Recent research confirms that low awareness of digital financial services is a key barrier to adoption in informal-sector SMEs in emerging markets (Kamutuezu et al., 2021; Small Business Bookkeeping Guide, 2025).

Marketing & Communication Tools

Marketing and communication tools are vital for women entrepreneurs, helping them reach target audiences and promote their products despite limited resources. Often working with small budgets, many rely on platforms like Instagram, Facebook, and WhatsApp, which allow for low or no-cost marketing, enabling access to a broad audience without significant financial investment. These social media platforms also offer affordable targeted advertising options that can be customized by demographics and interests, allowing entrepreneurs to focus on specific customer segments efficiently. Building a digital presence is key to brand awareness, and regular engagement with followers through posts and relevant content can attract potential customers ((Sari et al., 2023) A well-designed social media page or website reflects the quality and professionalism of the business. These sites serve as central hubs, providing essential information and online storefronts. Quick responses to inquiries and personalized service foster stronger customer relationships, ultimately driving business success.

In the present study, all Women Entrepreneurs in the Informal Sector were aware of WhatsApp but were not using it for business purposes (82%), with only 18 percent actively using it for business communication. Though WhatsApp has wide recognition, many still did not leverage it for business operations.

The social media platforms Instagram, Facebook, and YouTube show 100 percent awareness but no active usage among respondents. This could suggest that while these platforms are ubiquitous, they are underutilized for business operations.

Google Meet and Zoom tools also have 100 percent awareness and are used by the respondents primarily for communications, but they are not used for business operations. This indicates a significant gap between awareness and business integration, despite WhatsApp's growing adoption in micro and small enterprises across India (Ghosh & Sengupta, 2022). Similarly, social media platforms like Instagram, Facebook, and YouTube

had 100 percent awareness among respondents but no active business use. This suggests that while these platforms are widely known, many informal entrepreneurs lack the digital competency, strategic knowledge, or confidence to utilize them for business development (Kaur & Bansal, 2023).

E-commerce Applications

E-commerce applications are digital platforms that enable buying and selling goods or services online. They are vital for businesses, including informal entrepreneurs, as these platforms help connect with customers, manage transactions, and process payments without needing a physical storefront. For Women Entrepreneurs in the Informal Sector, one major benefit is the ability to access not just local and regional markets but also global audiences. This expanded reach can greatly enhance their sales potential. By selling products online, they can significantly increase their revenue. These entrepreneurs can avoid the costs associated with renting retail space, hiring a large workforce, or investing in expensive marketing campaigns. In addition to broadening market access, e-commerce platforms integrate secure payment systems such as Google Pay and PayTM. These systems reduce the risks associated with cash-based transactions, providing safer way for Women Entrepreneurs in the Informal Sector to conduct business. Furthermore, e-commerce tools enhance customer engagement through features like reviews, ratings, and direct communication, fostering a sense of community and trust around their brands (Srivastava & Sahu, 2021).The e-commerce empowers women entrepreneurs in the informal sector by providing cost-effective ways to reach wider audience, ensuring secure transactions, and facilitating customer interactions. Embracing these digital platforms can significantly enhance their business opportunities and growth.

In the present study among respondents, Amazon, Flipkart, and Meesho are the e-commerce platforms that show 100 percent awareness but did not actively used these applications for business operations. This could reflect their unawareness and concerns about how to sell on these digital platforms. This underutilization, primarily stem from lack of platform literacy, perceived complexity in onboarding, and concerns about logistics or digital fraud (Kumari & Thomas, 2024).

Digital Storage Tools

Digital storage tools are essential for managing and securing business data in the digital world. This allows entrepreneurs to store, organize, and share data without needing physical storage devices. Cloud storage allows automatic data backup, which protects

important files from loss due to hardware failures or accidental deletions (Saxena & Gupta, 2023). Entrepreneurs can access their data from anywhere with an internet connection, enabling remote work and productivity. Platforms like Google Drive and Dropbox offer free plans with plenty of storage for small businesses. These tools make document sharing and collaboration easy, allowing effective communication with team members and customers. Cloud storage solutions often include organizational features such as folders and tags, helping Women Entrepreneurs in the Informal Sector keep their data easily accessible and well-structured.

In the present study, Google Drive and Digi Locker shows that 88.33 percent were unaware of these business tools. 8.33 percent of Women Entrepreneurs in the Informal Sector are aware of but didnot use for business operations and the remaining three percent are only actively using it. Dropbox and Proof Hub showcase 100 percent unawareness. This implies that the majority of Women Entrepreneurs in the Informal Sector didnot know the importance of digital storage in business and also its importance varies with the business they are engaged. This indicates a significant digital awareness gap, where Women Entrepreneurs in the Informal Sector are not fully informed about the utility of cloud storage tools in managing and organizing business-related information (Chakraborty & Jha, 2024). The underutilization also reflects differences in perceived relevance, as entrepreneurs engaged in non-document-intensive businesses not immediately recognize the value of digital storage (Raj & Pillai, 2021).

Digital Payments

Digital financial transactions are the electronic transfer of money and payments without using physical cash. They take place over the internet or mobile networks and use various digital platforms, such as payment gateways, mobile wallets, and online banking systems.

One of the main benefits of digital transactions is that they allow individuals, particularly women entrepreneurs, to access their business funds anytime, day or night, without needing to visit a bank. This convenience makes it easier to manage finances effectively. Additionally, digital transactions reduce reliance on cash, which can be vulnerable to theft or loss. They often come with lower transaction fees, or sometimes no fees at all, making them a cost-effective option for Women Entrepreneurs in the Informal Sector. Instant payment methods like digital wallets and bank transfers help these

entrepreneurs improve cash flow and avoid delays that often occur with traditional payment methods, such as checks or cash (Nair & Mehta, 2023). Another advantage is that digital transactions create clear and accurate records of all payments and receipts. This transparency minimizes the risk of errors and discrepancies in business finances, helping owners track profits, and plan for future investments. Furthermore, by offering a variety of payment options such as credit and debit cards, mobile wallets, and UPI payments which women entrepreneurs can reach a larger customer base. This flexibility makes payment easier for customers and enhances their overall shopping experience and building trust in the business.

The digital financial transactions simplify financial management for entrepreneurs and provide new opportunities for growth and customer engagement in today's digital economy.

In the present study, about Google Pay, 51.62 percent are aware and use it for business operations and 48.30 percent are aware but not using it. This indicates high usage but also some friction or reluctance to adopt it fully. Bhim app has 51.25 percent unawareness among Women Entrepreneurs in the Informal Sector. About 23.3 percent of the respondents are aware and actively using it and the remaining 25.40 percent aware but did not use it for business operations. The PayTM has 85 percent awareness among Women Entrepreneurs in the Informal Sector who use it for business operations, but 9 percent are still unaware, highlighting its broad reach and its adoption. PhonePe shows almost exclusive use, with 94 percent aware but not using it. This suggests that the platform might be a well-known but not necessarily popular tool for business transactions by the current study group. This indicates moderate adoption reluctance, possibly due to perceived complexity, fear of fraud, or lack of hands-on training (Ravindran & Kumar, 2023).

Security and Privacy Tools

Ensuring the security and privacy of business data is vital for building customer trust and protecting sensitive information. Women in the informal sector often rely on personal digital devices to manage sales and store customer information. This reliance makes them vulnerable to cyber threats like data breaches, scams, or identity theft. The use of security and privacy tools in business can safeguard their personal and professional data, reduce risks, and maintain smooth operations in a digital environment. Antivirus software is essential for protecting devices from malware, viruses, and ransomware that can compromise important data and disrupt business activities. It is also crucial to manage passwords securely

to prevent unauthorized access to online accounts and sensitive information. For women entrepreneurs in informal, protecting financial data and transactions is key to safeguarding income and avoiding financial losses, which can prevent issues like identity theft, unauthorized transactions, and financial fraud (Hussain and Mubarak, 2024).

In the present study 87.52 percent of Women Entrepreneurs in the Informal Sector are unaware of Kaspersky Antivirus. About three percent are actively using it for business operations and the remaining nine percent are aware but did not use it for business operations.

Avast Antivirus is being used by 3.33 percent of the respondents for business operations and the rest 91.63 percent are unaware of it. McAfee antivirus has active users of 4 percent. 2.5 percent are aware but did not use it for business operations and the majority of the respondents (93.3%) unaware about the application. AVG antivirus has 100 percent unawareness. This indicates that women entrepreneurs in the informal sector did not need to use anti-virus software but using it in business increases their security and privacy.

Aggregator Platforms

Aggregator platforms are digital platforms or online marketplaces that bring together various sellers or service providers into one space, allowing customers to access a range of offerings from different vendors in a single location. These platforms aggregate services, products, or information from multiple sources to simplify the consumer experience and expand the reach of Women Entrepreneurs in the Informal Sector. For women entrepreneurs in the informal sector, aggregator platforms offer a unique opportunity to access larger markets, reduce operational complexities, and enhance visibility without the need for extensive infrastructure. In the current study, Swiggy and Zomato had 100 percent awareness among the respondents, but they have not been used for business purposes, which suggests that they are popular among consumers but not being utilized by small businesses for operations.

It is inferred that there are gaps in awareness, adoption, and utilization of various digital tools by women entrepreneurs in the informal sector, focusing on financial management, marketing and communication, e-commerce, digital storage, digital payments, security and privacy, and aggregator platforms. While, tools like WhatsApp, Google Pay, and Vyapar show higher awareness and limited usage, others like Canva, Tally Prime, or security tools like Kaspersky and McAfee remain largely unknown or unused this is in line

with the study (Internet Saathi Impact Report, 2024; The Guardian, 2025). This behaviour reflects a usage hierarchy, where tools that meet immediate, visible needs (e.g., payments and messaging) are adopted first, while tools that support back-end functions or long-term growth are postponed or ignored (Kumar & Rani, 2022).

4.6 Effectiveness of Digital Competency Intervention among select Women Entrepreneurs in the Informal sector

Digital technologies have changed the way of doing business and their value propositions (Urbinati et al, 2023). The infusion of technologies has increased access to wider markets and has improved the competitive position of the enterprise (Fitzgerald et al., 2022). Building a business around the customer has become the key to sustaining in the digital age. Thus, going digital help in meeting customer needs and values, strengthens customer contacts and international transactions via digital distribution channels (Ciechanowski et al., 2019). However, according to the Organisation for Economic Cooperation and Development (OECD,2021), digital transformations in business, including e-commerce, e-orders, and supply chain and customer management, are still striving to transform. Better-positioned businesses are leveraging technologies to make their business smarter. But the micro enterprises, contributing more than half a percent to Gross Domestic Product (GDP) show lower probability towards technology adoption (EIB, 2019). Lack of awareness and understanding of digital services and outcomes is the major concern for micro businesses to operate digitally (Horvath et al., 2019). Hence digital competence has become a necessity to meet the demands of fast changing work environment (Cascio & Montealegre, 2016; Saptura et al., 2022).

Digital competencies have been interpreted in various ways as Digital Literacy, Digital Competence, e-Literacy, e-Skills, e-Competence, Computer literacy, and Media literacy) in education, policy making, academic literature, and certification practices. The term digital competency highlights the importance of handling technology in the digital era (Ferrari, 2012; Bozkurt & Kondacki, 2022). This research considers digital competence technology related skills of an entrepreneur. The recent years witnessed use of several terms to describe the skills and competence of using digital technologies and are used interchangeably such as ICT skills, technology skills, information technology skills, 21st century skills, information literacy, digital literacy, and digital skills. (Adeyemon, 2009;

Susteyo Darmento et al.,2023). Sometimes the terms are narrow to internet skills, referring only to a limited area of digital technology, and some of them widen the content to media literacy. The wide variety of terms reflects the rapid development of technologies.

The term competence is more used than skills, reflecting the need for a wider and more profound content of the concepts. The relation between competence and skills is that "the competency is more than just knowledge and skills. It involves the ability to meet complex demands, by drawing on and mobilizing psychosocial resources (including skills and attitudes) in a particular context" (OECD, 2005).

Although the terms competency and competence are often used interchangeably to describe a skill or required knowledge for a particular state or function (Holtkamp et al., 2015). The present research uses the term competency as he knowledge, skills, and abilities required to solve problems. In the digital context, an individual's digital competency is necessary to tackle specific business problems to reach the target customers and deliver the right product at the right time and place.

A digital skill framework identifies the digital competences associated with different occupations and levels of education. Typically, digital skills frameworks are designed to support providers, organizations, and employers who offer training for youth and adults. The digital skills are essential for citizens to safely manoeuvre in a digital world. In the current research the digital competency is in the context of leveraging digital technologies for entrepreneurial opportunities (Davidson & Vaast, 2010), to use technologies for marketing, distribution, and managing stakeholder relationships (Hair et al., 2012).

Thus, Digital competence is "the confident and critical use of Information Society Technology for work, leisure and communication" (Soby, 2013, p. 135). Ferrari et al. (2012) observed digital competencies as the ability to understand and express the transformation of information into knowledge, operations, and services by making analytical, productive, and creative use of ICTs and social software. Apart from digital competency, entrepreneurs' attitude, personality, motivation, interest, prior experiences, and level of education (Oberlander et al., 2020) and structural factors such as industry context, digital infrastructure, government policies etc., contribute to digital competence (Ngoasong, 2018)

To stay competitive in the evolving digital landscape, entrepreneurs and organizations need to understand the application and utilisation of various digital technologies to exploit the new possibilities offered in the digital world.

Digital revolutions in business operations have made entrepreneurs to be more professionals in managing customers. Though many offline businesses earn more revenue and profit argue against digitalization, it has become critical to enhance digital capabilities to link online and offline and bring a competitive edge in the market.

Digital capability training programs play a crucial role in developing ICT skills through comprehensive pedagogical approaches to digital learning. According to United Nations reports (2018, 2019), effective digital skills training for citizens is essential for accelerating sustainability efforts in the digital age.

Hence, digital competency training was provided to women entrepreneurs based on digital competency areas framed by Digi Comp 2.0. It identifies six core areas that develop digital productivity and proficiency, defined by how individuals interact with information and communication technologies (JISC, 2019). The Digital competency covers 5 competence areas which include ICT Proficiency, Information and Data and Media literacy, Digital Creation, Digital Research and Problem-solving, Digital Communication, Collaboration and Participation, Digital Learning and Development, and lastly Digital Identity and Wellbeing (JISC 2015; as cited in Carretero et al., 2017).

A Pre-test of information regarding digital competencies was collected from participants before the training to structure the training modules. The Wilcoxon signed test is applied to determine the paired difference test of repeated measurements on a single sample to assess whether their population mean ranks differ (Xia et al, 2020). The average pre- and post-test scores were computed to identify significant mean differences in the digital competency of informal women entrepreneurs. The following hypothesis was formulated based on the above discussion on digital competency and its importance to informal women entrepreneurs.

Ho_1: There is no significant mean difference between the digital competency of select Women Entrepreneurs in the Informal Sector before and after training

Ha_1: There is a significant mean difference between the digital competency of select Women Entrepreneurs in the Informal Sector before and after training

4.6.1 Impact of Digital Proficiency training on Select women entrepreneurs in Informal Sector

According to Emwata (2013), Digital Proficiency is the ability to navigate, assess, and create information proficiently and analytically using a variety of digital technologies.

Further, ICT requires the user to "recognise and use that power, to manipulate and transform electronic media, to distribute widely, and to easily adapt them to new forms." (Ukachi, 2015). The Digital Proficiency training was provided under two sub-themes: ICT Proficiency and ICT Productivity. ICT proficiency and ICT productivity is the foundation to develop digital competence to use and manage technologies productively for business operations.

4.6.1.1 ICT Proficiency Training on Select Women Entrepreneurs in Informal Sector

ICT proficiency is the knowledge and skills to use basic ICT devices (Kepler 2019). This improves the entrepreneur's ICT knowledge and understanding of commonly used digital devices for business. The desired goal was to make them proficient in using computers, laptops, and smartphones, which is necessary to stay up-to-date with ICT. Furthermore, simple skills like using a mouse, keyboard, tablet, printer, and scanner were provided. The usage of software for presentations, editing, and spreadsheets was conveyed. Downloading and uploading files, and organizing devices to make them easier, were taught. This would help the entrepreneur in building a personal digital work environment. The effectiveness of ICT Proficiency Training on select women entrepreneurs in the informal sector is shown in table 4.6.1.1.

Table 4.6.1.1 shows the effectiveness of ICT proficiency training on select women entrepreneurs. The results indicate that the confidence of women entrepreneurs in using commonly used digital devices, including computer, laptop, and mobile, has improved from a mean score of 1.77 (SD = 1.154) from before the training to mean score of 3.08 (SD = 1.140) after the training ($P<0.000$). Willingness in the adoption of new devices, applications, software, and services has increased from a mean score of 1.26 (SD = 0.629) to 2.63(SD± 0.807) with ($P < 0.000$). To stay updated with ICT as it evolves has improved from a mean score of 1.21 (SD = 0.629) to 2.58(SD = 0.807) with ($P < 0.000$). Dealing with problems and failures of ICT have increased from a mean score of 1.17(SD = 0.373) to 2.56(SD = 0.650) with ($P <0.000$).

Table 4.6.1.1 Effectiveness of ICT Proficiency Training on select women entrepreneurs

Statements	Pre-training		Post-training		Effect of training		Wilcoxon Sign Test	
	Mean	SD	Mean	SD	Mean Difference	SD	Z	Asymp. Sig. (2-tailed)
Confidence in operating basic devices like laptops and smartphones	1.77	1.154	3.08	1.140	1.31	0.532	14.131	0.000
Willingness to adopt new hardware, software, and services	1.26	0.629	2.63	0.807	1.37	0.533	13.985	0.000
Stay updated with ICT's development	1.21	0.518	2.58	0.710	1.37	0.524	13.987	0.000
Capable of dealing with problems and issues in ICT	1.17	0.373	2.56	0.650	1.40	0.531	13.939	0.000

Source: Computed data (SD = standard deviation, Asymp. Sig. = Asymptotic Significance)

The results show that training has a significant impact, with a mean score difference of 1.40 in handling ICT-related problems and failures. The shift from dependence to self-reliance in managing digital tools, which is essential for sustaining digital engagement in microenterprises (Kumari & Thomas, 2024). The training addressed not just technical skills but also digital self-efficacy, which has been shown to influence long-term adoption and independent use of technology (Sarkar & Verma, 2023). This suggests that the training enhanced participants' confidence in using ICT and effectively managing technical challenges

4.6.1.2 ICT Productivity training on Select Women Entrepreneurs in Informal Sector

ICT productivity refers to the enhanced efficiency, effectiveness, and output achieved through the use of digital tools such as computers, smartphones, internet-based services, and software applications in business operations (Kumar & Rani, 2022). For

informal women entrepreneurs, acquiring digital competency involve the ability to confidently use ICT tools to access, manage, evaluate, and communicate information is critical for improving business efficiency, expanding market reach, and ensuring long-term sustainability (Chakraborty & Thomas, 2023). Effectiveness of ICT Productivity training on select women entrepreneurs in informal sector is presented in Table 4.6.1.2

ICT Productivity is the choice and application of technologies to meet the demands of different tasks. It also indicates the mindset and experience of users for applying those skills into action (Beetham et al., 2018). Further, it demands confidence, curiosity, judgement, discrimination, and the ability to deal with technological setbacks.

Table 4.6.1.2 highlights the impact of ICT productivity training on selected women entrepreneurs. The findings indicate a significant improvement in their ability to use ICT-based tools for efficient and high-quality task execution, with the mean score rising from 2.39 (SD = 1.154) before training to 3.64 (SD = 1.069) after training. Additionally, the ability to select appropriate devices, applications, and software for specific tasks improved, with the mean score increasing 1.83 (SD = 1.139) before training to 3.14 (SD ± 1.061) after training. Entrepreneurs also demonstrated enhanced decision-making in assessing the benefits and constraints of digital tools, reflected in a mean score increase from 1.50 (SD = 0.853) before training to 2.86 (SD = 0.916) after training. Furthermore, their ability to use digital devices, applications, and software for executing complex tasks showed notable progress, as indicated by the mean score rising from 1.33 (SD = 0.706) before training to 2.70 (SD = 0.808) post-training. Their understanding of how digital technology is transforming business practices also improved, with the mean score increasing from 1.33 (SD = 0.705) before training to 2.70 (SD ± 0.828) after training.

Table 4.6.1.2 Effectiveness of ICT Productivity training on Select Women Entrepreneurs in Informal Sector

Statements	Pre training		Post training		Effect of training		Wilcoxon Sign Test	
	Mean	SD	Mean	SD	Mean Difference	SD	Z	Asymp. Sig. (2-tailed)
ICT-based tools help perform tasks effectively with focus on quality.	2.39	1.222	3.64	1.069	1.25	0.539	13.897	.000
Selection of the proper devices and applications for specific tasks	1.83	1.139	3.14	1.061	1.31	0.539	13.935	.000
Assess tools based on their pros and cons before adopting them	1.50	0.853	2.86	0.916	1.36	0.546	13.929	.000
Ability to use various digital tools, platforms to handle complex tasks.	1.33	0.706	2.70	0.808	1.38	0.542	13.983	.000
Understanding how technology is changing business practices	1.33	0.705	2.70	0.828	1.38	0.543	13.975	.000

Source: Computed data (SD = standard deviation, Asymp. Sig. = Asymptotic Significance)

Consequently, the results signal the positive impact of ICT productivity training. The training influenced the use of digital devices, software, and applications for handling complex tasks, as well as the understanding of how digital technology is transforming work practices, both showing a similar effect with a mean score of 1.38. This demonstrates an improvement in women entrepreneurs' confidence and decision-making in selecting suitable digital tools by evaluating their benefits and constraints to effectively accomplish complex tasks. These results are consistent with literature suggesting that targeted ICT training enhances both practical and strategic digital competencies among women, enabling them to perform complex functions independently and adapt to evolving digital work environments (Verma & Das, 2022). Such improvements directly contribute to increased productivity,

resilience, and competitiveness of informal businesses, especially in digitally underserved regions (Desai & Joseph, 2024; UNESCO, 2021).

It is inferred that ICT proficiency and productivity training have a significant positive impact on the select women entrepreneurs in the informal sector. The training boosted their assurance and readiness to adopt digital tools, but also improved their capability to select and use suitable devices and applications for complex tasks. It fostered self-reliance in the conduct of ICT-related issues and bound decision-making regarding digital tools. Moreover, the entrepreneurs have increased understanding of how digital technology is transmuting business practices, positioning them for more effective participation in the evolving digital economy.

4.6.2 Impact of Information Literacy, Data Literacy, and Media Literacy on select women entrepreneurs in Informal Sector

The rapid development of technology and internet usage has increased the uncertainty in the quantity and quality of information. Unfiltered information is received through different media, which demands validity, authenticity, and reliability of information sources (Anafo and Filson,2014). Information, Data, and Media literacy skills are necessary for entrepreneurs to search, evaluate, and use information through different media. Further, it enables the entrepreneurs to think critically, evaluate, and work collaboratively to generate new ideas. The effectiveness of Information Literacy, Data, and Media literacy training on select women entrepreneurs is shown in tables 4.6.2.1, 4.6.2.2, 4.6.2.3.

4.6.2.1 Information Literacy training on select women entrepreneurs in Informal Sector

Information literacy is a set of abilities requiring individuals to "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information. According to Burnett & White (2022), information literacy empowers individuals to think critically, make informed decisions about the information they encounter, and engage meaningfully with society.

Table 4.6.2.1 Effectiveness of Information Literacy training on select women entrepreneurs in Informal Sector

Statements	Pre training		Post training		Effect of training		Wilcoxon sign test	
	Mean	SD	Mean	SD	Mean Difference	SD	Z	Asymp. Sig. (2-tailed)
To evaluate, manage, curate, organize, and share digital information.	2.38	1.261	3.63	1.171	1.26	.501	14.283	.000
To interpret digital information for work purposes.	1.54	1.026	2.88	1.059	1.34	.548	14.077	.000
To review, analyse, and represent digital information.	1.18	.388	2.57	.650	1.38	.536	13.963	.000
To have an understanding of the rules of copyright	1.58	.495	2.96	.756	1.38	.536	13.963	.000

Source: Computed data (SD = standard deviation, Asymp. Sig. = Asymptotic Significance)

The effectiveness of Information Literacy training on select women entrepreneurs were presented in Table 4.6.2.1. The findings revealed that women entrepreneurs have enhanced their ability to evaluate, manage, curate, organize and share digital information from a mean score of 2.38 (SD = 1.261) before training to 3.63 (SD = 1.171) after training. Elucidating the digital information for entrepreneurial opportunities has strengthened from mean score of 1.54 (SD = 1.026) before training to 2.88 (SD = 1.059) after training. The skills on how to review, analyse and represent digital information showed a significant improvement from mean score of 1.18 (SD = 0.388) before training to 2.57(SD = 0.657) after training. Lastly understanding on rules of copy right set out an increase of mean score of 1.58 (SD = 0.495) before training to 2.96 (SD = 0.756) after training.

The effect of Information Literacy training showed a greater difference of 1.38 for the ability to review, analyse and represent digital information along with understanding rules of copy right. This implies that information Literacy training enhanced their skills to evaluate, manage, curate, organize and share information for work purpose. This enabled them to review analyse and represent the digital information and thus having a general understanding of copy right rules. This transformation is consistent with literature suggesting that Information literacy training enables entrepreneurs, particularly women, to make more

informed business decisions, ensure ethical use of online resources, and improve digital communication with customers (Verma & Das, 2022). Moreover, increased awareness of copyright protections encourages more responsible and original content creation, fostering a culture of digital professionalism among informal entrepreneurs (UNESCO, 2021).

4.6.2.2 Data Literacy training on select women entrepreneurs

Data literacy refers to the ability to collect, manage, access, analyze, interpret, and use digital data effectively and responsibly. It involves working with data in various formats such as spreadsheets and databases, drawing insights through analysis and reports, understanding the ethical and legal responsibilities surrounding data use, and ensuring personal and professional data security. According to the *European Commission's Digital Competence Framework for Citizens (DigComp 2.2)*, data literacy includes skills such as organizing and processing digital data, protecting personal data, understanding privacy issues, and using data to make informed decisions in both professional and public contexts.

Data literacy is "the ability to transform information into actionable instructional knowledge and practices by collecting, analyzing, and interpreting all types of data" (Gummer and Mandinach, 2015).

The Effectiveness of Data Literacy training on select women entrepreneurs is presented in the table 4.6.2.2.

Table 4.6.2.2 presents the impact of Data Literacy training on selected women entrepreneurs. The results indicate a notable improvement in their ability to collate, manage, and utilize digital data in spreadsheets, charts, and databases, with the mean score increasing from 2.17 (SD = 0.913) before training to 3.47 (SD = 0.941) after training. Additionally, their capacity to interpret data by conducting analyses and generating reports improved significantly, with the mean score rising from 1.84 (SD = 0.623) before training to 3.20 (SD = 0.754) after training. The training also enhanced awareness and understanding of personal data security, reflected in an increase in the mean score from 2.26 (SD = 0.999) before training to 3.58 (SD = 0.952) after training. Furthermore, comprehension of legal and ethical guidelines in data collection and usage also have improved, with the mean score increasing from 1.63 (SD = 0.578) before training to 3.02 (SD = 0.787) after training.

Table 4.6.2.2 Effectiveness of Data Literacy training on select women entrepreneurs in informal sector

Statements	Pre training		Post training		Effect of training		Wilcoxon sign test	
	Mean	SD	Mean	SD	Mean Difference	SD	Z	Asymp. Sig. (2-tailed)
To collate, manage, access and use digital data in spreadsheets, databases and other formats.	2.17	.913	3.47	.941	1.30	.513	14.134	.000
Interrupting data by running data analyses, and reports.	1.84	.623	3.20	.754	1.36	.514	13.998	.000
Understanding personal data security.	2.26	.999	3.58	.952	1.31	.499	14.095	.000
Understanding on how data is used for professional and public life;	2.20	.959	3.54	.967	1.34	.533	14.051	.000
I have an understanding of Legal, ethical security guidelines in data collection and use.	1.63	.578	3.02	.787	1.38	.536	13.963	.000

Source: Computed data (SD = standard deviation, Asymp. Sig. = Asymptotic Significance)

Accordingly, from the above interpretation, it has been proved that Data Literacy training for women entrepreneurs has shown an advancement in their performance after training. The entrepreneurs have improved their skills in reading, understanding, analysing, and working with data for professional and public life. Hence, they gained a deeper understanding of legal ethical security guidelines in data collection and usage, and thus showed a greater difference of 1.38 towards the effect of training. These results align with the *European Commission's DigComp 2.2 Framework*, which identifies data literacy as a core digital competence (UNESCO, 2021; Vyuorikari et al., 2022).

4.6.2.3 Media Literacy training on select women entrepreneurs

Media literacy is the ability to access, critically evaluate, create, and respond to content in a variety of media formats, including text, graphics, video, audio, and animation. It involves not only understanding media messages and their intent but also engaging with them thoughtfully by curating, editing, or repurposing content while respecting intellectual property rights. According to the European Commission's DigComp 2.2 framework, media

literacy encompasses competencies such as interpreting media messages critically, understanding their origin and intent, and creating responsible and ethical media content (Vuorikari et al., 2022). Ciurel (2016) has noted Media literacy as the ability to read, analyse and interpret messages through the range of communication medias.

Similarly, the UNESCO Media and Information Literacy Framework emphasizes that media literacy equips individuals to analyze and assess media content, discern bias, identify misinformation, and participate actively in digital environments by creating meaningful, respectful, and legally compliant content (UNESCO, 2021). Influence of Media has backed entrepreneurs to promote their enterprises and create their brand recognised among target audience. But the increasing presence of information's in media lead to receive messages through numerous channels, this led to the search of valuable information's from disinformation's (Khriyenko, 2018). The effectiveness of Media Literacy training on select women entrepreneurs is given below in Table 4.6.2.3

Table 4.6.2.3 Effectiveness of Media Literacy training on select women entrepreneurs.

Statements	Pre training		Post training		Effect of training		Wilcoxon sign test	
	Mean	SD	Mean	SD	Mean Difference	SD	Z	Asymp. Sig. (2-tailed)
Critically analyze and respond to messages in a range of media – text, graphics, video, animation, audio	1.75	.752	3.13	.856	1.38	.527	13.966	.000
Curate, re-edit and repurpose media, giving due recognition to originators.	1.63	.578	3.02	.789	1.39	.537	13.956	.000
Evaluate media messages in terms of their origin and purpose	1.63	.578	3.03	.773	1.40	.539	13.943	.000

Source: Computed data (SD = standard deviation, Asymp. Sig. = Asymptotic Significance)

Table 4.6.2.3 shows the effectiveness of Media Literacy training on select women entrepreneurs. The outcomes shows that training has strengthened their skills to critically analyze and respond to messages through range of media from a mean score of 1.75(SD =

0.752) before training to 3.13(SD = 0.856) after training. Entrepreneurs' understanding on how curate, re-edit and repurpose media by giving due recognition to originators have improved from a mean score of 1.63(SD = 0.578) before training to 3.02(SD = 0.789) after training. Evaluation of media messages in terms of their origin and purpose have shown an improvement of 1.63 (SD = 0.578) before training to 3.03(SD = 0.773) after training.

The above findings confirmed that the effect of training has improved the entrepreneur's knowledge towards critically analysing and using digital medias through different communication channels. Thus, the effect of training showed a greater difference of 1.40 towards evaluation of messages in terms of origin and purpose. These findings are supported by research showing that digital media literacy training improves business outcomes including revenue growth, market reach, and customer satisfaction by enabling better use of digital platforms (Shetye & Indrakanti, 2024). Similarly, Gupta et al. (2025) found that women entrepreneurs experienced significant business growth through effective social media engagement, facilitated by digital and media literacy training.

The overall results indicate that information, data, and media literacy training have significantly strengthened the digital capabilities of women entrepreneurs in the informal sector. Participants marked an improvement in assessing and managing digital information, analysing, interpreting, and using data effectively, and to critically engaging with media content. These trainings have strengthened entrepreneurs' ability to steer the digital landscape, make informed decisions, and gain greater confidence in using digital tools for business activities.

4.6.3 Impact of digital creation and problem solving on select women entrepreneurs in

The shift from digital connectivity to digital production creates complex challenges to entrepreneurs and this demands for digital creation and problem-solving skills. The ability of entrepreneurs to develop and build new digital content, use digital evidences to resolve queries and develop new digital practices. The effectiveness of Digital creation and Problem solving on select women entrepreneurs is shown in Table 4.6.3.1 and 4.6.3.2 and Figure

4.6.3.1 Digital creation training on select women entrepreneurs

Digital Creation involves creation of written or visual contents in the digital spaces appealing to the target audiences. It also includes making the contents accessible to the audiences to reap the benefits of content development. Effectiveness of Digital creation training on select women entrepreneurs is presented in Table 4.6.3.1.

Table 4.6.3.1 Effectiveness of Digital Creation training on select Women Entrepreneurs in Informal Sector

Statements	Pre training		Post training		Effect of training		Wilcoxon sign test	
	Mean	SD	Mean	SD	Mean Difference	SD	Z	Asymp. Sig. (2-tailed)
Design and create new digital artefacts and materials such as digital writing, digital imaging, digital audio and video	2.20	.959	3.49	.951	1.30	.466	14.111	.000
Understanding of the digital production process and the basics of editing.	2.20	.959	3.53	.968	1.33	.513	14.064	.000

Source: Computed data (SD = standard deviation, Asymp. Sig. = Asymptotic Significance)

Quality content creation has been a key marketing strategy to build credibility, prestige, and visibility of enterprises. The data presented in Table 4.6.3.1 indicates the effectiveness of Digital content creation training on select women entrepreneurs. Findings observed an advance in their ability in designing and creating new artefacts and materials in the digital spaces, with a mean score of 2.20 (SD = 0.959) before training to 3.49(SD = 0.951) after training. Entrepreneurs have improved their skills on the digital production process, including basics of editing, with a mean score of 2.20 (SD = 0.959) before training to 3.53(SD = 0.968) after training.

Since the women entrepreneurs gained an insight into digital content creation and this strengthened their ability on digital production. Hence the effect of training on digital production process showed a difference 1.33. Global competitions in the digital era and the wide spread use of technologies paved the way towards digital problem-solving skills. This involves applying digital skills to collect and use digital evidences using digital methods and tools to solve problems in the digital context of the enterprises. Together, these insights confirm that digital content creation training does more than teach editing. It equips women entrepreneurs with the tools and mindset required to solve real business challenges using digital evidence, multimedia messaging, and adaptive workflows, thereby increasing their

resilience and market presence in the evolving digital economy (Nugroho et al., 2025; Zahwa et al., 2025).

4.6.3.2 Digital Problem-solving skill training for select women entrepreneurs

Digital problem-solving refers to the ability to identify needs, troubleshoot issues, and find solutions using digital tools and technologies. It encompasses the use of digital evidencesuch as data, analytics, and digital content—to answer questions, solve practical problems, and support informed decision-making. According to the *European Commission's DigComp 2.2 Framework*, digital problem-solving includes skills such as critically evaluating the quality and relevance of digital evidence, applying digital research methods, using data analysis tools, and collaboratively sharing findings in a digital format (Vuorikari et al., 2022). Table 4.6.3.2 displays the effectiveness of digital problem-solving skill training on select women entrepreneurs.

Table 4.6.3.2 Effectiveness of Digital Problem-solving skill training of select Women Entrepreneurs in Informal Sector

Statements	Pre training		Post training		Effect of training		Wilcoxon sign test	
	Mean	SD	Mean	SD	Mean Difference	SD	Z	Asymp. Sig. (2-tailed)
Usage of digital evidence to solve problems and answer questions;	1.87	0.972	3.22	1.001	1.35	0.521	14.011	.000
Knowledge to evaluate the quality and value of the evidence,	2.04	0.967	3.37	0.985	1.33	0.521	14.072	.000
Knowledge to share evidence and findings using digital methods	2.10	0.974	3.43	0.983	1.33	0.515	14.055	.000
Understanding of digital research methods	2.09	0.979	3.43	0.978	1.34	0.501	14.024	.000
Understanding of data analysis tools and techniques for my business.	2.10	0.969	3.45	1.005	1.35	0.549	14.067	.000

Source: Computed data (SD = standard deviation, Asymp. Sig. = Asymptotic Significance)

The effectiveness of Digital Problem-solving skill training on select women entrepreneurs is shown in Table 4.6.3.2 . Entrepreneurs' comprehension of data analysis tools and strategies for comprehending digital research methodologies improved from a mean score of 1.87(SD = 0.972) before training to 3.22 (SD = 0.959) after training. For evaluation of the quality and usefulness of the evidence, the mean score of 2.04 (SD = 0.967) before training increased to 3.37(SD = 0.985) after training. Awareness towards sharing digital evidence and findings using digital methods increased from a mean score of 2.10 (SD = 0.974) before training to 3.43(SD = 0.983) after training. The understanding of data analysis tools and techniques for understanding digital research methods of entrepreneurs improved from a mean score of 2.09 (SD = 0.979) before training to 3.43 (SD = 0.978) after training. Similarly, Entrepreneurs' comprehension of data analysis tools and strategies for comprehending digital research methodologies improved from a mean of 2.10 (SD = 0.969) to 3.45 (SD = 1.005).

By aforementioned data, it can be said that Informal women entrepreneurs have gained knowledge in using and sharing digital evidence to evaluate the quality of the evidence, including an understanding of digital research methods, tools, and techniques used for data analysis and problem solving in business operations. The success of training was demonstrated by an effectiveness of 1.35 difference identically for the capacity to understand digital research methods and understanding of data analysis, tools, and procedures for business. A study by LEAD at Krea University and Nasscom Foundation (2022) emphasized that digital upskilling improved women's data-driven decision-making and their use of online tools for business scaling. Furthermore, Ghosh and Ghosh (2021) noted that structured digital literacy programs enabled rural women entrepreneurs to critically analyse data and implement digital solutions in product planning, communication, and financial management.

Digital content creation and Digital problem-solving training resulted in enhancement of digital competencies among the select women entrepreneurs. The digital content creation training strengthened their abilities to design digital artefacts and materials, with notable improvement in digital production and basic editing skills. Likewise, the digital problem-solving training advanced their comprehension of data analysis tools, valuation of digital evidence, and application of digital research methods. The highest mean score differences were marked in digital production and analytical competencies, underscoring the substantial impact training programs in equipping women entrepreneurs with digital skills .

4.6.4 Impact of Digital communication, Collaboration, and Participation on select women entrepreneurs

The exponential rise in the mobile phones and the corresponding increase in the mobile data usage have transformed the entrepreneurial work space. Digital work space allows the entrepreneurs to collaborate, communicate and participate in the digital economy. Real time communication enables entrepreneurs to be more involved and share their expertise and ideas. Further it enhances the speed and precession of performance in the business operations (Trivelli et al., 2019). Developing a collaborative and participative work culture builds trust , increases team work and creates a feeling of community and promotes innovation. The bottom line is that Digital communication revolves around knowledge sharing but collaboration and participation exerts knowledge to productive use. Tables 4.6.4.1, 4.6.4.2,4.6.4.3 illustrate the Digital communication, Collaboration and Participation on select women entrepreneurs.

4.6.4.1 Digital Communication Training on Select Women Entrepreneurs in Informal Sector

Digital Communication, according to digital competency frameworks such as the European Commission's DigComp 2.2 and the UNESCO Digital Literacy Global Framework, digital communication refers to: "The ability to interact, communicate, and collaborate using digital technologies, while adhering to appropriate behavioral, cultural, and technical norms in digital environments."

It involves using digital tools and platforms (e.g., email, messaging apps, video conferencing, collaborative documents) for effective communication, whether for personal, social, educational, or professional purposes. The 21st century has seen a tidal wave of revolution in digital communication, which refers to any type of communication that occurs through technology and electronic channels (Nguyen, 2017). Table 4.6.4.1 shows the effectiveness of digital communication training on select women entrepreneurs.

Table 4.6.4.1 represents the agility with which an enterprise can be informed through communication media, demanding knowledge and expertise evolving technology. It helps entrepreneurs to quickly find and communicate information (Gartanti et al., 2020). The entrepreneur’s competence to communicate effectively in digital media and spaces has improved from a mean score of 3.18 (SD = 1.064) prior to training against 4.32 (SD = 0.956) after the training. The skills to collaborate effectively using shared digital tools and media

before training have been raised from a mean score of 2.60(SD = 1.134) to 3.85 (SD = 1.036) after training. The talent to design digital communications for different purposes and audiences initially, to the training, showed a mean score of 2.04 (SD = 0.967) and increased to 3.39(SD = 0.944) after training.

Table 4.6.4.1 Effectiveness of Digital Communication Training: Select Women Entrepreneurs in Informal Sector

Statements	Pre training		Post training		Effect of training		Wilcoxon sign test	
	Mean	SD	Mean	SD	Mean Difference	SD	Z	Asymp. Sig. (2-tailed)
To communicate effectively in digital media and spaces such as text-based forums, online video, audio and social media;	3.18	1.064	4.32	.956	1.15	.377	14.653	.000
To collaborate effectively using shared digital tools and media	2.60	1.134	3.85	1.036	1.25	.469	14.286	.000
To design digital communications for different purposes and audiences	2.04	.967	3.39	.944	1.35	.485	14.005	.000
To respect others in public communications and maintain privacy in private communications	2.04	.967	3.40	.975	1.35	.521	14.011	.000
Identify and deal with false or damaging digital communications.	2.04	.967	3.40	.980	1.36	.553	14.029	.000
Use the varieties of communication norms and needs	2.04	.967	3.39	.974	1.35	.527	14.035	.000
Aware of the features of different digital media for communication.	3.18	1.064	4.33	.952	1.15	.391	14.653	.000
Understanding of different communication norms and needs	2.09	.979	3.45	1.005	1.36	.547	14.013	.000

Source: Computed data (SD = standard deviation, Asymp. Sig. = Asymptotic Significance)

The understanding of respecting and maintaining privacy in communications improved from a mean score of 2.05(SD = 0.968) before training to 3.40 (SD = 0.975) after

the training. To identify and deal with false or in inarticulate digital communication showed an improvement in the mean score, 2.04 (SD = 0.980) before the training, comparable to 3.40(SD = 0.980) after the training. The ability to understand the features of different digital media for communication rose from a mean score of 3.18(SD = 1.064) prior to training to 4.33(SD = 0.952) after training. The awareness of different communication norms for varied purposes has shown an increase in the mean score of 2.09(SD = 0.979) before training against 3.45 (SD = 1.005) after training.

Considering the information above, it is evident that entrepreneurs have improved their digital communication skills, and it is inferred that entrepreneurs have gained the ability to communicate, collaborate, design, and use digital media for different purposes. This has improved their understanding of different communication norms and how to deal with false digital communications. According to their specific needs, and shows a maximum mean of 1.36. The studies affirm that targeted digital communication training fosters critical competencies such as designing audience-appropriate content, adhering to digital norms, and applying collaborative media tools, thus enabling women entrepreneurs to effectively navigate through the digital economy (Digital Empowerment Foundation, 2023; NASSCOM Foundation, 2022; Rao & Singh, 2021).

4.6.4.2 Effectiveness of Digital Collaboration training on Select Women Entrepreneurs in Informal Sector

Digital Collaboration capability, which refers to the ability of an entity to connect and coordinate information with partners over digital channels. Collaboration is the "coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem" (Roschelle & Teasley, 1995).

Enhancing interaction within and outside teams saves both resources and time of entrepreneurs in business operations. Further it helps in tackling complex difficulties. The four elements of digital collaboration are team aspects, type of work, quality of collaboration, and utilisation of right digital tools (Easley et al., 2003). Recent studies highlight that effective digital collaboration not only boosts productivity and innovation but also enhances problem-solving capacity, particularly among small and women-led enterprises navigating digital ecosystems (OECD, 2023). The effectiveness of Digital Collaboration training on select women entrepreneurs is depicted in Table 4.6.4.2

Table 4.6.4.2 Effectiveness of Digital Collaboration training on Select Women Entrepreneurs in Informal Sector

Statements	Pre training		Post training		Effect of training		Wilcoxon sign test	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean Difference	Std. Deviation	Z	Asymp. Sig. (2-tailed)
Knowledge to participate in digital teams and working groups	2.00	.994	3.25	1.107	1.25	.582	13.698	.000
capability to collaborate effectively using shared digital tools and media, produce shared materials, use shared productivity tools.	1.09	.425	1.75	.750	.67	.651	11.088	.000
To work effectively across cultural, social and linguistic boundaries	2.02	1.016	3.22	1.205	1.20	.661	13.215	.000
The understanding of various aspects of digital technologies for collaboration as well as varied cultural and other working norms.	1.90	.932	3.13	1.090	1.23	.617	13.381	.000

Source: Computed data (SD = standard deviation, Asymp. Sig. = Asymptotic Significance)

Effectiveness of Digital Collaboration training on select women entrepreneurs is displayed in table 4.6.4.2. The knowledge to participate in digital teams and working groups improved from a mean score of 2.00 (SD = 0.994) before training against 3.25 (SD = 1.107)

after the training. The knowledge to collaborate effectively using shared digital tools and media,to produce shared materials, and to use productivity tools for business operations have shown an increase from a mean score of 1.09 (SD = 0.425) prior training to 1.75(SD = 0.750) after training. Capability to work effectively across cultural, social and linguistic boundaries showed a rise in performance from 2.02(SD = 1.016) before training to 3.22(SD = 1.205) after training. The understanding of various aspects of digital technologies for collaboration as well as varied cultural and other working norms showcased an improvement from 1.90(SD = 0.932) before training to 3.13(SD = 1.090) after training..

In view of the information mentioned above, it can be said that training on digital collaboration has improved the entrepreneurs understanding on digital collaboration in business operations. Collaboration using digital tools and medias. The understanding on shared digital tools and medias for collaboration across cultural social and linguistic boundaries resulted a maximum towards effect of training on mean of 1.25 towards participation in digital teams and working groups. Such findings are in line with the Digital Saksham initiative by CII and Mastercard (2024), which highlighted that digitally trained microentrepreneurs became more capable of using tools like WhatsApp groups and shared Google platforms for task delegation and customer service. Likewise, the NASSCOM Foundation & First source (2023) program observed increased collaborative capacities among rural women artisans post-training, allowing them to co-create digital content and coordinate sales efforts online.

4.6.4.3 Digital Participation training on Select Women Entrepreneurs in Informal Sector

Digital Participation includes three aspects (Bosse, 2016): Firstly, Participation in digital technologies, defined as having access and use of digital devices, secondly participation through digital technologies, defined as having access to alternate access and finally participation within the digital world, including digital medias, social networks and services. Digital Participation involves active involvement of users towards usage and design of the Internet and the modern technologies and services (Seifert & Rossel, 2022). The effectiveness of Digital Participation training on women entrepreneurs in the informal sector is presented in Table 4.6.4.3.

Table 4.6.4.3 Effectiveness of Digital Participation training on Select Women Entrepreneurs in Informal Sector

Statements	Pre training		Post training		Effect of training		Wilcoxon sign test	
	Mean	SD	Mean	SD	Mean Difference	SD	Z	Asymp. Sig. (2-tailed)
Participate in, facilitate and build digital networks;	2.23	.999	3.52	.910	1.29	.455	14.113	.000
Engage in business, social and cultural life using digital media and services	3.02	.942	4.39	.801	1.38	.526	13.973	.000
Create positive connections and build contacts; share and amplify messages across networks;	2.96	.970	4.31	.832	1.35	.520	14.020	.000
Know to behave safely and ethically in networked environments	2.89	.962	4.29	.790	1.40	.554	13.951	.000
Understanding of how digital media and networks influence social behaviour	3.26	.793	4.63	.684	1.37	.525	13.980	.000

Source: Computed data (SD = standard deviation, Asymp. Sig. = Asymptotic Significance)

Table 4.6.4.3 shows the Effectiveness of Digital Participation training on select women entrepreneurs. Digital training to facilitate and build digital networks improved from a mean score of 2.23(SD = 0.999) before training to 3.52 (SD = 0.910) after training. The capability of an entrepreneur before training towards participation in social and cultural life using digital media services showed an increase in performance from mean score of 3.02 (SD = 0.942) to 4.39 (SD = 0.801) after training. To create and build contacts to share and amplify messages across networks showed an improvement from mean of 2.96 (SD = 0.970) before training to 4.31 (SD = 0.832) after training. Knowledge to behave safely and ethically in networked environments showed a rise in performance from mean of 2.89(SD = 0.962) before training to 4.29(SD = 0.790) after training. The understanding on how digital medias and networks influence social behaviour has improved from a mean score of 3.26 (SD = 0.793) before training to 4.63 (SD = 0.684) after training.

With regard to the information stated above it is clear that entrepreneurs have improved their digital participation in business operations through ethically building digital networks to share and amplify messages over networks. The effect of training showed it highest mean of 1.40 for the entrepreneurs understanding to behave safely and ethically in networked environments. It is justified that entrepreneurs have shown an improvement after the training on how to facilitate and build network through different digital medias and how it influences the social behaviour, this enhances their ethical knowledge to operate in networked environments. This aligns with findings from the Digital Empowerment Foundation (2023), which noted that structured digital training enables women entrepreneurs to participate in online communities, market their products, and amplify their voices through platforms like WhatsApp, Facebook, and YouTube. Additionally, Rao and Sharma (2022) emphasized that digital participation fosters self-expression, civic engagement, and social networking, especially in rural and informal sectors.

The findings clearly demonstrate that the digital competency training significantly enhanced the communication, collaboration, and participation skills of women entrepreneurs across all evaluated domains. The training led to notable improvements in their ability to communicate effectively in digital spaces, collaborate using shared digital tools across diverse contexts, and engage ethically and meaningfully in networked environments. The highest effectiveness of the training was observed in understanding the features of digital media for communication (mean difference of 1.36), participating in digital teams and working groups (mean difference of 1.25), and behaving safely and ethically in digital networks (mean difference of 1.40). These outcomes underscore the transformative impact of digital literacy training in equipping informal women entrepreneurs with essential skills for sustainable participation in the digital economy.

4.6.5 Impact of Digital learning and development on select women entrepreneurs in Informal Sector

Digital learning and development involve the individual's ability to engage effectively in learning activities using digital technologies to build new skills, reflect on personal progress, and foster continuous growth. It involves the capacity to participate in and benefit from digital learning opportunities, such as online courses, webinars, or interactive tutorials. It also includes the ability to identify and use relevant digital learning resources for specific learning goals.

Digital learning and development involve identifying digital learning opportunities, using digital resources to acquire new skills, and actively managing one's own learning journey. It includes staying updated with technological developments, participating in online learning platforms, and using digital tools for self-improvement and career progression. *(*European Commission, 2022; NDLM, 2021). Digital learning and development in the context of business are the strategies to promote self-advancement in the business operations using digital technologies (Tvenge and Martinsen ,2018). The effectiveness of Digital Learning and Development is unveiled in Tables 4.6.5.1

Table 4.6.5.1 Effectiveness of training on Digital Learning and Development on select Women entrepreneurs in Informal Sector

Statements	Pre training		Post training		Effect of training		Wilcoxon Sign Test	
	Mean	SD	Mean	SD	Mean Difference	SD	Z	Asymp. Sig. (2-tailed)
Participate in and benefit from digital learning opportunities	3.34	1.146	4.46	0.759	1.12	0.677	12.846	.000
Identify and use digital learning resources	3.98	1.074	4.80	0.456	0.82	0.832	10.555	.000
Ability to use digital tools to organise, plan, and reflect on learning	3.93	1.018	4.77	0.494	0.84	0.754	11.187	.000
Monitor progress and participate in the digital assessment and receive digital feedback.	3.97	1.046	4.78	0.481	0.81	0.767	10.903	.000
Manage own time and tasks to learn in digital settings	4.11	0.959	4.83	0.399	0.72	0.717	10.770	.000
Understanding of the challenges involved in learning online.	3.95	1.134	4.76	0.523	0.81	0.825	10.517	.000

Source: Computed data (SD = Standard Deviation, Asymp. Sig. = Asymptotic Significance)

Table 4.6.5.1 pinpoints the effectiveness of digital learning training on select women entrepreneurs. The digital learning initiative on entrepreneurs to participate and benefit from digital learning opportunities scored a mean 3.34 (SD = 1.146) before training and showed an improvement of 4.46 (SD = 0.759) after training. To identify and use digital learning resources had a mean score of 3.98(SD = 1.074) in the pre session and has increased after the training with a mean score of 4.80(SD =0.456) after the training. Ability to use digital tools to organise, plan and reflect on learning was shown a mean 3.93 (SD =1.018 against mean 4.77(SD =0.494) after training. To monitor progress and participate in the digital assessment and receive digital feedback prior the training showed a mean score of 3.97(SD =1.046) and was 4.78(SD =0.481) after the training. To manage time and tasks to learn in digital setting score a mean value of 4.11 (SD =0.956) before training and raised to a mean score of 4.83(SD =0.399) after the training. The understanding on challenges involved in the digital learning showed a mean score of 3.95(SD =1.134) in the presession and has improved to 4.76(SD =0.523) in the post session. These findings align with recent global studies highlighting how targeted digital training programs significantly enhance learning efficiency, digital engagement, and business adaptability among women entrepreneurs (World Bank, 2023; Singh et al., 2024).

In perspective of the above facts, it is clear that entrepreneurs have boosted their confidence to use the opportunities to participate and learn in the digital environment (Erdisna et al., 2020). The effectiveness of training showed a maximum towards the ability to participate and benefit from digital learning opportunities with a mean score of 1.12. The Digital learning opportunities are available for all skill levels and can be accessed at a convenient time and space. Hence, entrepreneurs are using it as a cost-effective way to boost productivity. A study on digital literacy training in Karolia village aligns with the current findings that that structured learning modules to participate in and use digital resources and learn in digital settings significantly improved women entrepreneurs' ability to use online resources and participate in blended learning models, and reflect on their progress (Bhatt, 2023)

4.6.6 Impact of Digital Identity and Wellbeing training on select Women entrepreneurs In Informal Sector

Digital identity and well-being play an integral role that aligns with personal values and business goals of entrepreneurs in the digital age. Digital identity is the collection of

information, attributes, and characteristics that represent an individual online. It encompasses both personally identifiable information (PII) and the online activities, interactions, and presence associated with a person. The Digital well-being involves maintaining a healthy and balanced relationship with digital technology and the digital spaces and the effectiveness of digital identity and Well Being training on women entrepreneurs is reported in Tables 4.6.61 and 4.6.6.2.

4.6.6.1 Digital Identity training on select Women entrepreneurs in Informal Sector

Digital identity is the online representation of an individual or a business. Building a positive and consistent digital presence across various platforms, including websites, social media profiles, and business networks, ensures that brand messaging and values aligning across these channels can contribute in strong and authentic digital identity. Digital identity can impact entrepreneurs' well-being. Embracing your digital identity allows to stay updated with industry trends, access learning resources, and connect with thought leaders. Digital identity designing is not to share it but to ensure "Genuine presence assurance" (Birch, 2017). The Effectiveness of Digital Identity training on select Women entrepreneurs is presented in table 4.6.6.1.

Table 4.6.6.1 showcase the effectiveness of digital identity training on select women entrepreneurs. The ability of an entrepreneur to develop and project a positive digital identity, e.g., (social /professional network) across a range of platforms prior training showed a mean score of 2.33(SD =.988) and post training showed an improvement with mean score 3.62(SD =0.943). To build and maintain digital profiles and other digital identity assets scored a mean of 2.86(SD =1.045) before training and has improved to 4.18(SD =0.987) after training. Understanding of the reputational benefits and risks involved in digital identity initiatives was 2.99 (SD = 0.896) mean before training and has increased to mean score 4.37 (SD = 0.731) after training.

Considering the statistics above it is obvious that Informal women entrepreneurs have broadened their awareness on digital identity management. Digital identity workshops enable them to build maintain and participate with digital identity initiatives and is reflected in the study of (Borras-Gene et al., 2022). The greatest mean score for comprehending the reputational advantages and risks on digital initiatives showed 1.38, indicating that the digital identity training gained an insight to build, maintain and participate in the digital identity initiatives.

Table 4.6.6.1 Effectiveness of Digital Identity training on select Women entrepreneurs in Informal Sector

Statements	Pre-Training		Post training		Effect of training		Wilcoxon Sign Test	
	Mean	SD	Mean	SD	Mean Difference	SD	z	Asymp. Sig. (2-tailed)
Ability to develop and project a positive digital identity, e.g., (social /professional network) profile across a range of platforms.	2.33	.988	3.62	.943	1.28	.470	14.152	.000
To build and maintain digital profiles and other identity assets such as records of achievement; review the impact of online activity.	2.86	1.045	4.18	.987	1.32	.484	14.070	.000
Understanding of the reputational benefits and risks involved in digital identity initiatives	2.99	.896	4.37	.731	1.38	.510	13.964	.000

Source: Computed data (SD = standard deviation, Asymp. Sig. = Asymptotic Significance)

4.6.6.2 Digital well-being training on select Women entrepreneurs in Informal Sector

Digital Well-Being is the ability of an individual to maintain and experience positive relationships in a social circle (Seligman ,2018). In the information society, well-being is connected to individual and social interactions mediated with digital technologies to maintain healthy and balanced relationship in the business (Peters et al., 2018). The digital age entrepreneurs have to rely on digital tools, platforms, and communication channels to obtain a digital competitive edge, but it is also crucial to prioritize their well-being to avoid digital stress, information overload, multi-tasking and other negative impacts. The effectiveness of Digital Well Being training on select women entrepreneurs is shown in Table 4.6.6.2.

Table 4.6.6.2 Effectiveness of Digital well-being training on select Women entrepreneurs

Indicators	Pre- training		Post - training		Effect of training		Wilcoxon Sign Test	
	Mean	SD	Mean	SD	Mean Difference	SD	Z	Asymp. Sig. (2-tailed)
The use of digital media to foster personal relationships and community actions.	3.92	1.040	4.76	.482	.85	.763	11.311	.000
To participate in social and community activities through digital tools and media	4.64	.625	5.00	.000	.36	.625	7.542	.000
Ability to act safely and responsibly in digital environments; negotiate and resolve conflict;	4.35	.893	4.92	.271	.57	.751	9.244	.000
The Concern for the human and natural environment when using digital tools	4.28	.874	4.90	.322	.62	.716	9.986	.000
Ability to manage Digital Stress, workload and distractions.	4.38	.897	4.92	.286	.55	.764	8.677	.000
An understanding of the benefits and risks of digital participation in health and wellbeing outcomes	4.35	.869	4.91	.283	.56	.723	9.397	.000

Source: Computed data (SD = standard deviation, Asymp. Sig. = Asymptotic Significance)

Digital Well-Being is the ability of an individual to maintain and experience positive relationships in a social circle (Seligman ,2018). In the information society, well-being is connected to individual and social interactions mediated with digital technologies to maintain healthy and balanced relationship in the business (Peters et al., 2018). The digital age entrepreneurs have to rely on digital tools, platforms, and communication channels to obtain a digital competitive edge, but it is also crucial to prioritize their well-being to avoid digital stress, information overload, multi-tasking and other negative impacts.

The Digi platform users face digital over consumption relates to "Permanent communication overabundance" (Gui, 2014) or "the information overload" (Levitin, 2014) which effects their physical and mental health. The negative effect of digital technologies on cognitive, psychological and social well-being are foregrounded through several authors (Spitzer ,2016; Turkle, 2015; Johnson,2012). Hence, it is critical to develop the digital well-being skills of entrepreneurs.

Table 4.6.6.2 shows the Effectiveness of Digital Well-being Training on select Women entrepreneurs. The use of digital media to foster personal relationships and community actions of entrepreneurs showed a mean score of 3.92(SD = 1.040) before training and after training it has improved to a mean score of 4.76(SD = 0.482). To participate in social and community activities through digital tools and media had a mean score of 4.64 (SD = 0.482) before training and has improved to 5.00 (SD = 0.000). Ability to act safely and responsibly in digital environments, along with confidence to resolve conflict, before the training showed a mean 4.35 (SD = 0.893) and increased to a mean 4.92 (SD = 0.271) after training. The Concern for human and natural environment when using digital tools before training showed a mean of 4.28(SD = 0.874), and after training, it increased to 4.90(SD = 0.322). To manage digital stress workload and distractions was 4.38(SD = 0.897) before training and 4.92(SD = 0.286) after training. An understanding of the benefits and risks of digital participation in health and wellbeing outcomes had a mean 4.35(SD = 0.869) before training and after the training the mean score has peaked to 4.91(SD = 2.83).

In accordance with the information above, the training has boosted the entrepreneur's ability towards digital well-being. The use of digital media to foster personal relationships and community actions showed a maximum effect of 0.85. The study by Stephen (2018) points out that Digital wellbeing influences entrepreneurs' motivation, decision-making, and persistence across the entrepreneurial journey and hence it is necessary to maintain digital well-being.

The overall results demonstrate that digital identity and digital well-being trainings significantly strengthened key digital competencies among women entrepreneurs. The digital identity training effectively enhanced their ability to build, maintain, and manage professional online presence, with the greatest improvement observed in understanding reputational implications. Similarly, the digital well-being training empowered them to use digital tools safely and meaningfully, particularly in fostering personal relationships and community engagement—highlighting improved digital confidence and responsible participation in networked environments. These outcomes reflect the practical impact of targeted digital upskilling on entrepreneurial development.

4.7 Socio-demographic Profile and Digital Competency of Informal Women Entrepreneurs

The socio-demographic profile and digital competency of informal women entrepreneurs after digital competency training are crucial for assessing the effectiveness of interventions. The socio-demographic profiles including age, education, residential area, marital status, and family structure significantly influence an entrepreneur's ability to adopt and use digital tools effectively (Sharma & Nandini, 2020). The Digital Competency across the socio-economic profile of informal women entrepreneurs is analysed using Mann-Whitney and Kruskal–Wallis test. The following hypothesis was developed based on the preceding discussion regarding the components of digital competency and the age of informal women entrepreneurs.

Ho_2: There is no significant mean difference between components of digital competency across the socio-demographic profile of Informal women entrepreneurs

Ha_2: There is a significant mean difference between components of digital competency across the socio-demographic profile of Informal women entrepreneurs

4.7.1 Digital Competency across Age of Women Entrepreneurs in the Informal Sector

Age can shape the ease and manner in which digit is acquired and applied. Younger entrepreneurs adapt more readily to digital technologies due to early exposure, while aged entrepreneurs face steeper learning curves (World Bank, 2023). Mann-Whitney U test was performed to evaluate whether the digital competency of informal women entrepreneurs differed by Age is shown in Table 4.7.1

Table 4.7.1 Digital Competency across Age of Women Entrepreneurs in the Informal Sector

Components of Digital Competency	Age	N	MR	SR	MW -U	W-W	Z	A-P
ICT Proficiency	Upto 30	178	120.81	21504	5462.5	7415.5	-0.132	0.895
	Above 30	62	119.6	7415.5				
ICT Productivity	Upto 30	178	119.36	21246	5315.5	21246.5	-0.472	0.637
	Above 30	62	123.77	7673				
Information Literacy	Upto 30	178	120.53	21453	5513.5	7466.5	-0.011	0.991
	Above 30	62	120.43	7466				
Data Literacy	Upto 30	178	119.87	21336	5405.5	21336.5	-0.269	0.788
	Above 30	62	122.31	7583				
Media Literacy	Upto 30	178	120.4	21431	5500	21431	-0.043	0.966
	Above 30	62	120.79	7489				
Digital Creation	Upto 30	178	120.13	21382	5451.5	21382.5	-0.173	0.863
	Above 30	62	121.57	7537.				
Digital Research and Problem-Solving	Upto 30	178	119.78	21320	5389	21320	-0.317	0.751
	Above 30	62	122.58	7600				
Digital Communication	Upto 30	178	120.26	21406	5475	21406	-0.102	0.919
	Above 30	62	121.19	7514				
Digital Collaboration	Upto 30	178	118.85	21155	5224.5	21155.5	-0.639	0.523
	Above 30	62	125.23	7764				
Digital Participation	Upto 30	178	119.99	21357	5426.5	21357.5	-0.217	0.828
	Above 30	62	121.98	7562.5				
Digital identity management	Upto 30	178	120.44	21438	5507	21438	- 026	0.979
	Above 30	62	120.68	7482				
Digital Learning	Upto 30	178	127.26	22652	4314.5	6267.5	-2.569	**0.010***
	Above 30	62	101.09	6267.5				
Digital Wellbeing	Upto 30	178	123	21894	5072.5	7025.5	-0.955	0.339
	Above 30	62	113.31	7025.5				

Source: Computed Data N- Number of respondents, MR- Mean rank, SR- Sum of ranks, MW-Man Whitney -U, Wilcoxon- W, A-P -asymptotic p-value , * Significant at 5%

According to Table 4.7.1 P-value for dimensions of Digital Proficiency (.895), Digital Productivity (.637), Information Literacy (.991), Data Literacy (.788), Media Literacy (.966), Digital Creation (.863), Digital Research and Problem-Solving (.751), Digital Communication (.919), Digital Collaboration (.523), Digital Participation (.828), Digital identity management (.979), Digital Wellbeing (.339) are reported to be greater than 0.05 (p-value < 0.05). Thus, at the 0.05 significance level, no statistically significant differences were observed between age groups regarding digital competency components except for Digital Learning (.010), where P-values charted to be less than 0.05 level showing a significant difference.

The lack of a statistically significant relationship between age groups and digital competency components aligns with recent studies showing that age is not always a limiting factor in adopting digital technologies, especially when providing access to training and supportive resources. Research highlights that while younger individuals often demonstrate higher levels of digital fluency, older age groups can attain comparable competency through targeted training and practical engagement with digital tools. For instance, findings from Eurostat (2023) revealed notable disparities in digital skills primarily based on exposure and educational background rather than age alone, emphasizing the need for tailored interventions to bridge such gaps across demographics. Moreover, studies focusing on professional and technological competencies have shown that individuals, irrespective of age, can develop significant digital skills when provided with appropriate tools and opportunities, underscoring the importance of inclusive approaches to digital literacy initiatives (Aldhaen, 2023)

Further Informal women entrepreneurs in the age group below 30 years have acquired digital skills through digital competency training than in the age group above 30 years. The respondents below the age of 30 are called the Z generation (1995 -2012). They are considered the first generation to grow up with the internet as a part of everyday life and they rely on digital technologies for information sharing and communications. The age group above 30 years (1980 -1994) is the digital natives, the generation grew up during the internet explosion but they do not have much exposure to digital technologies compared to Generation Z. Social constructivist perspectives on digital literacy reinforce this, showcasing its interaction with generational contexts and educational experiences (Smith et al., 2020).

The negative U-statistic (-2.569) and p-value (0.01) indicate a statistically significant result. In this context, it suggests that there is a significant difference across age and Digital learning. This significant association is tied to differences in learning styles and natural inclination towards adopting digital tools among younger entrepreneurs potentially being more accustomed to digital platforms for acquiring knowledge. This is in line with study (Van Dijk, 2020)

From the above discussion it is inferred that there were no statistically significant differences between age groups in most components of digital competency, suggesting that age is not a major barrier to digital skill acquisition when appropriate resources and training are provided. However, a significant difference was observed in Digital Learning (p =

0.010), with younger entrepreneurs (under 30) showing a higher level of digital competence. This highlight how younger generations, particularly Generation Z (born between 1995-2012), have grown up in a digital world, making them more familiar with digital tools for learning and information-sharing. Older generations, while still capable of acquiring these skills through targeted training and practice face steeper learning curves due to limited exposure to digital technologies in their formative years.

4.7.2 Digital Competency across Educational Qualifications of Women Entrepreneurs in the Informal Sector

Educational qualification is another key factor influence the components of digital competency among informal women entrepreneurs. Education often includes exposure to technology and influences an individual's ability to acquire, adapt, and apply digital skills (Anzak & Sultana, 2020). Kruskal -Walis Test was conducted to compare the digital competency components across educational qualifications of informal women entrepreneurs is shown in Table 4.7.2

Table 4.7.2 Digital Competency across Educational Qualifications of Women Entrepreneurs in the Informal Sector

Components of Digital Competency	Educational Qualification						Test Statistics		
	N			MR					
	SSC	HSC	Graduate	SSC	HSC	Graduate	Chi-Square	DF	A-P
Digital Proficiency	120	90	30	110.48	113.24	128.45	3.991	2	**0.053**
Digital Productivity	120	90	30	109.47	111.86	129.74	5.147	2	**0.056**
Information Literacy	120	90	30	110.55	112.51	136.98	4.516	2	**0.052**
Data Literacy	120	90	30	111.27	112.88	128.53	4.086	2	0.130
Media Literacy	120	90	30	109.45	111.41	130.08	5.826	2	**0.054**
Digital Creation	120	90	30	115.65	114.68	126.08	2.316	2	0.314
Digital Research Problem-Solving	120	90	30	111.33	115.14	126.81	2.754	2	0.252
Digital Communication	120	90	30	110.00	114.22	127.84	3.437	2	0.179
Digital Collaboration	120	90	30	114.43	121.06	121.60	.278	2	0.870
Digital Participation	120	90	30	107.05	112.94	129.53	5.274	2	0.072
Digital Learning	120	90	30	111.78	113.91	127.63	2.574	2	0.276
Digital identity management	120	90	30	111.03	115.22	126.83	2.654	2	0.265
Digital Wellbeing	120	90	30	112.97	110.29	130.04	4.650	2	0.098

Source: Computed Data *Correlation is significant at 5% level (2-tailed)

N- Number of respondents, MR- Mean rank, df – Degree of freedom, A-P -asymptotic p-value

Conversely significant differences were found across across educational settings for specific digital competency dimensions, including Digital productivity ($p = .056$), Information literacy ($p = .005$), and Media literacy ($p = .054$), as their p-values fall below the 0.05 threshold. This leads to rejecting the null hypothesis for these dimensions, suggesting that educational context influences these specific competencies. Thus, accepting the alternate hypothesis. This can be justified by the role of educational environments in shaping these skills. or instance, Ilomäki et al. (2020) emphasize that targeted exposure to information systems and media management within academic settings enhances students' ability to engage with and manage digital productivity tools effectively. Educational settings frequently expose individuals to digital productivity tools like Microsoft Office, project management software, and collaborative platforms, fostering proficiency in these areas and mean score were more among graduates.

Conversely, individuals with lower education levels rely more on less rigorous methods for information retrieval and evaluation which include over reliance on search engines and less credible platforms often leading to weaker competencies in this domain (Nath, 2019).

The preceding discussion, reveals that digital competencies are not significantly influenced by formal educational qualifications in most areas, suggesting that practical experience and access to digital tools are more critical factors in developing digital skills. This is consistent with studies that emphasize the importance of engagement with digital environments and self-driven learning opportunities for digital skill development (Scherer et al., 2021).

However, specific dimensions like Digital Productivity, Information Literacy, and Media Literacy showed significant differences across educational levels, implying that formal educational settings play a key role in enhancing proficiency in these areas. This supports the argument that exposure to targeted training and resources within educational environments contributes to stronger competencies in tasks that involve the use of digital tools for work and information management (Ilomäki et al., 2020). Thus, while educational background are not be a significant factor for all components of digital competency, it is crucial for areas that require structured training and exposure to productivity tools.

4.7.3 Digital Competency across Residential Area of Women Entrepreneurs in the Informal Sector

The relationship between the residential area of informal women entrepreneurs and the components of digital competency is influenced by several factors, including geographic location, access to resources, and exposure to digital tools and training. The divide between urban and rural areas is particularly significant, as it affects the availability of digital infrastructure and the ability to access digital training programs. Entrepreneurs residing in urban areas typically benefit from greater access to high-speed internet, advanced digital tools, and diverse digital platforms, which can enhance their proficiency in various digital competency components (Zeng et al., 2022).

Table 4.7.3 Digital Competency across Residential Area of Women Entrepreneurs in the Informal Sector

Components Digital Competency	Residential Area	N	MR	SR	MW - U	WW	Z	A-P
Digital Proficiency	Rural	112	120.03	13443.5	7115.5	13443.5	-0.11	0.913
	Urban	128	120.91	15476.5				
Digital Productivity	Rural	112	120.24	13467	7139	13467	-0.059	0.953
	Urban	128	120.73	15453				
Information Literacy	Rural	112	120.93	13544.5	7119.5	15375.5	-0.101	0.919
	Urban	128	120.12	15375.5				
Data Literacy	Rural	112	119.46	13379.5	7051.5	13379.5	-0.245	0.807
	Urban	128	121.41	15540.5				
Media Literacy	Rural	112	120.1	13451.5	7123.5	13451.5	-0.093	0.926
	Urban	128	120.85	15468.5				
Digital Creation	Rural	112	119.91	13430	7102	13430	-0.15	0.881
	Urban	128	121.02	15490				
Digital Research and Problem-Solving	Rural	112	119.79	13416.5	7088.5	13416.5	-0.172	0.864
	Urban	128	121.12	15503.5				
Digital Communication	Rural	112	121.41	13598	7066	15322	-0.212	0.832
	Urban	128	119.7	15322				
Digital Collaboration	Rural	112	123.98	13886	6778	15034	-0.745	0.456
	Urban	128	117.45	15034				
Digital Participation	Rural	112	121.6	13619	7045	15301	-0.256	0.798
	Urban	128	119.54	15301				
Digit66tal Learning	Rural	112	123.73	13857.5	6806.5	15062.5	-0.677	0.498
	Urban	128	117.68	15062.5				
Digital identity management	Rural	112	119.86	13424	7096	13424	-0.152	0.879
	Urban	128	121.06	15496				
Digital Wellbeing	Rural	112	127.75	14307.5	6356.5	14612.5	-1.527	0.127
	Urban	128	114.16	14612.5				

Source: Computed Data N- Number of respondents, MR- Mean rank, SR- Sum of ranks, MWU-Man Whitney -U, W-W- Wilcoxon, DF- Degrees of freedom, A-P -asymptotic p-value

In contrast, women entrepreneurs located in rural or remote areas face challenges such as poor internet connectivity, limited access to digital devices, and a lack of digital training opportunities. These barriers can restrict their ability to develop advanced digital competencies like digital creation and digital problem-solving, which are crucial for business growth and competitiveness (Mahmood et al., 2020). The Man-Whitney test was used to test the significant differences across the Rural and Urban residential areas across components of digital competency is shown in Table 4.7.3

From the Table 4.7.3, the components of digital competency -Digital Proficiency (p=0.913), Digital Productivity (p=0.953), Information Literacy (p=0.91), Data Literacy (p = 0.80), Media Literacy (p = 0.92), Digital Creation (p = 0.88), Digital Research and Problem-Solving (p = 0.86), Digital Communication (p = 0.83), Digital Collaboration (p = 0.45), Digital Participation (p = 0.79), Digital Learning (p = 0.49), Digital Identity Management (p = 0.87), and Digital Wellbeing (p = 0.12) between rural and urban residents were almost identical with P Values exceeding threshold of 0.05, indicating residential area (rural vs. urban) does not have a significant impact on the digital competency scores . The results indicates that digital competency training provided to participants have bridged the digital competency gaps between rural and urban residents. Structured training programs that incorporate hands-on learning and practical applications ensure uniform skill development regardless of participants' geographic location (Scherer et al., 2021). Further urban areas had better access to advanced technology and high-speed internet, while rural areas have increasingly benefitted from government and nonprofit initiatives aimed at reducing the digital divide. Projects like Digital Kerala, K Wi-Fi and the Digital India programmes have significantly improved internet access and digital competency in rural areas (Sundararajan, 2017).

The study indicates no significant differences in digital competency levels between rural and urban informal women entrepreneurs following digital competency training. High p-values for components such as Digital Proficiency (p=0.913) and Digital Productivity (p=0.953) demonstrate that residential location does not impact the skill acquisition process. These results highlight the effectiveness of structured digital competency training programs in bridging the digital divide between rural and urban areas. Initiatives such as Digital Kerala, K-WiFi, and Digital India have also played a pivotal role in equipping rural participants with comparable digital skills to their urban counterparts.

4.7.4 Digital Competency across Marital Status of Women Entrepreneurs in the Informal Sector

Marital status can significantly influence the acquisition of digital competency, particularly among women entrepreneurs, due to its impact on access to time, resources, and social support. Research highlights that married women often face heightened time constraints due to household and caregiving responsibilities, limiting their ability to engage in digital skill development (UN Women, 2022). These competing obligations reduce the time available for training, hindering the acquisition of digital skills essential for business growth.

Table 4.7.4 Digital Competency across Marital Status of Women Entrepreneurs in the Informal Sector

Components of Digital Competency	Marital Status	N	MR	SR	MW-U	WW	Z	A-P
Digital Proficiency	Married	197	117.76	23200	3696.5	23200	-1.464	0.143
	Unmarried	43	133.03	5720.5				
Information Literacy	Married	197	118.01	23248	3744.5	23248	-1.334	0.182
	Unmarried	43	131.92	5672.5				
Data Literacy	Married	197	117.61	23169	3666	23169	-1.556	0.121
	Unmarried	43	133.74	5751				
Media Literacy	Married	197	117.56	23159	3656	23159	-1.583	0.113
	Unmarried	43	133.98	5761				
Digital Creation	Married	197	118.22	23289	3785.5	23289	-1.333	0.183
	Unmarried	43	130.97	5631.5				
Digital Research and Problem-Solving	Married	197	119.02	23448	3944.5	23448	-0.817	0.414
	Unmarried	43	127.27	5472.5				
Digital Communication	Married	197	117.75	23197	3694.5	23198	-1.463	0.144
	Unmarried	43	133.08	5722.5				
Digital Collaboration	Married	197	118.25	23294	3791.5	23295	-1.103	0.27
Digital Participation	Married	197	117.58	23162	3659.5	23163	-1.561	0.119
	Unmarried	43	133.9	5757.5				
Digital Learning	Married	197	117.6	23168	3665.5	23163	-1.39	0.164
	Unmarried	43	133.77	5752				
Digital identity management	Married	197	117.35	23118	3615.5	23119	-1.701	0.089
	Unmarried	43	134.92	5801.5				
Digital Wellbeing	Married	197	115.7	22793	3290.5	22794	-2.313	0.061
	Unmarried	43	142.48	6126.5				

Source: Computed Data N- Number of respondents, MR- Mean rank, SR- Sum of ranks, MWU-Man Whitney -U, W-W- Wilcoxon, DF- Degrees of freedom, A-P -asymptotic p-value

Households with limited support for technology use can further exacerbate barriers to accessing training or devices, restricting opportunities for skill enhancement (OECD, 2022). Traditional societal expectations, especially in patriarchal cultures, often limit the ability of married women to prioritize personal skill development, reducing their engagement with digital tools. However, societal shifts toward gender equity and increasing recognition of women's roles in entrepreneurship are creating more favourable conditions for digital upskilling and skill application (World Bank, 2023). Mann -Whitney U test was applied to test the significant difference between marital status and components of digital competency is presented in Table 4.7.4

From the table 4.7.4 it is evident that there is no significant difference between marital status and components of digital competency. The P values for the components of digital competency -Digital Proficiency (p=0.143), Digital Productivity (p=0.182), Information Literacy (p=0.182), Data Literacy (p = 0.121), Media Literacy (p = 0.113), Digital Creation (p = 0.183), Digital Research and Problem-Solving (p = 0.414), Digital Communication (p = 0.144), Digital Collaboration (p = 0.27), Digital Participation (p = 0.119), Digital Learning (p = 0.164), Digital Identity Management (p = 0.089), and Digital Wellbeing (p = 0.061) were greater than threshold 0.05.

findings of the study suggest that marital status does not significantly impact the acquisition of digital skills among women entrepreneurs. studies show that when women entrepreneurs, regardless of their marital status, have access to quality training and support, they are able to enhance their digital skills (UN Women, 2022). In line with this, a study by the World Bank (2023) highlights that access to technology and training is often a more critical determinant of digital skill development than social or family roles.

It is inferred that access to training, technology, and resources is more influential in enhancing digital competencies than family or marital roles. Therefore, the study concludes that women entrepreneurs, regardless of their marital status, can equally benefit from digital competency training if they have access to the appropriate support and opportunities.

4.8 Business Profile and Digital Competency of Informal Women Entrepreneurs

The business profile of women entrepreneurs in the informal sector is diverse, ranging from tailoring, handicrafts, food processing, and retail to service-based micro-enterprises. Despite their significant contribution to local economies, these businesses often operate with minimal infrastructure, low capital investment, and limited formal support

(Sethuraman, 2020; Sharma & Joshi, 2023). In this context, digital competency has emerged as a crucial factor for improving business operations, enhancing visibility, and accessing wider markets. Digital skills—such as using mobile apps, digital payments, social media marketing, and online customer engagement enable women to overcome traditional barriers of mobility, market access, and information asymmetry (Thomas & Devi, 2022; Gupta & Mishra, 2024). Strengthening digital competency not only enhances business efficiency but also empowers women entrepreneurs to transition from survival-based to growth-oriented enterprises in the informal economy. Hence, a hypothesis is formulated to find digital competency across the business profiles of women entrepreneurs

Ho_3: There is no significant mean difference between components of digital competency across the Business profile of Informal women entrepreneurs

Ha_3: There is a significant mean difference between components of digital competency across the Business profile of Informal women entrepreneurs

4.8.1 Digital Competency across the Location of the Unit of Business among Women Entrepreneurs in Informal Sector

The location influences access to technology, digital learning resources, and opportunities for interaction with digital platforms, which can significantly shape individuals' digital competencies.

The significance of a firm's physical location in this digital era appears to be diminishing, as digital competencies can enable firms to overcome traditional barriers to internationalization. (Shaheer, 2020)

Traditionally, a firm's physical location was considered a key determinant of its competitive advantage, as it provided access to specific resources, talent pools, and market opportunities. However, the proliferation of digital technologies and the digital competency training given to informal women entrepreneurs has disrupted this notion, as newly established born-digital firms can now readily access a global pool of resources and training can compete on a level playing field, regardless of their geographic location. A Mann-Whitney U test was performed to compare digital competency between units located in panchayaths and Municipalities.

From the table 4.7.3 the results of the Man -Whitney U test reveals that P values for Digital Competency dimensions including Digital Proficiency (p = 0.116), Digital productivity (P = 0.209), Information Literacy (P = 0.092), Data Literacy (P = 0.066), Media literacy (P=0.108) , Digital Creation(P = 0.290), Digital research and problem solving (P = 0.306), Digital communication(P = 0.146), Digital Collaboration(p = 0.074), Digital participation(0.101) , Digital Learning (0.083), Digital Identity (p = 0.099) Digital Wellbeing (p = 1.000) showed no statistical significance across the Location of Unit.

Table 4.8.1 Digital Competency across the Location of the Unit of Business among Women Entrepreneurs in Informal Sector

Components of Digital Competency	Location of the unit						Test Statistics			
	N		MR		SR		MW	W- W	Z	A-P
	Panchayat	Municipality	Panchayat	Municipality	Panchayat	Municipality				
Digital Proficiency	138	102	115.09	127.82	15882.50	13037.50	6291.500	15882.50	-1.573	0.116
Digital Productivity	138	102	116.09	126.47	16020.50	12899.50	6429.500	16020.50	-1.256	0.209
Information Literacy	138	102	114.71	128.33	15830.50	13089.50	6239.500	15830.50	-1.683	0.092
Data Literacy	138	102	114.22	129.00	15762.00	13158.00	6171.000	15762.00	-1.837	0.066
Media Literacy	138	102	115.00	127.94	15870.00	13050.00	6279.000	15870.00	-1.609	0.108
Digital Creation	138	102	117.16	125.02	16168.00	12752.00	6577.000	16168.00	-1.059	0.290
Digital Research and Problem-Solving	138	102	117.09	125.11	16159.00	12761.00	6568.000	16159.00	-1.024	0.306
Digital Communication	138	102	115.47	127.30	15935.50	12984.50	6344.500	15935.50	-1.455	0.146
Digital Collaboration	138	102	113.79	129.57	15703.50	13216.50	6112.500	15703.50	-1.784	0.074
Digital Participation	138	102	114.84	128.15	15848.50	13071.50	6257.500	15848.50	-1.641	0.101
Digital Learning	138	102	113.86	129.49	15712.00	13208.00	6121.000	15712.00	-1.733	0.083
Digital identity	138	102	114.88	128.11	15853.00	13067.00	6262.000	15853.00	-1.651	0.099
Digital Wellbeing	138	102	120.50	120.50	16629.00	12291.00	7038.000	12291.00	.000	1.000

Source: Computed Data

N- Number of respondents, MR- Mean rank, SR- Sum of ranks, MW-Man Whitney -U, W-W- Wilcoxon- W, A-P -asymptotic p-value.

This leads to acceptance of null hypothesis and it of This indicates that Digital competency training programs provided equal access and content to all participants, regardless of location of Unit. Therefore, after undergoing the digital competency training, entrepreneurs from both Panchayaths and Municipalities have attained similar levels of digital competency. The exposure to digital tools through hands on experience with structured module rather than theoretical knowledge is a key factor in developing digital competencies, meaning locational disparities do not have a significant effect after the training (Eurostat, 2023).

The results imply that location is becoming a less critical factor in determining digital competencies, as equitable access to digital competency training and practical engagement with tools can effectively overcome geographic divides.

4.8.2 Digital Competency across the Nature of business among Women Entrepreneurs in Informal Sector

The relationship between the nature of business and components of digital competency is critical, especially for informal women entrepreneurs, as it determines the relevance and application of specific digital skills essential for business development. The usage of digital competency can vary depending on the specific type of business and how digital tools are integrated into day-to-day operations. The tailored digital competency training was ensured to informal women entrepreneurs to acquire the right skills for their business type. This is in line with studies by found in studies by Van Dijk (2020), which emphasize the importance of customized digital skills based on industry demands. Digital competency training was linked to digital tools for business operations which lead to better business outcomes and enhanced entrepreneurial sustainability. Kruskal -Walis Test was conducted to compare the digital competency components across nature of business of informal women entrepreneurs shown in table 4.8.2

From the Table 4.8.2, results indicate that there is no statistically significant differences between the components of digital competency including Digital Proficiency (p = 0.945), Digital productivity (P = 0.921), Information Literacy (p = 0.994), Data Literacy (p = 0.968), Media literacy , Digital Creation, Digital research and problem solving, Digital communication, Digital Collaboration(p = 0.406), Digital participation(0.999) , Digital Learning (0.779), Digital Identity (p = 0.992) Digital Wellbeing (p = 0.802) and the nature

of business. This leads to rejection of alternative hypothesis. This means there is no significant difference between nature of business and components of digital competency.

Table 4.8.2 Digital Competency across the Nature of business among Women Entrepreneurs in Informal Sector

Components of Digital Competency	Nature of business						Test Statistics	
	N			MR				
	M	T	S	M	T	S	df	A-P
Digital Proficiency	150	55	35	117.63	132.07	121.06	3	.945
Digital Productivity	150	55	35	118.61	135.71	120.88	3	.921
Information Literacy	150	55	35	118.65	123.64	121.12	3	.994
Data Literacy	150	55	35	119.71	131.71	120.54	3	.968
Media Literacy	150	55	35	120.35	130.57	120.41	3	.976
Digital Creation	150	55	35	117.74	139.07	120.53	3	.830
Digital Research and Problem-Solving	150	55	35	120.64	134.21	119.18	3	.913
Digital Communication	150	55	35	121.24	133.00	119.60	3	.956
Digital Collaboration	150	55	35	119.03	153.71	117.27	3	.406
Digital Participation	150	55	35	119.28	121.79	120.92	3	.999
Digital Learning	150	55	35	115.61	111.29	120.70	3	.779
Digital identity management	150	55	35	119.81	125.93	120.13	3	.992
Digital Wellbeing	150	55	35	115.61	118.00	123.85	3	.802

Source: Computed Data *Correlation is significant at the 0.05 level (2-tailed)
N- Number of respondents, MR- Mean rank, SR- Sum of ranks, MW-Man Whitney -U, W-W- Wilcoxon- W, A-P -asymptotic p-value

It indicates that universal demand for Digital Competency across businesses rely on foundational digital skills to operate and remain competitive. The Digital competency training on digital proficiency is recognized as a foundational skill for businesses in any sector, as it supports efficiency and innovation. The training on digital competency involved training on digital tools according to the business functions. Training increased the entrepreneurs to adopt tools like email, spreadsheets, and basic software to manage operations effectively.Digital productivity training have improved workflows and maintain competitive advantages (Parida et al., 2019). Information literacy is increasingly vital across sectors. It ensures that businesses, regardless of size, can navigate the information-rich digital environment (Bruce et al., 2006).Data literacy enables businesses of all scales to interpret and leverage data for strategic purposes (Davenport & Harris, 2007). SMEs often

use data-driven tools for decision-making and growth (Gupta et al., 2019). Media literacy is a core competency for navigating digital marketing and communication strategies, applicable to businesses of all kinds (Livingstone & Helsper, 2007). SMEs leverage digital platforms to build brand visibility (Tiago & Veríssimo, 2014). The collaboration tools enable businesses to improve teamwork and operational efficiency, irrespective of their size (Mazmanian et al., 2014). Such tools are widely adopted to adapt to remote and hybrid work models (Olson et al., 2020).Research and problem-solving skills are essential for businesses navigating digital transformation, as they foster innovation and adaptability (Westerman et al., 2014).Digital communication tools are ubiquitous and critical for maintaining stakeholder relationships across all industries (Leonardi et al., 2012).Digital participation enhances market reach and customer engagement for businesses, regardless of size (Bharadwaj et al., 2013). SMEs increasingly rely on digital platforms for visibility and sales (Zhu & Kraemer, 2005). Digital learning empowers businesses to remain competitive in a rapidly changing digital landscape (Fischer, 2013). The democratization of online learning tools benefits all business types (Wang et al., 2020). Effective digital identity management ensures trust and reputation, which are critical across sectors (Schwab, 2016). Digital well-being is increasingly recognized as a key factor in workplace satisfaction and productivity across industries (Ayyagari et al., 2011).

The above discussion indicates that the nature of the business does not influence the digital competency components. Regardless of the business type, the demand for foundational digital skills is universal, highlighting that digital competency is necessary for all businesses to remain efficient, innovative, and competitive. The training provided, which covered a wide range of digital tools and competencies, ensured that entrepreneurs, irrespective of their business focus, gained critical skills that applied across various sectors.

4.8.3 Digital Competency across Ownership of Business among Women Entrepreneurs in Informal Sector

The type of organization and digital competency reflects the influence of organizational structure, resource access, and operational priorities on the acquisition and application of digital skills. The Kruskal-Walli's test was applied to test the significant difference between organisation type and components of digital competency. Digital Competency across Ownership of Business among Women Entrepreneurs in Informal Sector is shown in table 4.8.3

Table 4.8.3 Digital Competency across Ownership of Business among Women Entrepreneurs in Informal Sector

Components of Digital competency	Ownership of Business						Test Statistics	
	N			MR				
	P	PR	SHG	P	PR	SHG	DF	A-P
Digital Proficiency	210	16	14	122.17	129.13	100.46	2	.205
Digital Productivity	210	16	14	122.80	125.13	99.07	2	.121
Information Literacy	210	16	14	122.25	123.88	105.21	2	.300
Data Literacy	210	16	14	122.17	131.13	97.71	2	.167
Media Literacy	210	16	14	122.13	127.59	102.86	2	.241
Digital Creation	210	16	14	121.29	133.03	105.61	2	.306
Digital Research and Problem-Solving	210	16	14	121.88	125.56	107.29	2	.368
Digital Communication	210	16	14	121.73	133.50	102.00	2	.200
Digital Collaboration	210	16	14	123.93	113.09	94.14	2	.142
Digital Participation	210	16	14	122.15	123.09	107.79	2	.326
Digital Learning	210	16	14	120.72	136.19	105.93	2	.593
Digital identity management	210	16	14	122.07	129.38	101.29	2	.222
Digital Wellbeing	210	16	14	121.02	124.44	117.86	2	.795

Source: Computed Data *Correlation is significant at the 0.05 level (2-tailed)
N- Number of respondents, MR- Mean rank, P- Proprietorship, PR- Partnerships, SHG-Self-help groups N - number of respondents, DF- Degrees of freedom, A-P -asymptotic p-value

The table 4.8.3 shows no statistically significant differences ($p>0.05$) in the components of digital competency across different ownership. The P values for Digital Proficiency ($p = 0.205$), Digital Productivity ($p = 0.121$),Information Literacy ($p = 0.300$), Data Literacy ($p = 0.167$), Media Literacy ($p = 0.241$), Digital Creation ($p = 0.306$), Digital Research and Problem-Solving ($p = 0.368$), Digital Communication ($p = 0.200$), Digital Collaboration ($p = 0.142$), Digital Participation ($p = 0.326$), Digital Learning ($p = 0.593$), Digital Identity Management ($p = 0.222$), Digital Wellbeing ($p = 0.795$) were consistent across all organization types indicating the rejection of alternative hypothesis.

The results were in line with studies by (World Economic Forum, 2020), the digital competency training on digital devices and basic digital platforms will minimise the gaps in digital competency across ownership types. The basic digital competencies, such as communication, research, and collaboration, are fundamental and adaptable to any organisation type, explaining the lack of significant differences.

Sole traders ranked moderately high across most digital competency components. This result indicates that proprietors possess an average level of digital skills, enabling them to manage operations independently, such as marketing, customer interaction, and financial tracking. Sole traders typically handle all business functions themselves, which necessitates a well-rounded digital skill set. These skills help them navigate e-commerce, social media, and financial tools (Cassar, 2017). Further, the studies show that sole traders are increasingly adopting affordable digital tools to compete in the market (Ramadani et al., 2019). They use digital communication and collaboration tools to engage customers and suppliers effectively, enhancing their competitive edge (Martin & Wright, 2005). Partnerships exhibited slightly higher ranks in certain components, such as Digital Communication and Data Literacy.

Partnerships often involve multiple individuals working together, necessitating strong communication and data management skills (De Clercq et al., 2010).

SHGs demonstrated slightly lower ranks in most competencies, potentially reflecting limited access to advanced digital tools or training. However, their participation in digital platforms for group coordination and empowerment was notable.SHGs, particularly in rural areas, often face barriers like limited infrastructure and financial resources, which restrict their adoption of advanced digital tools (Mehrotra, 2019).

The study demonstrates that digital competency training effectively standardizes foundational digital skills across diverse organization types, including sole traders, partnerships, self-help groups (SHGs). Despite variations in ownership structure and resources, the lack of statistically significant differences across components of digital competency suggests the universal applicability of the training program. This highlights the efficacy of the training in bridging skill gaps and equipping informal women entrepreneurs with essential digital tools and knowledge.

4.8.4 Digital Competency across Years of Experience in Business among Women Entrepreneurs in Informal Sector

Continuous exposure to business operations often necessitates the use of a variety of digital tools, which enhances individuals' comfort and adaptability with these technologies over time (Scherer et al., 2021). Entrepreneurs with significant business experience are typically more skilled at integrating productivity tools into their workflows, streamlining operations, and improving efficiency. Furthermore, seasoned entrepreneurs tend to use

collaboration platforms more effectively, fostering team dynamics and enhancing relationships with stakeholders (De Clercq et al., 2010). This accumulated experience also enables a more strategic approach to managing online presence and reputation, critical for maintaining trust and credibility in the digital age. The Kruskal-Walli's test was applied to test the significant difference between years of business experience and components of digital competency (Table 4.8.4)

Table 4.8.4 Digital Competency across Years of Experience in Business among Women Entrepreneurs in Informal Sector

Components of Digital competency	Years of experience in business								Test Statistics	
	N				MR					
	< 1	2-5	6-10	11-15	< 1	2-5	6-10	11-15	DF	A-P
Digital Proficiency	213	13	10	4	110.52	120.66	90.53	131.88	3	.085
Digital Productivity	213	13	10	4	110.83	115.43	95.71	134.94	3	.079
Information Literacy	213	13	10	4	104.46	118.70	93.50	135.63	3	**.025***
Data Literacy	213	13	10	4	112.67	116.21	90.76	134.49	3	.051
Media Literacy	213	13	10	4	112.15	117.36	89.45	134.07	3	**.049***
Digital Creation	213	13	10	4	109.31	113.90	107.68	133.08		0.11
Digital Research and Problem-Solving	213	13	10	4	110.19	114.62	95.74	136.58	3	.061
Digital Communication	213	13	10	4	109.43	118.65	90.55	135.57	3	**.037***
Digital Collaboration	213	13	10	4	122.93	118.17	106.71	126.09	3	.825
Digital Participation	213	13	10	4	109.92	118.75	90.97	133.17	3	.064
Digital Learning	213	13	10	4	101.82	128.23	108.24	136.69	3	**.020***
Digital identity management	213	13	10	4	107.98	121.85	91.76	132.03	3	.069
Digital Wellbeing	213	13	10	4	112.96	123.55	105.42	129.21	3	.533

Source: Computed Data *Correlation is significant at the 0.05 level (2-tailed)
N- Number of respondents, MR- Mean rank, N -number of respondents, DF- Degrees of freedom, A-P - asymptotic p-value

The table 4.8.4 highlight differences in digital competency components across organizations with varying years in business. Digital Proficiency (p= 0.85), Digital Productivity (P= 0.79), Data Literacy (P= 0.51), Digital Creation (P=0.11), Digital Research and Problem-Solving (p=0.031), Digital Collaboration (P= 0.82), Digital Participation (P= 0.64), Digital Identity Management (P = 0.69), and Digital Wellbeing (P=0.53) showed the lack of statistical significance suggests that the years in business do not create substantial differences in these competencies. It is more influenced by external factors such as access to training and user-friendly digital tools. This finding aligns with studies indicating that

structured digital competency training can enable the individuals with fewer years of experience to perform on par with more experienced peers (Scherer et al., 2021).

In contrast Information Literacy (p=0.025), Media literacy (p= 0.49), Digital Communication (p = .037), Digital Learning (P =0.020), Digital Communication (p = .037), Digital Learning (P =0.020) showed significant results where P = <0.05) indicating rejection of null hypothesis. This indicates that business longevity plays a critical role in developing certain digital competencies, as prolonged exposure to diverse information management tasks enhances entrepreneurs' ability to locate, evaluate, and use information effectively. Over time, experienced entrepreneurs tend to develop familiarity with leveraging digital media strategically, particularly for marketing and customer engagement. This experience enables them to navigate and utilize various platforms effectively, tailoring communication styles to meet the needs of diverse customers.

This is in line with the study by Scherer et al. (2021), emphasize that years of operational experience significantly enhance the ability to manage digital information effectively, enabling organizations to adapt to evolving digital ecosystems. Further it develops strong information-handling practices through consistent exposure to market dynamics and digital tools.

From the above discussion it is evident that Information Literacy, Digital Communication, and Digital Learning highlight the critical role of business longevity in enhancing these digital competencies. Entrepreneurs with more years in business are better equipped to navigate complex information management tasks, leveraging their experience to evaluate and utilize digital tools effectively. This exposure also fosters a strategic approach to using digital media, particularly for marketing and customer engagement, where seasoned entrepreneurs can customize communication strategies to cater to diverse audiences. Prolonged experience enables the application of learned skills across multiple platforms, emphasizing the practical value of sustained business operations in digital competency development

4.8.5 Digital Competency across Monthly income in Business among Women Entrepreneurs in Informal Sector

Monthly income significantly impacts access to digital tools, training, and opportunities, shaping individuals' ability to acquire and apply digital competencies across various domains. Previous research shows that financial capability facilitates access to

advanced technologies, high-speed internet, and digital education, creating a divide between higher- and lower-income groups (Van Deursen & Helsper, 2015; OECD, 2021).

Income disparities result in unequal levels of proficiency in digital skills such as productivity and problem-solving. Higher-income individuals are more likely to invest in online courses and advanced devices, enhancing their ability to leverage technology for entrepreneurial growth. In contrast, lower-income groups often face barriers to consistent digital engagement, limiting their ability to fully participate in the digital economy (Scherer et al., 2021). The Kruskal-Wallis test was used to test the significant differences across components of digital competency based on monthly income groups depicted in Table 4.8.5

Table 4.8.5 Digital Competency across Monthly income in Business among Women Entrepreneurs in Informal Sector

Components of Digital competency	Monthly Income								Test Statistics	
	N				MR					
	Below 10000	10001-20000	20001-30000	30001-40000	Below 10000	10001-20000	20001-30000	30001-40000	DF	A-P
Digital Proficiency	93	96	31	20	117.32	126.16	103.25	123.63	3	.445
Digital Productivity	93	96	31	20	115.97	127.19	102.80	124.81	3	.354
Information Literacy	93	96	31	20	117.89	127.07	102.05	119.87	3	.388
Data Literacy	93	96	31	20	119.42	123.84	104.25	123.87	3	.616
Media Literacy	93	96	31	20	117.86	127.37	102.00	119.08	3	.364
Digital Creation	93	96	31	20	119.98	122.23	112.50	121.85	3	.916
Digital Research and Problem-Solving	93	96	31	20	118.72	124.54	107.13	121.95	3	.675
Digital Communication	93	96	31	20	118.32	125.76	100.33	123.77	3	.394
Digital Collaboration	93	96	31	20	117.98	122.62	102.33	133.21	3	.431
Digital Participation	93	96	31	20	118.70	124.49	103.25	124.68	3	.540
Digital Learning	93	96	31	20	118.96	123.17	121.83	116.00	3	.955
Digital identity management	93	96	31	20	118.40	123.96	103.40	127.11	3	.508
Digital Wellbeing	93	96	31	20	119.48	131.09	105.53	100.42	3	.117

Source: Computed Data N- Number of respondents, MR- Mean rank, DF- Degrees of freedom, A-P - asymptotic p-value

Table 4.8.5 reveals that monthly business income does not strongly influence digital competency levels among the participants. Digital Proficiency (p=0.44), Digital Productivity (p=0.354), Information Literacy (p=0.38), Data Literacy (p = 0.61), Media Literacy (p = 0.36), Digital Creation (p = 0.91), Digital Research and Problem-Solving

(p = 0.67), Digital Communication (p = 0.39), Digital Collaboration (p = 0.43), Digital Participation (p = 0.54), Digital Learning (p = 0.95), Digital Identity Management (p = 0.50), and Digital Wellbeing (p = 0.11) showed insignificant result which has led to rejection of alternative hypothesis. This indicates that democratization of technology due to affordable internet and smartphones minimizes skill gaps.

This mirrors the results documented in recent studies by World Bank, (2020), emphasise that affordable access to digital infrastructural facilities lead to digital inclusion of marginalised groups. Further the digital competency training has improved the digital skills of informal women entrepreneurs, which explains the uniformity in competencies across income levels (Banerjee et al., 2021).

It is deduced that monthly income of business among informal women entrepreneurs does not significantly impact the digital competency levels. This suggests that affordable access to technology, digital tools, and targeted training programs, are more influential in enhancing digital skills. Furthermore, the digital competency training provided to the participants has led to an overall improvement in their digital skills, contributing to a uniformity in competencies across various income brackets.

4.8.6 Digital Competency across Business activities among Women Entrepreneurs in Informal Sector

Business activities are set of competencies that individuals acquire through education, experience, or personal development, enabling them to successfully identify, create, and exploit business opportunities. Entrepreneurs gain significant skills from hands-on experience in running a business. This includes understanding business operations, financial management, customer relationship management, and market dynamics. Experience helps entrepreneurs to deal with challenges and develop innovative solutions based on past encounters. Through experience, entrepreneurs learn to assess and manage risks associated with their businesses and make informed decisions (Acs & Audretsch, 2010)

Special training refers to structured learning that includes formal education, professional development programs, and business courses aimed at enhancing specific entrepreneurial competencies like marketing, finance, leadership, and technology. Training programs often emphasize leadership, communication, and management skills that are essential for entrepreneurs to effectively run teams and scale their businesses (Chitralekha

& Singh, 2020). In the current study Informal women entrepreneurs have acquired training in food processing, tailoring, plumbing, personal care etc. Further they have got training sessions on improving skills in communication and marketing.

Entrepreneurial Spirit refers to the natural or learned inclination to innovate, create new ideas, and seek out opportunities (Schumpeter, 1934). Entrepreneurs need to recognize opportunities, develop new products, and create innovative solutions. An entrepreneurial spirit involves persistence in the face of challenges, a willingness to take risks, and the determination to continue despite setbacks.The Kruskal-Wallis test was done to test significant differences between different types of entrepreneurial skills across the components of digital competency

4.8.6 Digital Competency across Business activities among Women Entrepreneurs in Informal Sector

Components of Digital competency	**Business Activities involved**								**Test statistics**	
	N				**MR**					
	FB	**BP**	**HA**	**SRS**	**FB**	**BP**	**HA**	**SRS**	**DF**	**A-P**
Digital Proficiency	112	51	23	54	111.53	120.43	109.81	132.38	3	0.188
Digital Productivity	112	51	23	54	113.49	121.72	109.81	126.85	3	0.496
Information Literacy	112	51	23	54	109.94	121.64	105.39	131.68	3	0.157
Data Literacy	112	51	23	54	112.26	120.54	105.39	131.19	3	0.249
Media Literacy	112	51	23	54	112.34	120.18	103.82	131.92	3	0.225
Digital Creation	112	51	23	54	114.76	120.14	108.14	128.85	3	0.402
Digital Research and Problem-Solving	112	51	23	54	112.33	119.66	102.61	133.13	3	0.166
Digital Communication	112	51	23	54	109.21	121.36	102.61	133.28	3	0.108
Digital Collaboration	112	51	23	54	115.35	125.13	108.25	116.57	3	0.569
Digital Participation	112	51	23	54	111.57	121.31	109.81	130.31	3	0.257
Digital Learning	112	51	23	54	105.40	126.88	106.39	125.51	3	0.103
Digital identity management	112	51	23	54	112.72	121.58	102.61	128.19	3	0.378
Digital Wellbeing	112	51	23	54	117.51	120.48	104.61	124.46	3	0.860

Source: Computed Data FB- Food and Beverages, BP- Beauty and personal care, HA- Handicraft and artisans, SRS- Small Retail stores N- Number of respondents, MR- Mean rank, DF- Degrees of freedom, A-P -asymptotic p-value

From the table 4.8.6, the test results show no statistically significant differences between different types of entrepreneurial skills (Experience, Special Training,

Entrepreneurial Spirit) across the components of digital competency. The p-values for components of digital competency - Digital Proficiency (p=0.18), Digital Productivity (p=0.49), Information Literacy (P=0.15),Data Literacy (p = 0.24), Media Literacy (p = 0.22), Digital Creation (p = 0.40), Digital Research and Problem-Solving (p = 0.16), Digital Communication (p = 0.10), Digital Collaboration (p = 0.56), Digital Participation (p = 0.25), Digital Learning (p = 0.10), Digital Identity Management (p = 0.37), and Digital Wellbeing (p = 0.86) were greater than 0.05, and were insignificant across business activities involved by informal women entrepreneurs indicating rejection of alternative hypothesis.

This suggests that Digital competencies require specific, hands-on engagement with technology, which not always align with the general skills developed through entrepreneurial experience. Nambassa and Simiyu (2021) found that formal digital training programs had a much stronger impact on digital competencies than prior entrepreneurial skills.

Further digital skills are domain-specific and require targeted learning, which is not be adequately addressed by entrepreneurial training focused on business operations or management. It is justified that entrepreneurship curriculum fosters skills like innovation and risk management, but these skills do not inherently contribute to technological proficiency(Salim et al., 2021)

The entrepreneurial spirit within the entrepreneurs are more adaptable and open to new technologies (Zhao & Seibert, 2016). Research by Seligman and Csikszentmihalyi (2000) on positive psychology and entrepreneurship suggests that while entrepreneurial spirit contribute to motivation and persistence, it does not automatically lead to proficiency in digital tools and technologies. Hence the specialized training in digital competency is often more influential in building digital competency than general entrepreneurial skills acquired (Nambassa & Simiyu 2021)

It is inferred that p-values for digital competency components were greater than 0.05, suggest that types of business activities do not significantly influence digital competencies among informal women entrepreneurs. This indicates that digital competencies require specific, hands-on engagement with technology, which is not be effectively developed through general entrepreneurial training that focuses on business operations. While entrepreneurial training fosters essential skills such as innovation and risk

management, these do not directly contribute to proficiency in digital tools or technologies. Moreover, although an entrepreneurial spirit increase adaptability to new technologies, it does not inherently lead to digital tool proficiency. Thus, specialized digital competency training is crucial for effectively enhancing digital skills, beyond the scope of general entrepreneurial education.

4.8.7 Digital Competency across the Growth outlook of business among Women Entrepreneurs in the Informal Sector

The growth outlook provides a roadmap for organizations to plan for growth, innovation, and sustainability, aligning business goals with emerging opportunities and challenges.

The future outlook of business for informal women entrepreneurs before digital competency training can significantly influence the skills they acquire through training. The growth outlook focused on formalization, expansion, and modernization, which motivates and integrates informal women entrepreneurs to apply digital skills effectively. The entrepreneurs with a forward-looking business outlook are more inclined to leverage digital technologies as tools for innovation and scaling their operations, facilitating better market reach and adaptability to change (Lupton et al., 2023). The Kruskal-Wallis test was used to analyse the differences in digital competency components across different plans for their business, shown in Table 4.8.7

Table 4.8.7 Digital Competency across Growth outlook of business among Women Entrepreneurs in Informal Sector

Components of Digital competency	Growth outlook of business						Test Statistics	
	N			MR				
	Formalise	Expand	Modernise	Formalise	Expand	Modernise	DF	A-P
Digital Proficiency	4	213	23	92.63	123.28	99.59	2	.145
Digital Productivity	4	213	23	99.25	122.61	104.67	2	.345
Information Literacy	4	213	23	93.25	123.09	101.24	2	.186
Data Literacy	4	213	23	89.88	123.01	102.54	2	.192
Media Literacy	4	213	23	92.38	123.06	101.72	2	.188
Digital Creation	4	213	23	82.00	123.09	103.22	2	.111
Digital Research and Problem-Solving	4	213	23	75.50	122.83	106.72	2	.150
Digital Communication	4	213	23	91.75	123.07	101.70	2	.191
Digital Collaboration	4	213	23	113.50	121.34	113.91	2	.864

Digital Participation	4	213	23	90.38	123.49	98.09	2	.109
Digital Learning	4	213	23	133.88	120.92	114.30	2	.843
Digital identity management	4	213	23	97.25	122.58	105.28	2	.327
Digital Wellbeing	4	213	23	123.25	121.83	107.74	2	.645

Source: Computed Data N- Number of respondents, MR- Mean rank, DF- Degrees of freedom, A-P - asymptotic p-value

From the table 4.8.7 the results reveal that The p-values for each component were all above the significance level of 0.05, indicating that there are no statistically significant differences in digital competency based on the different future plans of the businesses. Digital Proficiency (p=0.14), Digital Productivity (p=0.34), Information Literacy (P=0.18),Data Literacy (p = 0.19), Media Literacy (p = 0.18), Digital Creation (p = 0.11), Digital Research and Problem-Solving (p = 0.15), Digital Communication (p = 0.19), Digital Collaboration (p = 0.86), Digital Participation (p = 0.10), Digital Learning (p = 0.84), Digital Identity Management (p = 0.32), and Digital Wellbeing (p = 0.64) showed insignificant across entrepreneurial skills acquired by informal women entrepreneurs indicating rejection of alternative hypothesis.

The p-values for all the components are greater than 0.05, indicating that none of the digital competency components show significant differences based on whether the entrepreneurs are focused on establishing a formal unit, expanding, or modernizing their business. This suggests that, regardless of the type of growth entrepreneurs are focusing on, digital competency components such as proficiency, communication, collaboration, and learning are equally relevant across all future plans.

The previous research highlights that digital competency is a fundamental skill for navigating digital platforms and is essential for business operations in a technology-driven economy (UN Women, 2022; World Bank, 2023). It supports formalization, expansion, and modernization by improving operational efficiency and enabling informed decision-making (OECD, 2022). Digital productivity enhances time and resource management, making it indispensable for business growth (OECD, 2022). Information literacy empowers entrepreneurs to navigate digital landscapes effectively, aiding in sourcing, marketing, and management for sustained business development (UNCTAD, 2022). Data literacy is increasingly vital for interpreting and utilizing data to drive decisions in scaling and modernization (OECD, 2022). Additionally, digital wellbeing ensures sustainable technology use, mitigating risks like burnout and stress, which are crucial for long-term entrepreneurial success (World Health Organization, 2023)

4.9 Awareness and use of Business applications after Digital competency training among women in the Informal sector

In the evolving digital landscape, equipping informal women entrepreneurs with essential digital skills has become a critical step toward enhancing their business competitiveness and sustainability. A pre- training programme was conducted among women in informal sector to know the awareness level of the applications and it has been found that most of the women in the informal sector are not aware and though aware means they are not using the business applications in their business operations.

Table 4.9 Awareness and use of Business applications after Digital competency training among women in the Informal sector

Business applications	Aware and using		Aware but not using	
	Number of Respondents	Percent	Number of Respondents	Percent
Financial Management				
Quick book	12	5	228	95
Vyapar	132	55	108	45
My bill book	221	92	19	8
Expensify	8	3	232	97
Wave Accounting	-	-	113	47
Marketing & Communication				
WhatsApp	240	100	-	-
Instagram	123	51.25	117	49
Facebook	18	7.5	222	92
You Tube	102	42.5	138	57
Google Meet	240	100	-	-
Zoom	121	50	119	49
E-commerce Applications				
Amazon	-	-	240	100
Flipkart	-	-	240	100
Meesho	240	100	-	-
Storage				
Google Drive	240		-	-
Dropbox	121		119	50
Digi locker	240		-	-
Proof hub	12		228	95
Digital Payment				
Google pay	240	100	-	-
Bhim App	240	100	-	-
Paytm	240	100	-	-
Phone pe	240	100	-	-
Security and Privacy				
Kaspersky antivirus	48	20	192	80
Avast antivirus	112	47	128	53

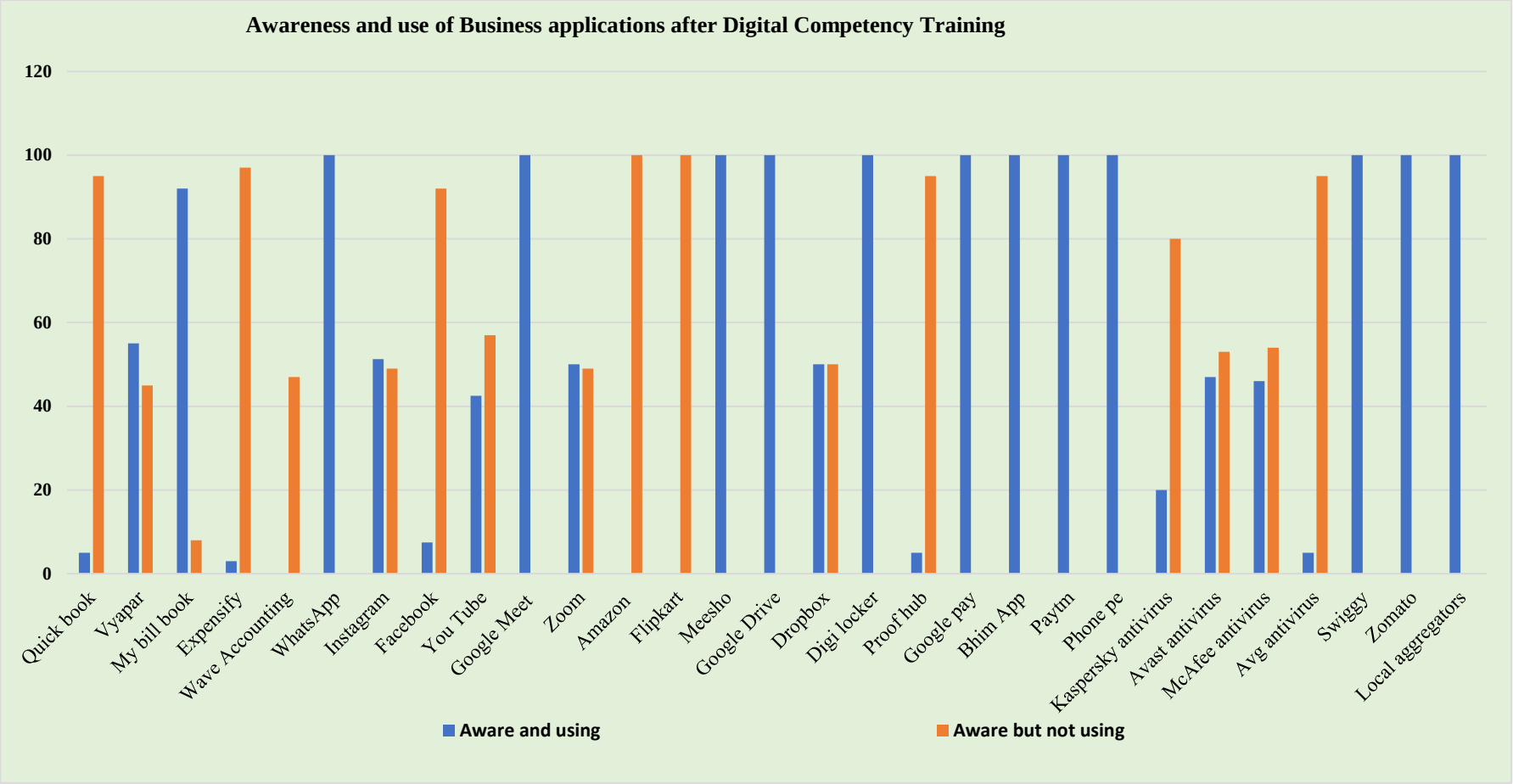
Business applications	Aware and using		Aware but not using	
	Number of Respondents	Percent	Number of Respondents	Percent
McAfee antivirus	110	46	130	54
Avg antivirus	11	5	229	95
Aggregator platforms				
Swiggy	240	100	-	-
Zomato	240	100	-	-
Other Local aggregators	240	100	-	-

Source : Primary Data

To bridge this gap, a comprehensive digital competency training program was conducted targeting informal women entrepreneurs, focusing on key business application areas such as financial management, marketing and communication tools, digital payment systems, cybersecurity and privacy, and aggregator platforms .As a result of this intervention, participants reported a notable increase in awareness, familiarity, and the actual use of these business applications in their entrepreneurial activities. The training not only demystified digital technologies but also enabled the women to integrate them into their business practices, leading to improved efficiency, visibility, customer engagement, and access to broader markets which is outlines in Table 4.9 and Figure10.

Table 4.9 presented above provides insights into the impact of digital competency training on the adoption of business applications among entrepreneurs. The post-training results indicate increased awareness and utilization across key business domains such as financial management, marketing, e-commerce, storage, digital payments, security, and aggregator platform.

Figure 10 Awareness and use of Business applications after Digital Competency Training



1. **Financial Management: Increased Adoption of Structured Accounting Tools**

Before training, entrepreneurs exhibited low usage rates for structured financial management applications like QuickBooks (5%) and Expensify (3%). Post-training adoption remained limited for these platforms, suggesting that highly specialized accounting software is not align with entrepreneurs' needs. However, Vyapar (55%) and My Bill Book (92%) saw high adoption rates, indicating a preference for user-friendly, locally tailored financial management tools. Supporting the findings above , Sarawagi et al. (2024), identified financial business applications suited for MSMEs in India due to its user-friendly interface and high satisfaction rates

2. Marketing & Communication: Shift Towards Multi-Platform Engagement

WhatsApp and Google Meet (100% adoption) were already universally utilized pre-training, reinforcing their role as essential communication tools. Platforms such as Instagram (51%) and Facebook (7.5%) saw increased engagement post-training, indicating growing digital literacy and confidence in social media marketing. The moderate uptake of YouTube (42.5%) suggests a strategic shift toward video content marketing, though barriers to content creation still exist.

3. E-Commerce Adoption: Limited Use of Global Platforms

Despite comprehensive training, entrepreneurs demonstrated low engagement with Amazon and Flipkart (0% adoption). However, Meesho (100%) saw full adoption, highlighting a preference for platforms that cater to localized, small-scale selling models rather than larger marketplaces.

4. Storage Solutions: Digital Literacy Improvements in File Management

Training enhanced awareness and utilization of cloud storage reveals that Google Drive (100%) and DigiLocker (100%) reached full adoption, showing strong uptake in cloud-based storage for documentation and backups. While Dropbox (50%) and Proof Hub (5%) remained less utilized, this suggests a preference for simpler, easily accessible storage rather than advanced file collaboration tools.

5. Digital Payments: High Dependence on UPI-Based Systems

Post-training, entrepreneurs universally adopted Google Pay, BHIM, Paytm, and PhonePe (100%), reinforcing the dominance of UPI-based digital transactions in micro-business environments.

6. Security & Privacy

Digital security and privacy applications empower them to control who sees their data, protect sensitive business operations and operate safely in online spaces. The post-training results reveal that small entrepreneurs moderately engage with external security applications. While Avast (47%) and McAfee (46%) showed relatively higher adoption rates, the low usage of Kaspersky (20%) and AVG (5%) indicates a continued reluctance to integrate third-party security tools into their business operations.

7. Aggregator Platforms: Full Adoption for Business Expansion

Entrepreneurs recognize the value of these applications in customer acquisition and service expansion, with 100 percent engagement with Swiggy, Zomato, and local aggregators suggesting strong integration of aggregator platforms into business strategies

The digital competency training effectively enhanced entrepreneurs' awareness and adoption of key business applications, particularly in financial management, e-commerce, cloud storage, and digital payments. The increased proficiency in these areas has contributed to greater operational efficiency, improved market accessibility, and streamlined business processes and this is in line with the studies conducted by (Lafuentea et al., 2024; Hussain & Mubarak, 2024). However, certain challenges persist, particularly in cybersecurity awareness, global e-commerce expansion, and the utilization of advanced collaborative tools.

4.10 Registration under e-Shram Portal after Digital Competency among women in the Informal sector

The e-Shram Portal, developed by the Ministry of Labour and Employment, is a centralized platform aimed at creating a comprehensive database of unorganized workers in India, enabling access to various social security and welfare schemes. Prior to the implementation of digital competency training, it was observed that a majority of informal women entrepreneurs had neither heard of the e-Shram Portal nor registered on it. his lack of awareness was largely due to limited digital exposure, insufficient outreach, and low levels of digital literacy prevalent in the informal sector. The absence of registration also

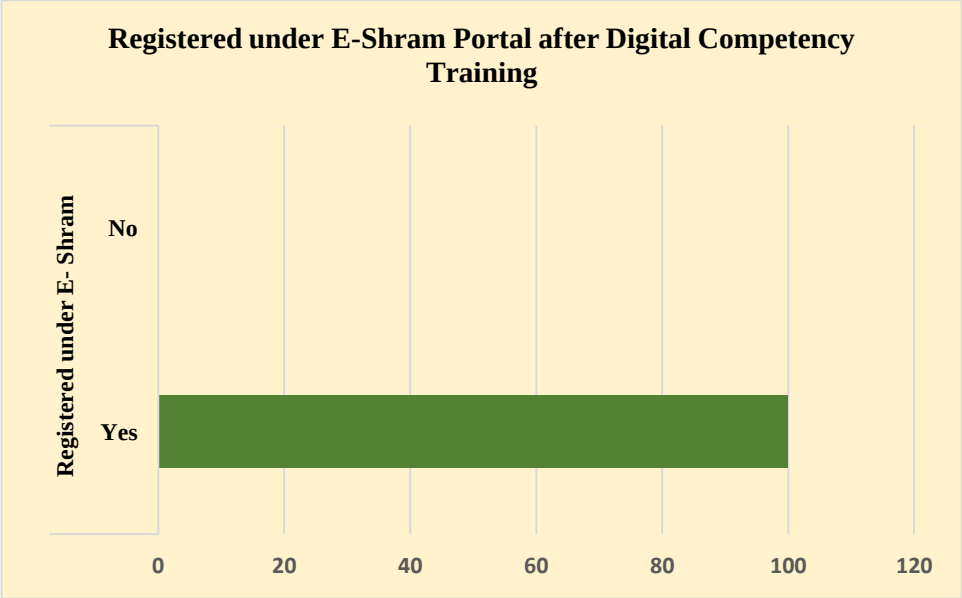
meant missed opportunities for accessing government schemes designed to support and safeguard these workers. In response to this gap, a digital competency training program was conducted, which included a focused session on the purpose, benefits, and registration process of the e-Shram Portal. The training aimed to build awareness and equip participants with the necessary skills to complete the registration process. The below table 4.8 shows the registration of women in informal sector under e-Shram Portal after Digital Competency Training

Table 4.10 Registration under e-Shram Portal after Digital Competency Training among women in the Informal sector

	Opinion	Number of Respondents N= 240	Percent
Registered under e-Shram after Digital Competency Training	Yes	240	100
	No	-	-

Source: Primary Data

Figure 11 Registered under E- Shram Portal after the Digital Competency Training



From the table 4.10 and figure 11 it is revealed that select women entrepreneurs in the informal sector (100%) have registered under the e-Shram portal, indicating complete adoption of this digital government initiative among the trained informal women entrepreneurs.

This finding is significant because registration on the e-Shram portal offers social security benefits, financial assistance, and inclusion in national welfare schemes for informal workers—a group that historically has limited access to formal support systems (Ministry of Labour & Employment, 2024). The 100% registration rate suggests that targeted digital literacy training not only improves awareness but also translates into concrete digital action, especially when linked to direct socio-economic benefits. According to a report by NITI Aayog (2024), digital onboarding of informal workers through platforms like e-Shram has been sluggish, particularly among women, due to digital illiteracy and lack of awareness. However, recent pilot studies (NASSCOM Foundation, 2023; Digital India Corporation, 2024) affirm that structured digital skill training can significantly improve registration rates and service utilization among underserved populations

4.11 Perception of antecedents of technology adoption among the Women Entrepreneurs in the Informal Sector

The women entrepreneurs' perceptions regarding the antecedents of technology adoption assess how digital tools are integrated into their business practices. These perceptions involve Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Behavioural Intention, and Actual Usage, which play a crucial role in shaping their willingness and ability to adopt and sustain digital technology in informal settings. For women in the informal sector, where structural barriers such as low education, income, and restricted mobility often intersect, these antecedents act as practical enablers that influence decisions to adopt a technology or not. A positive perception of digital technology's usefulness, ease of use, and supportive environment fosters stronger behavioural intention and actual usage. Research by Venkatesh et al. (2012) under the UTAUT framework confirms that performance and effort expectancy significantly predict technology use, particularly when reinforced by social and infrastructural support. Similarly, studies like that of Maroufkhani et al. (2020) emphasize that social encouragement and contextualized training programs enhance women's digital confidence and entrepreneurial growth. Therefore, assessing these perceptions not only helps identify adoption readiness but also informs the design of more inclusive, responsive digital empowerment programs tailored to the unique realities of informal women entrepreneurs.

The Perception of women in the informal sector on antecedents to adopt and use a technology through a five-point Likert scale and results are shown in Table 4.11

Table 4.11 Perception on Antecedents of Technology Adoption among the Women Entrepreneurs in the Informal Sector

Antecedents of Technology Adoption	Perception of Respondents	SA	%	A	%	N	%	DA	%	SDA	%	M	SD
Performance Expectancy	Digital technology enables to accomplish business related task quickly	84	35.00	120	50.00	34	14.17	2	0.83	0	0.00	4.19	0.7
	Digital technology enhances the quality of work done in business	102	42.50	105	43.75	31	12.92	2	0.83	0	0.00	4.28	0.74
	Digital technology increases efficiency in business operation	111	46.25	104	43.33	24	10.00	1	0.42	0	0.00	4.35	0.69
	Digital technology increases business growth potential	120	50.00	98	40.83	21	8.75	1	0.42	0	0.00	4.4	0.67
Effort Expectancy	Easy to integrate new digital technology into business	120	50.00	90	37.50	20	8.33	8	3.33	2	0.83	4.33	0.79
	Technologies simplifies business related tasks	80	33.33	100	41.67	40	16.67	15	6.25	5	2.08	3.91	0.93
	Comfortable in troubleshooting minor issues with digital tools on my own.	60	25.00	100	41.67	50	20.83	25	10.42	5	2.08	3.71	1
	Learning to use technology is complicated	100	41.67	90	37.50	30	12.50	15	6.25	5	2.08	3.95	0.95
Social Influence	Influence of friends and family in adopting digital technology improves business outcomes	90	37.50	100	41.67	40	16.67	10	4.17	0	0.00	4.12	0.83
	Expectation of society motivates to use technology	140	58.33	70	29.17	20	8.33	10	4.17	0	0.00	4.42	0.81
	Entrepreneurial circle motivates to adopt technology	120	50.00	70	29.17	30	12.50	20	8.33	0	0.00	4.21	0.96
	Trainers of digital competency and support staff of JSS motivated to adopt technology	130	54.17	75	31.25	25	10.42	10	4.17	0	0.00	4.35	0.83
Facilitating conditions	Digital competency training sessions encourage the use of digital technology in business	126	52.50	88	36.67	18	7.50	6	2.50	2	0.83	4.37	0.83
	Access to Digital infrastructure and financial resources motivates to use digital technology	120	50.00	94	39.17	20	8.33	4	1.67	2	0.83	4.35	0.8

Antecedents of Technology Adoption	Perception of Respondents	SA	%	A	%	N	%	DA	%	SDA	%	M	SD
	Jan Shikshan Sansthan support the use of digital technology	96	40.00	104	43.33	34	14.17	5	2.08	1	0.42	4.2	0.77
	A person or group is available for assistance with difficulties in the use of digital technology	133	55.42	94	39.17	10	4.17	2	0.83	1	0.42	4.48	0.7
Behaviour Intention	Intend to adopt new digital technologies to improve efficiency in business operations.	78	32.50	102	42.50	39	16.25	15	6.25	6	2.50	3.91	0.92
	Integrate business applications into business operations	110	45.83	98	40.83	25	10.42	5	2.08	2	0.83	4.35	0.67
	Plan frequently to use technology in the near future	46	19.17	75	31.25	68	28.33	32	13.33	19	7.92	3.53	1.03
Actual Usage	Routine use of digital tools and platforms to perform essential business tasks, such as managing inventory, payments, and customer interactions	150	62.50	65	27.08	18	7.50	5	2.08	2	0.83	4.61	0.71
	Incorporated learned digital skills into daily operations, including marketing, product/service listing, and order tracking	110	45.83	98	40.83	25	10.42	5	2.08	2	0.83	4.35	0.67
	Actively engage with online systems for communication, feedback management, and enhancing customer relations	46	19.17	75	31.25	68	28.33	32	13.33	19	7.92	3.53	1.03
	Regularly explore and apply advanced features of digital platforms to improve efficiency	150	62.50	65	27.08	18	7.50	5	2.08	2	0.83	4.61	0.71

Source: Primary data **(**SA- Strongly Agree, A-Agree, N- Neutral, DA- Disagree, SDA- Strongly disagree, M - Mean score, SD – Standard Deviation, % - Percent)

The table 4.11 illustrates the perception of **Performance Expectancy** regarding the adoption of digital technology. The responses indicate a consistently high level of agreement across all four items, suggesting that the majority of the women perceive digital technologies as instrumental in enhancing business-related performance. The statement *"Digital technology increases business growth potential"* recorded the highest mean value of 4.40 with (SD = 0.67), revealing a strong and consistent belief that digital tools contribute significantly to business expansion. Digital technology enables wider market access by using social media and e-commerce platforms. The digital visibility increases the

sales volume. Further, the improved access to digital finance enables women to expand their business operations. This aligns with recent findings by MSDE (2025), which highlight that digital engagement among women entrepreneurs in the informal sector leads to greater market access and scalability of enterprises.

Similarly, the item *"Digital technology increases efficiency in business operation"* scored a mean of 4.35 and (SD = 0.69), confirming that digital tools are perceived as highly effective in streamlining operational processes and increasing productivity. The usage of digital tools reduces time wastage, improves accuracy, minimises manual efforts, thereby increasing the efficiency in business operations. This is consistent with a study by MeitY (2024), that digital tools have improved the operational efficiency of informal entrepreneurs by automating business processes and reducing transaction time. The perception that *"Digital technology enhances the quality of work done in business"* (mean = 4.28, SD = 0.74) further supports the notion that digital tools help improve precision, professionalism, and overall quality of output. The use of digital technology enhances product presentation by creating visually appealing product images, packaging, digital catalogues, etc. The use of digital platforms can set up automatic replies, order confirmation, and structured conversations, improving customer experience. Task management applications, the use of reminders, and follow-ups lead to great operational reliability. This, in turn, increases the perceived standard and excellence of work done. Lastly, the item *"Digital technology enables to accomplishment of business-related tasks quickly"* scored a mean of 4.19 with (SD = 0.70), indicating agreement that technology saves time and accelerates business processes. The use of business applications for instant customer inquiries, sharing product updates, tracking inventories in real time, allowing instant payments etc, reduces the manual work and enhances decision-making speed of task completion to run the business more competitively. This perception of improved performance serves as a critical driver for technology adoption. Recent initiatives under the Digital India programme and Skill India Digital platform have further validated the utility of digital tools for women entrepreneurs in the informal sector, thereby reinforcing the significance of performance expectancy in technology adoption decisions (Ministry of Skill Development and Entrepreneurship [MSDE], 2025). These findings affirm that targeted digital training not only enhances digital skills but also shapes favorable attitudes towards technology use in business settings.

The perceptions of **Effort Expectancy** among informal women entrepreneurs towards digital technology adoption indicates a generally favourable attitude toward the ease of learning and using digital tools, with varying levels of confidence across specific skills and tasks. The statement *"Easy to integrate new digital technology into business"* recorded the highest mean score of 4.33 (SD = 0.79), suggesting that a majority of women entrepreneurs find it relatively easy to adopt and embed new technologies into their existing business processes. This aligns with recent findings by NITI Aayog (2024), which observed that exposure to structured digital training significantly reduces perceived barriers in adopting technology, especially when it is relevant to business needs.

The item *"Technologies simplify business-related tasks"* received a mean score of 3.91 (SD = 0.93), indicating agreement among respondents that digital technology reduce the workload and streamline operations. The slightly higher standard deviation suggests variations in responses reflecting differences in digital familiarity with age, educational background, access to digital infrastructural facilities, the type of business and prior training and support across select women entrepreneurs. Further it can be also be due the cognitive load after the digital competency training as it takes time to adapt and become a frequent user of digital tools. Gupta & Kaur (2023) further found that digital familiarity among informal entrepreneurs was strongly associated with age, education, and access to infrastructure, reinforcing the explanation for varied responses in the current data.

In contrast, the statement *"Comfortable in troubleshooting minor issues with digital tools on my own"* recorded the lowest mean score of 3.71 with the highest SD of 1.00, pointing to more varied experiences and less confidence in resolving technical problems independently. This suggests a gap in digital self-efficacy, which remains a critical area for capacity-building. It underscores the importance of hands-on, follow-up training beyond initial digital literacy sessions to help entrepreneurs handle troubleshooting challenges confidently.

The statement *"Learning to use technology is complicated"* has a mean of 3.95 (SD = 0.95), a high mean score reflects that learning to use technology has lower perceived difficulty by most respondents and higher standard deviation highlight the differences in personal experience, exposure and confidence levels among the respondents. This suggests that while initial fears about complexity exist, exposure to user-friendly tools and peer learning can shift perceptions positively. This aligns with findings from the Ministry of Skill Development and Entrepreneurship (MSDE, 2025), which notes that women

entrepreneurs who undergo structured digital training tend to overcome fear of technology faster, especially when the training is delivered in a local language and contextualized to their business needs.

Perceptions of informal women entrepreneurs regarding **Social Influence** as a factor involves family, peers, trainers, and society plays a significant role in shaping motivation toward digital adoption. The statement *"Expectation of society motivates to use technology"* recorded the highest mean score of 4.42, (SD =0.81), suggesting a strong consensus on societal expectations including increase in digital services, preference for digital transactions, and technology trends among the peers are compelling women entrepreneurs adopt technology so that they can survive in the digital era. This finding is in line with the study by Chakraborty and Saha (2023), who found that societal norms and exposure to digital services in communities increase women readiness to engage with technology in business.

The statement *"Trainers of digital competency and support staff of JSS motivated to adopt technology"* showed a mean of 4.35, (SD = 0.83), suggesting high positive perception, but with response variations. The differences in training intensity, delivery style, and post-training support can vary. Banerjee and Sharma (2024**)** emphasized that the consistency and relatability of trainers significantly impact how women internalize digital concepts.

The statement *"Entrepreneurial circle motivates to adopt technology"* has a slightly lower mean of 4.21 but the highest SD at 0.96, suggesting wider variability in how women entrepreneurs perceive peer influence. The informal sectors entrepreneurial ecosystems are unevenly developed with thriving peer networks in urban and semi-urban areas while rural entrepreneurs might lack interaction with technology driven entrepreneurs. Kiran and Rana (2023) found that rural and semi urban areas often witness informal women entrepreneurs operating their business in isolation and rely more on family and lacks digital exposure, indicating the greater divergence in responses.

Similarly, *"Influence of friends and family in adopting digital technology improves business outcomes"* recorded a mean of 4.12 (SD = 0.83). Friends and family serves as primary social referents in the informal sector. In such context encouragement from family, especially from younger members who are digitally literate can support them. While, many women from conservative households where initial fear of technology or lack in exposure

can hinder technology adoption. Sundararajan and Joseph (2022) noted that , intergenerational or family support plays a significant role in determining women's confidence and willingness to use technology.

The perception on **Facilitating Conditions** among informal women entrepreneurs regarding the support available for adopting digital technology in their businesses indicated that, the highest mean score was observed for the statement *"A person or group is available for assistance with difficulties in the use of digital technology"* at 4.48 with the lowest SD of 0.70. This low SD shows strong agreement among respondents and minimal variation in their perception, underscoring the significance of social and technical support in overcoming barriers to technology usage. This strong consensus can be attributed to the role played by the support system such as trainers, local facilitators including Jan Shikshan Sansthan and peer networks in navigating the complexities of digital technologies in business. Venkatesh et al. (2003) in the UTAUT model emphasize that facilitating conditions, including access to support, significantly influence actual technology usage, particularly when users face implementation challenge. In essence, the high level of perceived availability of support through targeted digital skilling that prioritize mentoring and personalised support have helped them to integrate technology in their business practices.

The statement *"Digital competency training sessions encourage the use of digital technology in business"* recorded a mean score of 4.37 with (SD = 0.83). This indicates that the training provided has effectively motivated participants to utilize digital tools in their enterprises. For informal entrepreneurs, particularly with limited exposure to formal education, digital technologies face technophobia and lack of confidence. Training sessions tailored to informal entrepreneurs in local languages helps to bridge these gaps.The findings aligns with studies that emphasize the role of digital skilling in enhancing digital adoption among entrepreneurs (OECD, 2019).

The perception that *"Access to digital infrastructure and financial resources motivates the use of digital technology" showed* a mean of 4.35, and (SD = 0.80). The informal women entrepreneurs who operate their business without formal registration or access to institutional support have limited access to digital infrastructural facilities including lack of updated devices, unreliable internet connection within their work place. Further financial access is a critical enabler even when women are digitally trained and

literate, the inability to afford smartphones, data plans and subscription to digital platforms restricts their usage. In the current study JSS is providing digital devices with the help of government schemes to buy digital devices particularly smart phones in low monthly instalments. This shows that infrastructure and financial access are pivotal in encouraging technology integration, it is consistent with the findings of Hilbert (2016), who emphasized the importance of infrastructural access in bridging digital divides in developing contexts.

The statement *"Jan Shikshan Sansthan supports the use of digital technology"* had a slightly lower mean of 4.20 (SD = 0.77), indicating that while respondents recognize the institution's role in facilitating digital adoption, the perceived impact is modestly less pronounced compared to the other factors. JSS has been instrumental in extending **community-based, vocational based demand-driven skill training** to the most underserved populations. Further its efforts in integrating modules of digital competency with business operations have enabled women entrepreneurs to confidently use technology in business operations. This finding highlights that institutional support through acknowledged is less strongly felt or visible as more direct support like peer assistance and physical infrastructure. However, the overall mean reflects a positive outlook and validates the institutional support as a component of facilitating conditions, particularly in rural or semi-urban areas where such public training institutions play a critical role (UNESCO, 2022).

The perception of **Behavioural Intention** to adopt digital technology among informal women entrepreneurs shows a mix of positive anticipation and cautious readiness. The statement *"Integrate business applications into business operations"* recorded a high mean of 4.35 (SD = 0.67), indicating strong intent and confidence among participants in using digital tools for core business functions. This can be attributed to targeted digital skilling interventions that have familiarized women with practical applications like billing software, payment apps, and inventory tracking, enabling real-world application (OECD, 2019).

The statement *"Intend to adopt new digital technologies to improve efficiency in business operations"* had a moderate mean of 3.91 (SD = 0.92), suggesting that while many participants are motivated, a portion remains tentative. The slightly higher standard deviation points to variation in confidence levels—likely due to factors such as inconsistent access to infrastructure or varying degrees of prior exposure. As highlighted by Hilbert

(2016), mere exposure to technology is insufficient unless reinforced by contextual learning and support systems.

Notably, the lowest behavioural intention score was recorded for the statement *"Plan frequently to use technology in the near future"* with a mean of 3.53 (SD = 1.03), reflecting a cautious stance on future use of technology for business operations. This hesitation stem from perceived complexity on continuous technology engagement. Moreover, it takes time and effort to be a frequent user of technology for women entrepreneurs. Additionally irregular electric supply, limited internet penetration and low digital ecosystem maturity further reduce the predictability and feasibility of planning the digital engagement. As per UNESCO (2022), in rural and informal contexts, digital planning requires long-term support and reliable infrastructure for continuous usage of technology.

The perception of informal women in informal sector on the **Actual Usage** of digital technology reveals a stronger commitment to applying digital tools after six months of digital skills training. The highest mean score of 4.61 (SD = 0.71) for *"Routine use of digital tools and platforms to perform essential business tasks"* shows that when informal women entrepreneurs receive relevant digital competency training and access, they actively utilize technology for day-to-day operations. The transition from intention to consistent usage reflects the effectiveness of targeted digital skills training and support system that address the unique barriers addressed by women in informal sector. The findings resonate with Deloitte (2023), The practical exposure to technology is more than creating an intention which thus becomes a stronger predictor of sustained digital usage

Similarly, the statement *"Regularly explore and apply advanced features of digital platforms to improve efficiency"* also scored 4.61 (SD = 0.71), reflecting a growing curiosity and capability among digitally trained women. This suggests that once foundational skills are developed, women are willing and able to explore more complex features such as analytics, advertising tools, and customer management systems—skills often overlooked in generic training but highly impactful in practice (ITU, 2023).

The statement *"Incorporated learned digital skills into daily operations, including marketing, product/service listing, and order tracking"* also showed a strong mean of 4.35 (SD = 0.67), highlighting the practical impact of hands-on training. Informal women

entrepreneurs are not only learning but also translating skills into actionable steps signalling that well-designed programs can bridge the digital divide effectively.

However, the statement *"Actively engage with online systems for communication, feedback and enhancing customer relations"* recorded a lower mean of 3.53 (SD = 1.03). This pattern reflects different set of skills and practices involving real time responses, language proficiency etc as digital communication and customer feedback are more public, interactive. Though they might be digitally competent but need experience in handling customers to fully integrate digital communication and feedback system into their business. According to GSMA (2023), many women entrepreneurs in informal economies feel less confident when engaging with unknown or distant customers in digital spaces compared to face-to-face transactions, even if they are skilled in using the tools themselves.

The findings conclude that informal women entrepreneurs have a generally favourable perception toward adopting digital technology in their business operations. They recognize the value of digital tools in enhancing business performance, quality, and efficiency. While technological integration is considered manageable, the areas, including independent troubleshooting and deeper digital engagement, require capacity building. Social encouragement from peers, trainers, and the community plays a vital role in motivating technology use, and supportive structures like training and access to digital infrastructure further enable adoption of technology.

4.12 Causal relationship of antecedents influencing use behaviour to adopt technology among select women entrepreneurs in Informal sector

The advancement and pace of digital technologies dismantled the traditional barriers and transformed the way of doing business (Forman et al., 2019). The impact of digital technologies has the potential to upend the existing behaviours in entrepreneurship (Lee & Berente, 2012; Sussan et al., 2017). The acceptance of technology among individuals, regardless of the type of technology used, is voluntary and is influenced by several boundaries, including age, gender, experience and self-control (Shinar et al., 2018; Van Gelderen et al.,2015; Shirokova et al.,2016; Dabholkar and Bagozzi, 2002; Kim and Kankanhalli, 2009).

Recognising what motivates individuals to accept or reject information technology (IT) is competent in today's digital arena, and it is constantly reviewed for two reasons: novel technologies continue to evolve and establish their place in organizations and society,

and the crash rate of information systems continues to remain high (Tamilmani et al., 2019). Thus, entrepreneurs' intention towards technology adoption involves a desire to adopt technology or not in their business operations. These desires are transformed into actions when the entrepreneur can meet the conditions to infuse technology into the entrepreneurial process. Hence, behavioural intention is considered as the prime predictor of actual technology use behaviour.

The Theory of Reasoned Action, Theory of Planned Action, Social Cognitive Theory, Unified Theory of Behaviour, and the Integrated Model are examples of proven psychological models of action that emphasise the importance of intention (Taherdoost, 2018; Ajzen, 1991; Bandura, 1986; Guilamo-Ramos, 2008). Several decades' worth of experimental and observational data point to the malleability of behavioural intentions and show that changes in intention intensity will frequently correspond to changes in behaviour (Sheeran et al., 2016). Since intention is the construct that has the highest predictive power for voluntary behaviour, it is regarded as the most immediate modulator of Use behaviour (Huy & Zott, 2019; Sheeran et al., 2005)

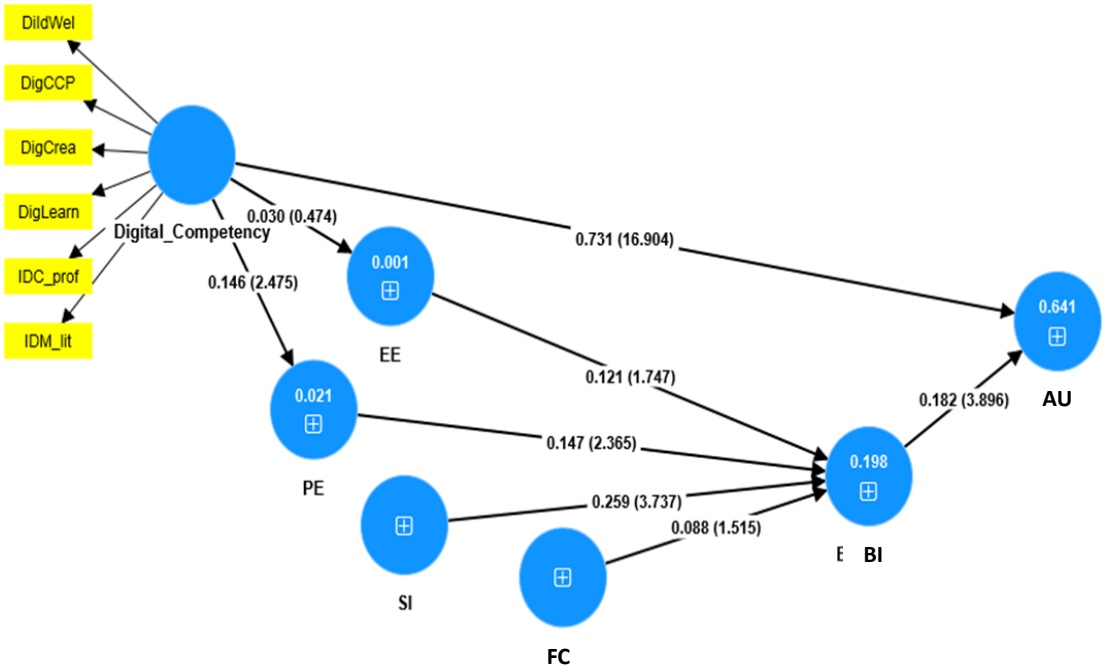
Hence, a conceptual model was developed to test the linear relationship between the antecedents of behaviour intention and actual technology usage.

The Smart partial least squares path modelling was employed to test the hypotheses of the antecedents influencing the behavioural intention of entrepreneurs towards acceptance of technology. This analytical method allows for the evaluation of the overall fit of the proposed model as well as the estimation of all the associated route coefficients at the same time (Hair et al., 2019). Further, it offers benefits over regression-based techniques in evaluating several latent constructs with different manifest variables (Henseler et al., 2015). Moreover, Smart PLS can process non-normally distributed data without issues and focuses more on prediction rather than just theoretical fit, making it useful for applied research.

Entrepreneurs' intention to adopt technology has a strong influence on their user behaviour to accept and use technology. Intention and Usage are the outcomes to measure the acceptance and use of technology (Abbad, 2012). The linkage between behaviour intention to use technology and actual use of technology will help outline entrepreneurs to analyse factors underlying entrepreneurs' behaviour to develop an effective technology adoption strategy.

To identify the antecedents of behaviour intention and technology adoption among the women entrepreneurs, the premises of the Unified Theory of Acceptance of Technology (UTAUT) were applied. A person's intention and behaviour on technology adoption are determined by their key beliefs. According to UTAUT, the actual use of technology is driven by Behavioural Intention (BI), and the predictors of BI include Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions, which are the direct determinants of BI. Facilitating conditions and behaviour intention are the direct determinants of the actual use of technology. The influences of various constructs on the intention to adopt a technology by women entrepreneurs in the informal sector are depicted in Figure 12.

Figure 12 Determinants of behaviour intention and Actual Usage of technology



To calculate the influence of variables and confirm the empirical model's fit, the data were used to analyse the two steps of Structural Equation Modelling (SEM): Measurement model analysis and Structural model analysis.

4.12.1 Evaluation of Measurement Model

The measurement model is evaluated using maximum likelihood Confirmatory Factor Analysis (CFA) to quantify the validity of the constructs. Before the model was tested, each construct's reliability was gauged through internal consistency of measurement (Linn and Gronlund, 2000). Cronbach's Alpha estimates were acceptable for measuring the

internal consistency (Legate et al., 2023; Kachooei, 2015; George and Mallery, 2003; Kline, 2000). The reliability and validity of the model are displayed in Table 4.12.1.1

Table 4.12.1.1 Evaluation of Reliability and Validity for the Antecedents of Technology Adoption

Constructs	Measurements	Factor Loadings	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average Variance Extracted (AVE)
Actual Use (AU)	A1	0.732	0.684	0.790	0.755	0.444
	A2	0.779				
	A3	0.798				
	A4	0.810				
Behaviour Intention (BI)	B1	0.786	0.724	0.784	0.792	0.585
	B2	0.896				
	B3	0.897				
Digital Competency (DC)	ICT Prof	0.964	0.960	0.963	0.969	0.837
	IDM	0.973				
	Dig learn	0.792				
	Dig Crea	0.939				
	Dig CCP	0.900				
	Dig Wel	0.911				
Effort Expectancy (EE)	EE1	0.718	0.813	0.886	0.876	0.639
	EE2	0.731				
	EE3	0.788				
	EE4	0.749				
Performance Expectancy (PE)	PE1	0.892	0.820	0.847	0.880	0.648
	PE2	0.769				
	PE3	0.800				
	PE4	0.752				
Facilitating Condition (FC)	F1	0.740	0.710	0.864	0.865	0.764
	F2	0.803				
Social Influence (SI)	SI1	0.912	0.782	0.822	0.860	0.609
	SI2	0.717				
	SI3	0.735				
	SI4	0.741				

(*Reliability and Validity test output using Smart PLS 4*)

The fundamental aspects of construct validity are convergent and divergent validity (Krabbe , 2017; Strauss and Smith, 2009). Convergent validity is the degree to which a variable correlates with other variables and measures of the same construct. Furthermore, the concept should not correlate with unrelated or dissimilar variables, but rather with related ones. The values of Composite Reliability (CR) and Average Variance Extracted (AVE) were used to assess the constructs' convergent validity (Sambashiva and Bramhani, 2019).

The initial step in assessing construct reliability is examining indicator reliability. In PLS-SEM, factor loadings indicate the strength of the relationship between individual measurement items and their corresponding latent construct. Higher loadings reflect stronger associations, confirming that the indicators effectively represent the construct. According to Hair et al. (2017), a factor loading of 0.70 or higher is considered acceptable for ensuring measurement reliability, and all the constructs have factor loadings greater than 0.70, indicating indicator reliability.

Cronbach's Alpha (α) is a measure of internal consistency that assesses how well a set of items in a construct are related. The reliability analysis indicates that the Cronbach's Alpha values for constructs range from 0.684 to 0.960, exceeding the recommended threshold (Lance et al., 2006; Hair et al., 2017), demonstrating acceptable internal consistency within the measurement model.

The Omega Coefficient, often referred to as Composite Reliability, quantifies the dependability of a composite scale, composed of sub-scales intended to assess a single underlying concept. The composite reliability metrics, omega-a (rho a) and omega-c (rho c), compose the output for reliability and validity in Smart PLS 4. Omega-a is appropriate for use when all of the items are intended to test the same underlying construct. Omega-a is obtained as the sum of the extracted average variance (AVE) and the squared correlations of the items with each other. Omega-c (rho c) is acceptable when the components are viewed as distinct scales of the underlying construct. It is determined as the total of each item's AVE divided by the sum of each item's AVE and the squared correlations with each other.

The composite reliability of the constructs should be greater than 0.70 for both rho a and rho-c to assure convergent validity (Hair et al., 2019).

The current research considers Omega-a as a better indicator of reliability since the items evaluate multiple facets of the underlying construct. Table 4.41 shows that values of omega-c range from 0.784 to 0.963, which is greater than 0.70 and confirms the reliability of the constructs (Dijkstra and Henseler 2015).

The AVE measures the construct's ability to capture variation in comparison to the amount of variance caused by measurement error, and the recommended range for AVE values is 0.5 and above (Fornell & Larcker, 1981; Hair et al.,2019; Maruf et al., 2021). The AVE values of the current study vary from 0.444 to 0.837, which is shown in Table 4.41

and confirms the convergent validity of the constructs. Hence, the measurement model's convergent validity is proved to be adequate.

Table 4.12.1.2 Discriminant Validity – HTMT Ratio (Heterotrait-monotrait ratio) for the Antecedents of Technology Adoption

Constructs	AU	BI	DC	EE	PE	FC	SI
Actual Use (AU)							
Behaviour Intention (BI)	**0.565**						
Digital Competency (DC)	0.649	**0.370**					
Effort Expectancy (EE)	0.285	0.355	**0.054**				
Performance Expectancy (PE)	0.380	0.388	0.160	**0.357**			
Facilitating Condition (FC)	0.236	0.307	0.092	0.419	**0.242**		
Social Influence (SI)	0.361	0.513	0.154	0.454	0.442	**0.390**	

(Discriminant validity test using HTMT *in Smart PLS 4*) (Note: Bold values are square root of AVE Values)

The table 4.12.1.2 illustrates the discriminant validity describes how the model's constructs are different from one another. When the constructs are different from one another, discriminant validity is proven (Franke & Sarstedt, 2019). Henseler et al. (2015) propose the Heterotrait-Monotrait (HTMT) ratio of correlations as an alternative metric to assess discriminant validity, and a series of follow-up studies have confirmed its robustness (Radomir & Moisescu, 2020).

The Bootstrapping procedure is used to assess whether its values deviate significantly from a predetermined threshold. This threshold depends, however, on the conceptual similarity of the constructs under consideration. For example, a higher HTMT threshold can be assumed for conceptually similar constructs, whereas the analysis of conceptually distinct constructs should rely on a lower threshold, such as 0.85 (Franke & Sarstedt, 2019; Hair et al., 2022). In the present study, the constructs are distinct and thus considered lower threshold of 0.85 and table 4.42 shows that all HTMT values are under 0.85, thus meeting the validity of the construct.

4.12.2 Evaluation of Structural Model

The outcomes of the Inner Structural Model were assessed to determine the applicability of its forecasts. The correlation of two variables (R^2), the path coefficient and t-statistic values, the model's impact size and predictive significance (Q^2), and the Model fit score constitute the structural model's initial assessment parameters (Shmueli et al., 2016).

Initially Variance Inflation Factor (VIF) is assessed to test the multicollinearity among predictor variables in the structural model. Multicollinearity occurs when independent constructs are highly correlated, which can distort path coefficients and reduce the reliability of results. The recommended threshold for VIF follows Hair et al. (2017) and Kock (2015), where VIF $\leq$ 3.3 is acceptable (no multicollinearity issues). Since the VIF values of all constructs are $\leq$ 3.3, meeting the reliability requirements for hypothesis testing and predictive analysis which is shown in Table 4.12.2.1

Tolerance is the inverse of the Variance Inflation Factor (VIF) and is used to assess multicollinearity in PLS-SEM. It is calculated as: Tolerance=1/VIF. Tolerance values above 0.10 indicate no serious multicollinearity concerns (Hair et al., 2017). Since all tolerance values in the model are $\geq$ 0.75 (Senaviratna et al.,2019), the predictors in the model are independent of collinearity issues, confirming model stability as shown in Table 4.12.2.1

Table 4.12.2.1 Variance Inflation Factor for the Antecedents of Technology Adoption

Path	VIF Values	Tolerance (1/VIF)
Digital Competency → Performance Expectancy	1.000	1.000
Digital Competency → Effort Expectancy	1.000	1.000
Performance Expectancy → Behaviour Intention	1.197	0.835
Effort Expectancy → Behaviour Intention	1.270	0.787
Social Influence → Behaviour Intention	1.321	0.757
Facilitating Condition → Behaviour Intention	1.170	0.854
Behaviour Intention → Actual Usage	1.084	0.922
Digital Competency → Actual Usage	1.084	0.922

(Source: Computed data)

Readings for the variance inflation factor (VIF) as shown in table 4.12.2.1 are below the critical value of 3.33, demonstrating that the structural model is free of multicollinearity issues (Diamantopoulos & Siguaw, 2000; Hair et al., 2022).

Further, the Coefficient of Determination (R^2) is a measure to test the model's predictability, which helps to calculate the general effect size and variance of the endogenous construct of the structural model. In the model depicted in Figure 11, multiple constructs such as DC, EE, PE, SI, FC, and BI interact to influence the AU of technology among women entrepreneurs in the informal sector. The strength and significance of path coefficients between these variables influence the coefficient of determination.

The model demonstrated an R^2 value of 0.641, meaning that digital competency, effort expectancy, performance expectancy, social influence, facilitating condition and behaviour intention to adopt technology explain 64.1 percent of the variation in actual usage of technology. Additionally, determinants of behaviour intention to adopt technology, including digital competency, effort expectancy, performance expectancy, facilitating condition and social influence, account for 19.8 percent of the variation in behavioural intention.

Table 4.12.2.2 Goodness of Fit Statistics for Measurement Model for the Antecedents of Technology Adoption

	Saturated model	Estimated model
SRMR	0.082	0.137
d_ULS	3.474	4.072
d_G	0.996	1.101
Chi-square	1241.211	1312.709
NFI	0.928	0.912

(Source: Computed data)

The magnitude of each exogenous latent construct's influence on the endogenous latent construct is represented by the value f^2 (Hair, Hult, Ringle, & Sarstedt, 2016). Effect size classifications include trivial ($f^2 < 0.02$), small ($f^2 \geq 0.02$), medium ($f^2 \geq 0.15$), and large ($f^2 \geq 0.35$) categories, depending on the statistical measure used (Cohen,1988; Sullivan & Feinn, 2012). The effect of DC on AU exhibits the strongest effect size ($f^2 = 0.468$), underscoring its critical role in driving technology adoption. In contrast, SI on BI has a small effect size ($f^2 = 0.031$), indicating a moderate influence on an individual's willingness to adopt technology. Meanwhile, EE, PE and FC exhibit trivial effect sizes (< 0.02), signifying that they contribute minimally to behavioural intention. However, PE on BI has

an f^2 value of 0.057, slightly above trivial, implying a small but relevant influence on behavioural intention.

Evaluating the fit of structural models in Partial Least Squares Structural Equation Modelling (PLS-SEM) is essential for determining how well the proposed relationships among latent constructs align with the observed data. A thorough evaluation of structural model fit strengthens the reliability of research findings and ensures robustness in theoretical interpretation. Table 4.44 presents result for both the saturated model and the estimated model fit indices. The saturated model evaluates all possible relationships between constructs, while the estimated model assesses only the relationships specified in the model's hypothesis.

The Standardised Root Mean Square Residual (SRMR) of the Saturated Model is 0.082, which is ≤ 0.08, indicating a good model fit. In contrast, the SRMR of the Estimated Model is 0.137, which exceeds 0.08, showing that the model exhibits a moderate fit.

The Squared Euclidean Distance (d_ULS) is used to assess model fit by measuring the discrepancy between the empirical covariance matrix and the covariance matrix implied by the model, and lower values indicate a better fit of the model. Thus, the d ULS of the Saturated (3.474) and estimated models (4.072) show model fit.

Geodesic Distance (d_G) evaluates how closely the model's estimated parameters align with expected values. Values near 1.0 indicate strong model consistency. Since both values are close to 1, the structural model exhibits reasonable alignment with empirical data.

Chi-Square (χ^2) Statistic compares the expected covariance matrix with the observed matrix. Lower values indicate better alignment, but PLS-SEM does not rely heavily on Chi-square due to its focus on predictive power.

Normed Fit Index (NFI) assesses incremental model fit by comparing the tested model against a null baseline model. Values ≥ 0.90 indicate strong model fit (Bentler & Bonett, 1980). Since both values fall above 0.90, with 0.928 for Saturated and 0.912 for Estimated Model indicating good model fit.

Table 4.12.2.3 Casual Relationship of selected Constructs with Technology Adoption Intention and Actual Usage Behaviour among select women entrepreneurs in Informal sector

Path coefficients	O	SD	T statistics	F^2 (Effect size)	P Values	Decision
Digital Competency → Performance Expectancy	0.146	0.059	2.475	0.031	0.014	**Supported**
Digital Competency → Effort Expectancy	0.030	0.063	0.474	0.002	0.636	**Not Supported**
Performance Expectancy → Behaviour Intention	0.731	0.062	2.365	0.003	0.019	**Supported**
Effort Expectancy → Behaviour Intention	0.121	0.069	1.747	0.015	0.082	**Not Supported**
Social Influence → Behaviour Intention	0.259	0.069	3.737	0.057	0.000***	**Supported**
Facilitating Condition → Behaviour Intention	0.088	0.058	1.515	0.002	0.131	**Not Supported**
Behaviour Intention → Actual Use	0.182	0.047	3.896	0.031	0.000***	**Supported**
Digital Competency → Actual Use	0.731	0.043	16.904	0.468	0.000***	**Supported**

Source: Computed data (O = Original Sample, SD = Standard Deviation, *)

Path coefficients in Partial Least Squares Structural Equation Modelling (PLS-SEM) represent the strength and significance of relationships between latent variables in a research model. These coefficients indicate how strongly an independent variable affects a dependent variable, allowing researchers to evaluate the theoretical framework's validity. Original Sample (O) represents the estimated path coefficient showing the direct relationship strength between constructs. Standard Deviation (SD). Measures the variability of the path coefficient, ensuring model stability. T-statistics determine the statistical significance of a relationship. P-values validate whether the relationship is statistically significant ($p \leq 0.05$ indicates support). Below are the causal relationships between determinants of behaviour, intention to adopt technology, and actual usage of technology (Table 4.45)

Digital competence is the confident and critical use of technology for work, recreation, and communication (Gotama & Rindrayani, 2022; Hasanah& Setiaji, 2019; Pradini & Susanti, 2021; Yeubun, 2022; Soby, 2013). Individuals grow more confident in choosing and using digital tools and applications for entrepreneurial opportunities.

Additionally, being digitally competent involves the ability of an individual to adapt to future technological advancements, such as those involving artificial intelligence, critically evaluate innovations, adopt relevant technologies, and implement them effectively to optimise business performance. The digital competency training has increased their abilities to use digital technologies, which has boosted their performance in terms of finding and maintaining new customers, new markets, reduction in transaction cost, faster service, competing on the price of products, and thus achieving competitive advantage. Consequently, the improvement in performance through an increase in productivity has created an intention to use technology. (Mansour, 2022; Mahmud et al., 2022; Falloon, 2020). Hence, digital competency is a predictor of behaviour intention through performance expectancy and tested with alternative hypothesis H_4.

H_4: Digital competency positively influences the performance expectancy of select women entrepreneurs towards the adoption of technology

The study investigates the relationship of digital competency on performance expectancy and the result revealed that training has improved the performance of women entrepreneurs in informal sector ($\beta = 0.146$, $t = 2.475$, $P = 0.014$), indicating H_4 is accepted. The findings are consistent with earlier research where digital competency proved to have a positive effect on performance expectancy (Palumian et al., 2023; Jang et al., 2021; Aavakare et al., 2020; Chavez Herting et al., 2020). The results indicate that the entrepreneur's digital competency has enhanced operational efficiency, making work processes more streamlined and productive. Digital skills improved task efficiency by reducing manual workload and timeliness in business operations. On the contrary, few studies claim that digital competency does not influence performance expectations (Ahmet et al., 2023; Nikou & Aavakare,2021; Jang et al., 2021)

Digital competency played a crucial role in enhancing effort expectancy among women entrepreneurs by reducing the perceived complexity and difficulty of using technology in business operations. Digital literacy programs were effective in minimising the efforts required to adopt and integrate new technologies, particularly in higher education institutions. These initiatives have enabled teachers and students to use digital tools with greater ease and efficiency (Nikou & Aavakare, 2021; Mohammadyari & Singh, 2015). The casual relationship is tested with alternative H_5

H_5: Digital competency positively influences the effort expectancy of select women entrepreneurs towards adoption of technology

The findings from this study indicate a negative influence of digital competency on effort expectancy ($\beta = 0.030$, $t = 0.474$, $p = 0.636$), suggesting that after undergoing digital training, the majority of women entrepreneurs had medium to high levels of digital competence. While they tend to prefer technologies that are intuitive and easy to use, achieving proficiency requires time and cognitive effort. The process of familiarising themselves with the operational norms of newly learned technologies demands significant engagement, resulting in a temporary cognitive load. This cognitive burden negatively impacts effort expectancy, leading to the rejection of H_5. But once entrepreneurs master these digital tools, their business operations will become more efficient and contribute to long-term technological adoption and enhanced productivity.

In this study, Behaviour Intention is used as the focal variable for predicting the entrepreneur's intention to adopt technology. Performance expectancy is the first independent variable which enters the model.

According to Venkatesh et al. (2003), Performance Expectancy is to what extent that a person feels that utilising the system would enable them to improve their performance at work. Researchers argued that individuals will take action if the new task or action is attractive for them and if they feel personally capable of performing the task or action, regardless of whether the task is difficult or easy (Krueger & Brazeal, 1994; Krueger, Hansen, Michl, & Welsh, 2011).

Performance expectations are crucial to people because they will adopt and employ IT innovations more readily if they can benefit and improve performance (Venkatesh & Zhang, 2010). PE has received a varied level of scholarly attention within the entrepreneurial context (e.g. Figueroa-Armijos et al., 2023; Upadhyay et al., 2022; Rahi et al., 2019).

Typically, entrepreneurs are more concerned with the benefits they gain from new opportunities that enhance enterprise performance (Elfring and Hulsink, 2003; Tsai, 2009; Holzmann & Gregori, 2023). Hence, several studies claim the predominant influence of performance expectancy on technology adoption intention of entrepreneurs (Zuiderwijk et

al., 2015; Raza et al., 2019; Dabous & Boustani,2023). It is tested by proposing an alternative hypothesis (H_6).

H_6: Performance Expectancy positively influences Behaviour Intention of select Informal Women Entrepreneurs toward technology adoption

The results of the study indicate that performance expectancy ($\beta = 0.731$, $t = 2.365$, $P = 0.019$) positively influences the behaviour intention of entrepreneurs to adopt technology, indicating acceptance of H_6. The training has improved their attitude towards using new technology, improved their capability in performing tasks, desirability, and acceptability. This indicate that women entrepreneurs expect that utilising technology would increase their confidence and motivate them to increase their performance in business operations, and their intention to use it is strengthened. Hence, the hypothesis (H_6) is accepted.

The level of ease associated with using the system is known as effort expectancy (Venkatesh et al., 2003). Through the mechanisms of instrumentality and self-efficacy, perceived ease of use has a considerable impact on use intention (Davis 1989). Users of information systems are concerned with the ease is associated with the use of the information system. A complex system or a web interface that is difficult to navigate can make users uninterested in adopting the system or website (Byun & Finnie, 2011). The issue regarding the level of computer literacy amongst the population can alter perception of respondents to the ease associated with using an information system, because computer-savvy users are indifferent.

The perceived less expectancy in using an information system can improve the performance of user. Convenience in handling a system can influence their behavioural intention and can lead to confidence in using a system. Hence, effort expectancy is regarded as the second important predictor towards adoption of technology (Jang et al., 2020; Dutta and Shivani, 2020; Mehata & Sinha, 2022). It is examined through alternative hypothesis (H_7).

H_7: Effort Expectancy positively influences Behaviour Intention of select Informal Women Entrepreneurs toward technology adoption

The findings of the study are in contrast with the prior studies, indicating the negative influence of Effort expectancy ($\beta = 0.121$, $t = 1.747$, $P = 0.082$) on the behaviour

intention of entrepreneurs towards technology adoption. Hence, the hypothesis (H_2) is rejected. The findings are supported by the previous studies from (Mohammad & Kassim, 2019; Israel & Velu, 2019). It is envisaged that Women entrepreneurs are expected to develop a stronger preference for technology when its usability and ease of learning align with their expectations for effortless use. The time required to learn and apply new technologies, along with the perceived benefits of that effort, significantly impacts their intention to adopt digital tools. Therefore, selecting technologies that are user-friendly and easy to integrate into daily operations will enhance their willingness to embrace technological advancements.

Perceived social influence on technology adoption has been incorporated as the "interpersonal considerations" of individuals (Chan et al., 2010). The behaviour, feelings and beliefs of individuals are changed with the influence of peers, superiors, and opinions from important others that he/she believes (Kelman 1958; Bagozzi, 2007; Venkatesh et al., 2003). Social influence has been included in the major technology adoption models but has a heterogeneous set of conceptualisations which include subjective norm, social capital, group norms, social identity and others (Lorenz and Buhtz, 2017) which influence the technology adoption behaviour. The social influence around the women entrepreneurs can increase or decrease the intention towards technology adoption, and several studies claim that female are more receptive to peer advice, and can have stronger effect on the desire to use technology (Venkatesh et al., 2003; Venkatesh & Morris, 2000; Chatterjee et al., 2020). Hence, social influence has been considered one of the strongest predictors of behaviour intention (Chopdar et al., 2022; Dwivedi et al., 2019). The relationship is analysed with an alternate hypothesis, H_8

H_8: Social Influence positively influences Behaviour Intention of select Informal Women Entrepreneurs toward technology adoption

In this study the social influence has high positive influence on behaviour intention ($\beta = 0.259$, $t = 3.737$, $P = 0.000$), indicating the acceptance of hypothesis H_8. The findings are in consistent with earlier researches where social influence proved to have a positive influence on behaviour intention (Nassar et al., 2019; Huseynov & Ozkan Yıldırım 2019). The results indicate that women entrepreneurs have strong networking ties (Babajide et al., 2022), which enables them to get acquainted with technologies and in turn builds their trust to use technologies for the survival of their business in the digital era. On the contrary

negative influence of social influence on behaviour intention was found in studies (Al-Hattami & Hamood, 2023; Saprikis et al., 2022; Faqih, 2022).

The availability of sufficient resources for optimal information technology performance is essential for efficient technology utilisation (Onaolapo & Oyewole, 2018). It encompasses the availability of resources, including software, hardware, documentation, financial resources, and other technical infrastructure that facilitate the adoption of technology (Khalifa and Shen 2008; Venkatesh et al., 2003; and Yuen et al., 2015). The women entrepreneur's utilisation of technology is contingent upon how much the availability of resources can improve their intention to use technology. Resources are thus one of the most significant factors influencing behaviour intention (Salem et al., 2023; Andati et al., 2022). The empirical evidence from prior studies indicated that resources have a positive influence on behavioural intention. (Shahadat et al., 2023; Al-maroof et al., 2022; Padi et al., 2022; Panisora et al., 2022) .The relationship is examined by framing alternative hypothesis H_9

H_9: Facilitating Conditions positively influence the Behaviour Intention of select Informal women Entrepreneurs toward technology adoption

But the study's results show that resources have no influence on behaviour intention to use technology ($\beta = 0.088$, $t = 1.515$, $P = 0.131$), indicating rejection of H_9. The entrepreneurs of the digital era are aware of the broader access and large range of affordable technologies.

However, women entrepreneurs lack the technical expertise and understanding needed to effectively use technologies in their businesses. A consequence of this is a lack of digital trust (Mubarak & Petraite, 2020) and technophobia (Halaweh et al., 2023) towards technology adoption intention. Hence application of digital skills in their business is more important than resources for the sake of being digital.

The acceptance and actual use of technology involves digital competence to use the technology effectively for work purposes. Digital competencies are the basic knowledge, skills, abilities, and other characteristics that enable individuals to efficiently and successfully perform tasks at work involving technologies (Oberlander et al., 2020). Knowledge of digital technologies helps an entrepreneur to automate their entire business in terms of marketing, business operations, customer relationships, communication and there by achieving productivity. Digital competency training programmes are necessary for

women entrepreneurs for the actual use of technology for work purpose (Bhatt, 2023). The prior studies pointed on the importance of digital competency towards acceptance and use of technology, specifically among micro and small enterprises (Diz-otero et al., 2023; Badriyah et al., 2023). While entrepreneurs with high level of digital skills are frequently linked to intensive use of technology, those with a lower level of skills are frequently linked to technological lag. In the context of entrepreneurship, several studies on micro, small, and medium-sized businesses have emphasised the significance of digital competence for the digitization of their enterprises, which only covers processes and not business operations. Hence, digital competence is considered as the key construct in predicting actual use of technology. The relationship is tested by framing the alternative hypothesis H_{10}

H_{10}: Behaviour intention positively influences the Actual use Behaviour of Informal women Entrepreneurs towards technology adoption

In the current study, digital competency showed a positive influence towards actual use of technology ($\beta = 0.731$, $t = 16.904$, $P = 0.000$) indicating the acceptance of $H_{10.}$ This finding is consistent with a prior study (Drydakis, 2022). There was limited research on digital skills training programmes for women entrepreneurs and towards actual usage of the technology and has gained importance after the covid economic crisis (Drydakis, 2022). A digitally competent entrepreneur can directly set up and operate an online store after training, regardless of their initial performance perceptions or intentions. Further, behaviour intention can be fragile. Competency training often involves hands-on experiences, which lead to immediate and habitual usage of technology. Repetition during training fosters familiarity and confidence, ensuring that users continue using digital tools in their daily activities. A digitally competent entrepreneur can directly set up and operate an online store after training, regardless of their initial performance perceptions or intentions.

In the study, women entrepreneurs in informal sector have attained digital competency through the training on ICT proficiency, information, data and media literacy, digital creation, digital communication collaboration and participation, digital learning, and digital identity and well-being which has been outlined in the digital competency framework of European union 2.1 and 2.2 (Vuorikari et al., 2020). The data analysis before and after training revealed an improvement in the digital competency of women entrepreneurs. It is claimed that practical training initiatives have encouraged entrepreneurs to employ the technology for business activities frequently.

User acceptability is the basis for the success of technology adoption (Sumak et al., 2017; Davis, 1989). The actual use behaviour of technology is the endpoint where people leverage technologies frequently for different purposes. The choice of whether or not to utilise technology is influenced by behavioural intention to use it (Songkram et al., 2023; Bagozzi, 1983). The factors predisposing individuals to adopt new technologies vary depending on system features, individual differences, culture, etc. Further adding more variables can increase the probability of success in predicting the behavioural intention to adopt technology. Subsequently, many researchers have included different variables by using various models in varying sectors of technological acceptance (Papakostas et al., 2023; Muangmee at al., 2021; Zhong et al., 2021; Nuryyev et al., 2020; Saprikis et al., 2020; Sharif & Raza, 2017). Hence, the most direct determinant of individuals to accept and use technology is determined by their behaviour intentions to adopt technology. It is examined by testing the alternative hypothesis by testing $H_{11.}$

H_{11}: Digital Competency positively influences the Actual Usage of select Informal Women Entrepreneurs towards technology adoption

In the current study, behavioural intention has a favourable impact on actual technology use behaviour ($\beta = 0.731$, $t = 16.904$, $P = 0.000$), supporting H_8. This indicates that digital competency training effectively equips women entrepreneurs. with the skills and confidence needed to directly apply technology in their business activities. This is in line with the prior research (Tambunan et al., 2023; Handayani et al., 2023), which highlights that improved digital skills facilitate immediate and practical technology use in entrepreneurial contexts.

4.12.3 Effect of selected constructs on behaviour intention to adopt technology and actual use behaviour of technology among women entrepreneurs in informal sector

To explore the direct and indirect effect of the exogenous variables on the endogenous variables, the results from PLS analysis were summarized. In the following table, performance expectancy, effort expectancy, social influence, resources and digital competency are exogenous variables while behaviour intention to adopt technology and use behaviour towards technology adoption were the endogenous variables.The Direct, indirect, and total effect of select constructs on behaviour intention and actual usage of technology adoption is presented in Table 4.12.3

Table 4.12.3 Effect of selected constructs on behaviour Intention to adopt technology and Actual use behaviour

Model Predictor	Behavioural Intention to Adopt Technology			Actual Use Behaviour of Technology		
	Direct effect	Indirect effect	Total effects	Direct effect	Indirect effect	Total effects
Performance expectancy	0.147	-	0.147	-	0.027	0.027
Effort expectancy	0.121	-	0.121	-	0.022	0.022
Social Influence	0.259	-	0.259	-	0.047	0.047
Facilitating Condition	0.088	-	0.088	-	0.016	0.016
Digital competency	-	0.025	0.025	0.736	0.005	0.741
Behaviour intention	-	-	-	0.182	-	0.182
Total	**0.615**	**0.025**	**0.640**	**0.918**	**0.117**	**1.035**

Source: Computed Data

4.12.3.1 Direct and Indirect Effects on Behaviour Intention on Technology Adoption

The total direct effect of the predictors on behavioural intention is 0.615, indicating that multiple factors contribute to shaping entrepreneurs' intention to adopt technology.

4.12.3.1.1 Direct Effects on Behavioural intention to Adopt Technology

The direct effect of Performance Expectancy (PE) on Behavioural intention (0.147) indicates that the perceived usefulness of technology plays a moderate role in shaping adoption decisions. Entrepreneurs who believe that digital tools will enhance business productivity are more inclined to integrate them into their operations. This reinforces the idea that expected benefits outweigh initial challenges, making performance expectancy a key motivational driver in adoption decisions

Similarly, the direct effect of Effort Expectancy (EE) on Behavioural intention (0.121) suggests that the ease of learning and using technology positively influences on adoption intention. The simpler a technology is perceived to be, the more likely entrepreneurs are to engage with it. However, the slightly lower effect compared to performance expectancy implies that while usability is important, entrepreneurs prioritize the anticipated benefits of technology over its ease of use.

The direct effect of Social Influence (SI) on Behavioural intention (0.259) becomes the strongest predictor, emphasizing the significant role of peer recommendations, industry norms, and external encouragement in shaping adoption decisions. Entrepreneurs are more likely to embrace technology when they perceive strong societal acceptance and observe its successful use within their networks. This highlights the importance of mentorship,

networking, and business ecosystems in driving adoption, as entrepreneurs are influenced by the success stories and digital experiences of their peers.

In contrast, the direct effect of Facilitating Conditions (FC) on Behavioural intention (0.088) suggests that access to financial, technical, and infrastructural resources contributes to adoption intention but has a relatively weaker influence compared to expectancy-driven and social factors. While adequate resources reduce barriers to technology adoption, their effect remains secondary because entrepreneurs tend to focus on usability, business benefits, and external validation when making adoption decisions.

These findings establish a clear distinction between direct predictors of behaviour intention towards technology adoption, each playing unique role in shaping technology adoption intention among entrepreneurs.

The dominance of social influence highlights the need for community-driven interventions, while the moderate impact of performance expectancy and effort expectancy underscores the importance of practical benefits and ease of use in shaping entrepreneurial adoption attitudes. The weaker role of facilitating conditions suggests that while resources matter, skills, perceptions, and external motivation play a more decisive role in technology adoption.

4.12.3.1.2 Indirect effect on behavioural intention to adopt technology

The indirect effect of digital competency (0.025) on behavioural intention to adopt technology suggests that while technological proficiency does not directly dictate an entrepreneur's intention to use digital tools, it exerts influence through other key adoption factors. Entrepreneurs with higher digital competency are more likely to view technology as beneficial (performance expectancy) and easier to use (effort expectancy), which will strengthen their willingness to adopt it.

This indirect pathway highlights that digital competency enhances confidence in navigating technology, thereby reducing perceived complexity and adoption resistance. When entrepreneurs possess foundational digital skills, they are better equipped to assess the advantages of technology without being hindered by fears of usability challenges or lack of technical knowledge. As a result, their expectations regarding ease of use and performance benefits improve, leading to a higher behavioural intention to integrate technology into their business operations.

4.12.3.2 Direct and Indirect Effects on Actual Usage behaviour on Technology Adoption

The model presents the direct and indirect effects of key predictors on actual technology usage behavior, highlighting the factors that influence entrepreneurs' ability and decision to actively engage with digital tools. The total effects on actual use behavior amount to 1.035, confirming that multiple variables shape technology adoption beyond mere intention presented in table 4.12.3.

4.12.3.2.1 Direct Effects on Actual Usage Behaviour

The direct effect of Digital competency (0.736) on actual technology usage exhibits the strongest direct effect, reinforcing its critical role in actual usage behavior of technology. Entrepreneurs with higher digital competency are significantly more likely to integrate technology into their operations, as they possess the necessary skills, confidence, and experience to navigate digital tools effectively. The digital competency training programs targeting the improvement of digital skills have a direct and substantial impact on actual usage of technology. For informal women entrepreneurs, equipping them with skills in using mobile applications, online business tools, or e-commerce platforms can significantly enhance their ability to integrate technology into their business operations.

Behavioural intention has a moderate direct effect (0.182) on actual use, indicating that a strong willingness to adopt technology translates into real engagement. This aligns with established adoption models, where intention serves as a precursor to action. However, the effect size suggests that while intention is necessary, it alone is insufficient—digital competency and usability factors must complement it to facilitate sustained technology use.

The findings confirm that digital competency is the strongest determinant of actual technology use, surpassing behavioural intention. While a strong intention to adopt technology increases engagement, sustained usage relies on skill proficiency and confidence in navigating digital tools. This underscores the importance of structured digital training programs, particularly for informal women entrepreneurs, ensuring they possess both the motivation and technical capability to integrate technology effectively into their business operations. Without adequate digital competency, adoption intentions remain unrealized, reinforcing the need for skill-building initiatives to bridge the gap between willingness and actual usage.

4.12.3.2.2 Indirect effect on Actual Usage Behaviour

Performance expectancy exerts an indirect effect of 0.027 on actual use behavior, indicating that entrepreneurs who perceive technology as beneficial for business operations first develop an intention to adopt it, which subsequently influences their actual usage. This demonstrates that while expected performance improvements motivate technology adoption, they do not directly drive usage but rather work through behavioural intention as an intermediary variable. Entrepreneurs who believe digital tools will enhance efficiency and productivity are more inclined to form adoption intentions, which later translate into technology implementation

Effort expectancy has an indirect effect of 0.022 on actual usage behavior, reinforcing that the perceived ease of learning and using technology plays a role in shaping adoption intention first, which then leads to actual use. Entrepreneurs are more likely to engage with digital tools when they believe these technologies require minimal effort to master. However, since ease of use alone does not directly influence actual implementation, it highlights the importance of digital literacy programs that ensure entrepreneurs transition from interest and intention to real-world application.

Social influence indirectly impacts actual use with an effect size of 0.047, confirming that external encouragement, peer recommendations, and societal acceptance play a crucial role in shaping technology adoption intention, which later affects usage behavior. Entrepreneurs exposed to networks that actively use technology are more likely to develop favorable adoption attitudes, reinforcing their decision to integrate digital tools into business operations. However, the indirect nature of this effect suggests that social validation alone is not sufficient to sustain actual use—competency and accessibility must complement this influence.

Facilitating conditions exert an indirect effect of 0.016 on actual technology use, demonstrating that resource availability contributes to behavioural intention, which later influences adoption behavior. Entrepreneurs with access to financial support, infrastructure, and technical assistance find it easier to consider adopting technology, but these resources alone do not directly drive usage behavior. This highlights the need for holistic approaches that combine resource support with skill-building programs to ensure sustained engagement with technology.

Digital competency indirectly influences actual use with an effect size of 0.005, indicating that while digital skills primarily exert a direct influence on technology usage, they also play a minor role in shaping behavioural intention. Entrepreneurs with higher digital literacy develop greater confidence in adopting technology, strengthening their intention to integrate digital solutions, which later translates into usage behavior. This small indirect effect underscores the importance of competency-driven training programs, ensuring that skill development supports both intention formation and technology implementation.

The indirect effect of digital competency on actual technology use through performance expectancy and effort expectancy highlights the role of digital proficiency in shaping perceived usefulness and ease of use, which subsequently drive actual adoption behavior.

Entrepreneurs with higher digital competency are more likely to view technology as beneficial (performance expectancy) and easy to use (effort expectancy). This perception strengthens their intention to adopt technology, which then translates into actual usage behavior. The indirect pathway suggests that while digital skills do not directly influence immediate adoption decisions through expectancy-based factors, they help entrepreneurs develop a more favorable perception of technology, making adoption more intuitive and seamless.

Since digital competency has a strong direct effect on actual use (0.736), its indirect impact through performance expectancy (0.027) and effort expectancy (0.022) remains relatively minor. However, this confirms that digital proficiency enhances perceived benefits and ease of use, reinforcing the adoption cycle. Entrepreneurs who possess advanced digital skills not only find technology useful but also experience fewer barriers to engagement, resulting in higher actual usage.

The indirect effects confirm that technology adoption is a multi-step process, where expectancy-based factors, social influence, and resource availability first shape behavioural intention before leading to actual usage behaviour. While these indirect relationships are meaningful, they are not as strong as direct influences, particularly digital competency, which remains the most significant determinant of actual technology use.

Table 4.12.4 Specific Indirect Effects towards Behavioural Intention and Actual Usage of Technology

Indirect Path of constructs	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
DC-> PE -> BI	0.021	0.024	0.015	1.463	0.145
DC-> PE -> BI -> AU	0.004	0.004	0.003	1.264	0.208
PE -> BI -> AU	0.027	0.028	0.014	1.921	0.056
DC-> EE -> BI	0.004	0.006	0.010	0.350	0.727
DC-> EE -> BI -> AU	0.001	0.001	0.002	0.346	0.730
EE -> BI -> AU	0.022	0.025	0.015	1.501	0.135
SI -> BI -> AU	0.047	0.048	0.018	2.597	0.010
FC-> BI -> AU	0.016	0.017	0.012	1.309	0.192

(Source: Computed value)

The analysis of specific indirect effects in Structural Equation Modeling (SEM) plays a critical role in understanding the complex interactions between predictor variables and actual technology use. While direct effects provide a straightforward representation of how independent variables influence outcomes, indirect effects reveal mediated pathways, demonstrating how certain variables first shape behavioural intention, which subsequently translates into actual usage behaviour.

The indirect effect of Digital Competency (DC) on Behavioural intention (BI) through Performance Expectancy (PE) (0.021, p = 0.145, t = 1.463) suggests that while entrepreneurs with higher digital competency perceive technology as beneficial, this effect does not significantly translate into stronger adoption intentions. The p-value (0.145) exceeds the 0.05 threshold, and the t-statistic (1.463) falls short of 1.96, confirming weak statistical support. This aligns with the Unified Theory of Acceptance and Use of Technology (UTAUT), which emphasizes performance expectancy as a key determinant of adoption behavior (Venkatesh et al., 2012). While digital competency enhances an entrepreneur's ability to recognize business advantages, other contextual factors such as industry norms, external encouragement, and prior experience may have a more substantial influence on behavioural intention (Dwivedi et al., 2019).

The indirect effect of Digital Competency on Actual Use through Performance Expectancy and Behavioural Intention (0.004, p = 0.208, t = 1.264, STDEV = 0.003) suggests that while entrepreneurs with higher digital competency perceive technology as beneficial for their business operations, this perception does not strongly translate into

behavioural intention or actual usage. Digital competency training developed confidence in use of range of technologies. As their digital skills improve, they no longer perceive digital competency as a barrier but instead focus on how technology can enhance business performance. This shift in mindset leads them to evaluate technology based on their capability to use it rather than ability of technology in improving efficiency in performance.

The indirect effect of Performance Expectancy on Actual Use through Behavioural Intention (0.027, p = 0.056, t = 1.921, STDEV = 0.014) suggests that entrepreneurs who perceive technology as valuable for enhancing business efficiency first develop the intention to adopt it, which later translates into actual usage behaviour. This result aligns with prior studies on technology acceptance models, where perceived usefulness is recognized as a strong determinant of adoption behaviour (Davis, 1989). However, research suggests that entrepreneurs often weigh practical concerns such as usability challenges, cost implications, and the relevance of digital tools within their specific business context before translating their adoption intention into actual usage (Venkatesh et al., 2012). The near-significant effect implies that while performance expectancy influences behavioural intention, external motivators such as peer influence, access to training, and policy support may be needed to drive actual usage (Dwivedi et al., 2023).

The indirect effect of Digital Competency on Behavioural Intention through Effort Expectancy (0.004, p = 0.727, t = 0.350, STDEV = 0.010) suggests that while women entrepreneurs prefer technologies that are intuitive and easier to use in their business operations. The process of adapting to a new technology demands time and effort to familirise tools for business purposes. As a result, this perception does not significantly strengthen their intention to adopt it. This result aligns with prior research indicating that entrepreneurs who undergo digital competency training often develop confidence in using technology, reducing their reliance on perceived ease of use as a motivating factor and their focus shifts towards strategic value and performance outcomes (Subhani et al.,2023). As digital proficiency increases, effort expectancy becomes less relevant, since users no longer evaluate technology based on usability concerns but rather on its strategic benefits (Dwivedi et al., 2019). Recent studies further support this finding, showing that effort expectancy plays a stronger role in early adoption stages but diminishes as users gain experience and familiarity with digital tools . Additionally, research highlights that entrepreneurs prioritize

business outcomes over usability concerns, reinforcing the need for competency-driven adoption strategies rather than reliance on perceived ease of use (Hasan Emon, 2023).

The indirect effect of Digital Competency on Actual Use through Effort Expectancy and Behavioural intention (0.001, p = 0.730, t = 0.346, STDEV = 0.002) suggests that while entrepreneurs with higher digital competency may perceive technology as easier to use , this perception does not significantly strengthen their intention to adopt it , nor does it translate into actual usage . This result aligns with prior research indicating that entrepreneurs who undergo digital competency training often develop confidence in using technology, reducing their reliance on perceived ease of use as a motivating factor (Venkatesh et al., 2012). As digital proficiency increases, effort expectancy becomes less relevant, since users no longer evaluate technology based on usability concerns but rather on its strategic benefits (Dwivedi et al., 2019). Recent studies further support this finding, showing that effort expectancy plays a stronger role in early adoption stages but diminishes as users gain experience and familiarity with digital tools (Duong et al., 2023). Additionally, research highlights that entrepreneurs prioritize business outcomes over usability concerns, reinforcing the need for competency-driven adoption strategies rather than reliance on perceived ease of use (Hendrajaya et al., 2024).

The indirect effect of Effort Expectancy on Actual Use through Behavioural intention (0.022, p = 0.135, t = 1.501, STDEV = 0.015) suggests that entrepreneurs who perceive technology as easy to use may develop an intention to adopt it (BI), which could later translate into actual usage. This result aligns with prior research indicating that effort expectancy is more influential in early adoption stages but diminishes as users gain experience and confidence in using technology (Mohamad et al., 2024). Entrepreneurs who undergo digital competency training often develop proficiency, reducing their reliance on perceived ease of use as a motivating factor (Sair & Danish, 2018). Recent studies further support this finding, showing that while effort expectancy contributes to behavioural intention, actual usage behavior is often driven by external motivators such as social influence, perceived business benefits, and institutional support (Angelica et al., 2023).

The indirect effect of Social Influence on Actual Use through Behavioural intention (0.047, p = 0.010, t = 2.597, STDEV = 0.018) suggests that external encouragement, peer validation, and societal norms significantly shape adoption intention (BI), which then translates into actual technology use (AU). This result aligns with research emphasizing the

importance of social validation in technology adoption, particularly in collectivist cultures where peer recommendations and industry norms strongly influence decision-making (Leow et al., 2021). Studies confirm that entrepreneurs often rely on community-driven adoption models, where social influence acts as a catalyst for behavioural intention and sustained technology use (Kim et al., 2025).

The indirect effect of Facilitating Conditions (FC) on Actual Use (AU) through Behavioural intention (BI) (0.016, p = 0.192, t = 1.309, STDEV = 0.012) suggests that resource availability, infrastructure, and technical support contribute to adoption intention (BI), which may later influence actual technology use (AU).This result aligns with studies showing that while facilitating conditions reduce adoption barriers, they do not necessarily drive sustained technology use unless complemented by competency-building initiatives (Zheng et al., 2025). Research suggests that entrepreneurs often rely more on personal skill competency and external influences than infrastructural support alone for sustained usage (Li et al., 2025).