CHAPTER 6

BARRIERS FOR ADOPTION OF AUGMENTED REALITY BUSINESS MODEL IN THE HANDLOOM SECTOR

6.1 Introduction

In the previous chapter 4, The study suggests that online marketing and sales are necessary to fulfill customer requirements. Nevertheless, practitioners encounter challenges when adopting and executing new technologies for online marketing for the handloom sector. Therefore, it becomes necessary to recognize the barriers that obstruct the implementation of Augmented reality in the handloom Sector. Whereas in the handloom sector, brick-and-mortar stores have traditionally been followed for the sale of products, but the advancement of technology on the market has become so popular and has provided a better platform for customer interaction for business development (Grace 2021). In the present era, many firms are already using digital technologies to interact with customers with improved experience by providing immediate access to products and services and reducing costs (Batat 2021). The key digital approaches include online advertising (Lim et al. 2021), Social media marketing (Les Dolega et al. 2021), Email marketing (Bismo et al. 2019), and Mobile Marketing (Peter and Dalla Vecchia 2021). Augmented reality (Mourtzis et al. 2020) is one technology that can aid these approaches

Augmented Reality (AR) is a new technology used to provide a real-time curated experience to a person by integrating the real world with a digital overlay (Sharma et al. 2022). AR technology can benefit the Indian handloom sector to grab the online market. It can enable customers to access online marketing information in a user-friendly manner by

positioning a digital content layer on top of the physical world (Wang et al. 2018). In a broader Mixed Reality (MR) framework, Milgram et al. (1995) placed AR between virtual reality (VR) and physical reality. Whereas AR augments the real world to convey the information, VR presents all the information Virtually (Masood and Egger 2019). AR is also one of the essential and integral parts of Industry 4.0 (Masood and Egger 2019, 2021) and is used to increase productivity and efficiency by combining the digital and the physical world using cyber-physical entities and human-machine interface (Kumar et al. 2021). The implementation of rapidly evolving AR technologies can easily be found in the applications developed for the retail environment (Shakya and Smys 2020), museums (Trunfio et al. 2022), games (Sekhavat 2016), tourism (Yung and Khoo-Lattimore 2019), health care (Williams et al. 2019) and the manufacturing industry (Schein and Rauschnabel 2021).

Currently, customers are using electronic products like mobile phones, webcams, or digital cameras to capture real-time input for AR platforms (Parekh et al., 2020). According to Javornik (2016), marketing practices have been explored using AR since the late 2000s. Using these applications, consumers can access intended experiences without the limitation of space or time. Simultaneously, smooth and stimulating interactions can be designed with the virtual goods according to the marketing strategy. Consumers develop positive psychology and responses to benefits not only themselves but also the brands (Wang et al. 2022). Pantano (2014) states AR will increase brand value by enhancing consumer engagement and purchase decisions. It helps companies provide new opportunities for consumers and marketers (Scholz and Smith 2016). Plotkin et al. (2022) mentioned that most adults know the AR mobile apps launched by their favourite brands. So, brands are eager to meet consumer demand by launching their own AR application.

The apparel market is highly volatile, and they have a shorter lead time (Noor et al. 2022). Therefore, fashion retailers are trying to incorporate AR-based technologies into physical retail setups in a suitable format (Xue et al., 2023). The information about the products, promotions, and locations is primarily conveyed to the consumers using AR techniques (Iannilli and Spagnoli 2021). According to Huang et al. (2019), AR technologies and services can also offer a personal experience to the customer, especially in the apparel industry, by presenting the consumers' actual bodies in real time. Similarly, Yim et al. (2017) also agree that AR can easily be used to provide real-time access to the consumer's actual body and appearance for the virtual try-on process rather than using an avatar, which results in a compromised experience. Javornik (2016) described that an AR-based try-on system could offer the ability to review, re-check, and correct self-fitting effects during an online shopping experience. According to Hoyer et al. (2020), AR technology can also enhance the customer experience in shops by placing AR-powered mirrors, enabling the customers to have a virtual experience to look different in various conditions or on other occasions. Despite of many advantages of AR, some industry is still unable to implement AR in their business. Masood and Egger (2019) suggested that there is a need to identify and analyze the factors influencing the implementation of the AR system in the individual industry. The handloom is one such sector of the apparel industry that has yet to adopt AR technological aid to beat the current market force, especially the competitive one. However, despite the high significance of AR in the sector, there is a scarcity of literature reviews exploring the adoption of AR technology for the handloom sector. Hence, this chapter tries to address the following research questions.

- Identifications and prioritization of the barriers affecting AR adoption in the handloom industry?
- Identification of inter-relationships between barriers to the adoption of AR.

The above discussion shows that considerable research on AR usage and adoption in different industries is available. Despite the growing interest in augmented reality (AR) technology, there is currently limited literature on its adoption within the Indian handloom sector. Table 6.1 shows the previous studies on the handloom sector.

Table 6.1: Comparative literature on handloom sector

Sr. No.	Author/ authors	Techniques/ approach	Focus area	Findings/results
1	Goswami and Jain (2014)	Semi-structured interviews and observations	Strategy for Sustainable Development of the Handloom Sector	Need of online sales through website
2	Mishra et al. (2019)	Focus Group Discussions and Brainstorming	Design and Development of a web-based application for the handloom sector in India	Web-based applications will promote equity by giving small-scale producers a fair chance to compete against large textile industries.
3	Sudha and Das (2021)	Survey-based Questionnaires	Digitalization of Sambalpuri handloom	The weavers in 21–40 years age group are more inclined towards the development of Sambalpuri handloom products through digitalization.
4	Patra (2021)	Survey-based Questionnaires	Role of e-market in the marketing of handloom products of Cuttack	The e-market is promoting handloom products on the online platform
5	Balasubrahmanyam and Muthumeenakshi (2020)	Survey-based Questionnaires	Role of social media in advertising of Handloom products	Social media is increasing knowledge of the customers and sales of handloom products.
6	Sivasakthi and Rabiyathul (2018)	SWOT Analysis	Understanding consumer preferences and problems of Kanchipuram handloom products	The Handloom sector needs continuous promotion and regular advertising campaigns to have a durable and effective impact of the handloom products on the customer.
7	Iyer (2018)	Interactions with manufacturers	Digital Adoption for	The Handloom sector's interactions with customers through

			Consumer Delight	mobile apps are acquiring new customers and increasing customer experience.
8	Meera and Vinodan (2022)	Interview and structural equation modeling	Innovative approach and marketing skill for artisans in India	Weavers Need of Understanding of online e-commerce operations
9	Guha et al. (2021)	Offline questionnaire and structural equation modeling	Social media marketing strategies for promoting handicraft	The sector is still lagging behind in adopting social media to market their valuable products to their potential customers
10	Current study	Focus group discussion and ISM method	Augmented reality for business development	Developed a frame work to adopt an augmented reality business model for the Indian handloom sector.

Therefore, this paper aims to address this gap by focusing on identifying barriers to AR adoption within the Indian handloom sector. In this study, 11 barriers are considered. They are explained in detail in Section 3.

To determine the barriers to AR adoption in the handloom sector, a literature review was conducted to understand augmented reality's advantage in the handloom sector, followed by identifying the factors prohibiting its successful implementation called barriers. Further, experts from academics as well as the handloom sector are interviewed to understand and identify the other possible barriers. The barriers identified from the above two stages are provided in Table 6.2. In this research, a total of twelve experts are involved, such that each expert is having experience of more than 15 years in handloom and allied fields. The demographic profile of the experts is provided in Table 6.3. The sufficiency of experts is in adherence to the existing research Shen et al. (2019) used seven experts; Kashyap and Shukla (2022) used seven experts; Yadav and Samuel (2022) used

eleven experts. The factors obtained in Table 6.2 are further discussed thoroughly with the experts while considering the applicability of the barriers to the Indian handloom sector, the socio-economic condition of the Indian handloom sector, similarity or commonality among the barriers, and other constraints of the Indian business environment. Thus, the finalized set of the barriers considered in this study is provided in Table 6.4. Further, to investigate the causal-dependence relationships among the factors, the expert's response is collected and quantified considering the steps involved in the ISM-MICMAC analysis approach. To deal with the inconsistencies with the expert's opinion, a 70% rule was used (Singh and Samuel 2018 and Naik et al. 2023). This ISM-MICMAC analysis clusters the barriers into different levels and groups based on their driving and dependence ability (Siddhu et al., 2016). Further, a directed graph is obtained, which provides the causal relationships between the barriers of different levels. And based on the expert's response, a directed graph representing the level of driving ability of each barrier is developed.

Table 6.2: Barriers identified from the literature review

Sr. No.	Barrier
1	Lack of information and knowledge (LIK)
2	Lack of top management commitment (LMC)
3	Lack of skilled workers (LSW)
4	Lack of funds (LOF)
5	Lack of IT infrastructure and solid internet access (LIT)
6	Legal and contractual uncertainty (LCU)
7	Privacy issues (PI)
8	Fear of failure (FF)
9	Lack of digital culture (LDC)
10	Lack of government support and polices (LGP)
11	Poor research and development on sector (PRD)
12	Resistance to change (RC)
13	Negative past experience (NE)
14	Organizational resistance (OR)
15	Lack of experience with similar technology (LET)
16	Work place policy and regulations (WPR)
17	Uncertainty about economic benefits (UEB)
18	Insufficient precision of technology (IPT)
19	Probable health issues due to long usage of AR technology gadgets (PHG)
20	Time constraint (TC)
21	Cyber security issues (CSI)

Table 6.3: The demographic profiles of experts

Sr. No.	Expert type	Sex	Numbers	Age	Working Experience
1	Manager	Male	6	48-58	18-27
2	Manager	Female	3	46-53	16-27
3	Academic expert	Male	1	54	19
4	Academic expert	Female	2	51-58	16-24

Table 6.4: Barriers to augmented reality adoption in Handloom sector

Sr.No	Barrier Name	Description	Reference
1	Lack of information and knowledge (LIK)	Most of the handloom units are located in rural areas, and they do not have knowledge about AR technology.	Cugno et al. (2021); Kamble et al. (2018); Majumdar et al. (2021); Oke and Arowoiya (2022)
2	Lack of top management commitment (LMC)	AR adoption of the handloom sector requires high investment for developing appropriate infrastructure. Additional costs are required for training or hiring a workforce and proper knowledge of technology use. Without this management, heist to implement AR in business.	Luthra and Mangla (2018); Ajmera and Jain (2019); Majumdar et al. (2021)
3	Lack of skilled workers (LSW)	Knowledgeable workers are needed to adopt AR systems in business for updating products and maintaining interfaces. In addition, they also need to interact with customers if they have any problems assisting with the AR interface.	Moktadir et al. (2018); Ajmera and Jain (2019); Kumar et al. (2021); and Iyanna et al. (2022)
4	Lack of funds (LOF)	The AR system will need significant capital to hire skilled workers, train workers, and develop infrastructure.	Luthra and Mangla (2018); Ajmera and Jain (2019); Alarcon et al. (2020); Kumar et al. (2021); Oke and Arowoiya (2022)
5	Lack of IT infrastructure and solid internet access (LIT)	Most handloom units are in rural areas with poor internet connectivity and limited infrastructure. But high-speed internet connectivity is needed to use AR applications for marketing	Oke and Arowoiya (2022); Moktadir et al. (2018); Majumdar et al. (2021); Kumar et al. (2021); and Alarcon et al. (2020)

		and sales and interact with customers in real time.	
6	Legal and contractual uncertainty (LCU)	The agreement related to data sharing and data protection, service support between partners, and profit share.	Majumdar et al. (2021); Luthra and Mangla (2018)
7	Privacy issues (PI)	Competitors or cyber-attacks can get the details of customers' or personal sector data, where data misuse is possible.	Ajmera and Jain (2019); Moktadir et al. (2018); Kumar et al. (2021); and Majumdar et al. (2021)
8	Fear of failure (FF)	There is a scarcity of documented evidence of the application of AR in the handloom sector, and there is no guarantee of a return on investment.	Alarcon et al. (2020); Kumar et al. (2021); and Majumdar et al. (2021)
9	Lack of digital culture (LDC)	Most of the handloom sector sells its products through physical stores, and most of the sector does not have experience in digital marketing and online sales.	Luthra and Mangla (2018); and Majumdar et al. (2021)
10	Lack of government support and policies (LGP)	Government agencies are not providing information about AR adoption in the handloom business, and they do not have a policy that supports the weavers to implement AR in the handloom business.	Kumar et al. (2021); Majumdar et al. (2021); Luthra and Mangla (2018); Oke and Arowoiya (2022)
11	Poor research and development in the sector (PRD)	Focus research is needed to address various issues related to the adoption of AR in the handloom sector.	Ajmera and Jain (2019); Kumar et al. (2021); Luthra and Mangla (2018); Majumdar et al. (2021)

6.2 Methodology

6.2.1 ISM method

The ISM method proposed by Warfield in 1974 is utilized to develop the contextual relationship between barriers. According to Rajesh Attri et al. (2013), the ISM model is a well-established method that effectively identifies and summarises the relations between direct and indirect barriers. This method is advantageous when it is used to investigate the

criteria's interrelationships. Even complicated issues or complex problems might be stated using ISM to generate a well-defined structure using flow charts to aid decision-makers (Li et al. 2019). The ISM technique is considered superior to other interpretive techniques as discussed in the section 2.8.3.

The ISM model has been applied in various industries by different researchers. For instance, Singh et al. (2020) employed the ISM model in Indian manufacturing industries to develop a conceptual model for green practices. Rana et al. (2019) deployed the ISM method to understand the barriers to m-commerce adoption in SMEs in the UK. Similarly, Mathiyazhagan et al. (2013) used ISM approach for the barrier analysis in implementing green supply chain management. Vinodh (2021) studied the barriers to integrate with lean with industry 4.0. Additionally, Kumar et al. (2021) utilized the ISM approach to analyze barriers to adopting Industry 4.0. This study collected data from 12 experts, including nine managers of handloom units and three from an academic background. All the experts have a minimum of fifteen years of handloom sector experience. The steps of the ISM methodology employed in this study are illustrated in Figure 6.1.

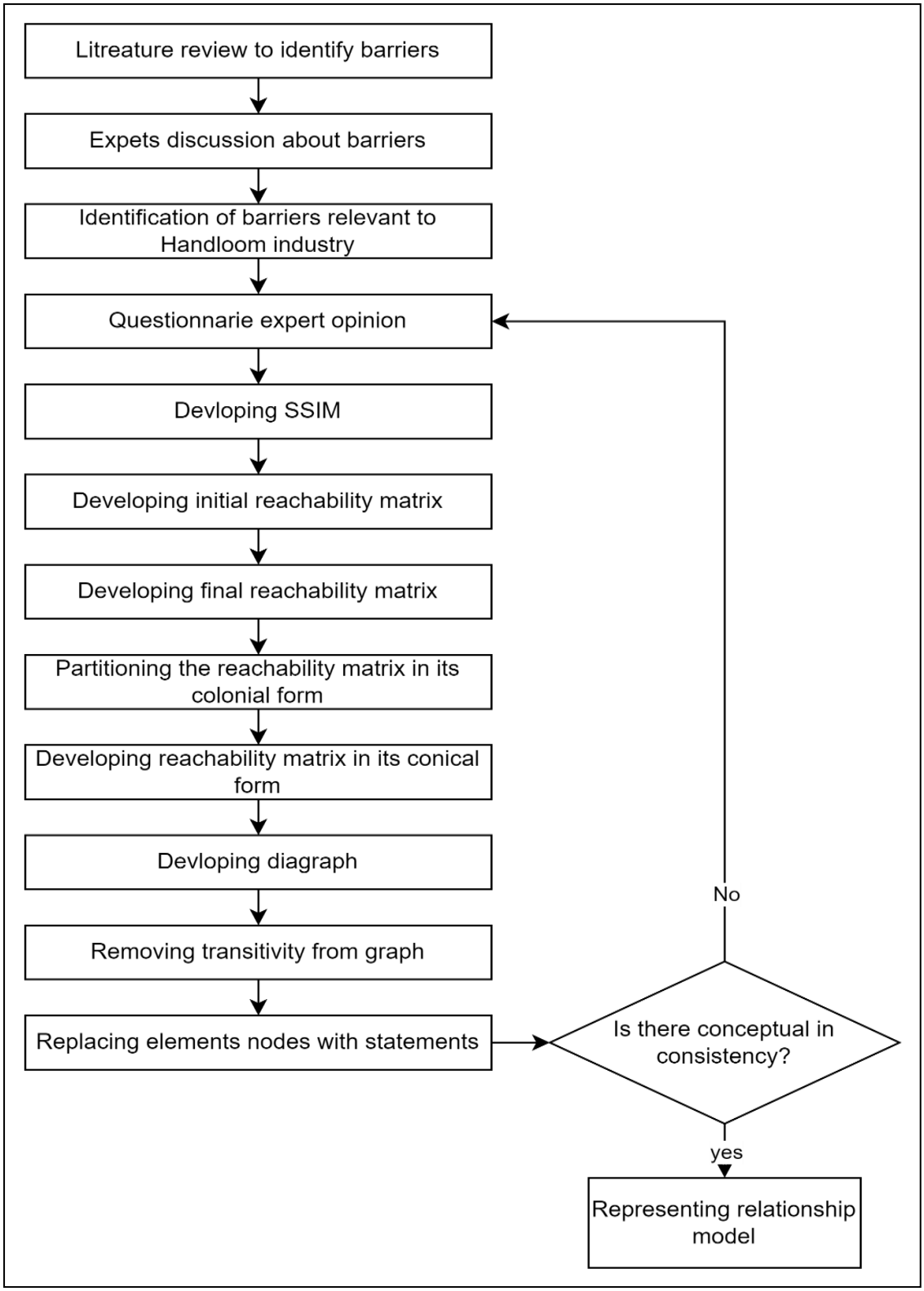

Figure 6.1: Flowchart of Research Methodology

Step 1: Develop a structural self-interaction matrix (SSIM)

The first step in the ISM method involves the development of a Structural Self-Interaction Matrix (SSIM). This (Table 6.5) matrix denotes the relationship between any two identified barriers (i and j). Experts are then asked to evaluate the relationship between the barriers and rate it using symbols based on their experience, as mentioned in the previous section 5.2.1.

Table 6.5: Provides the SSIM for barriers related to AR adoption.

i / j → ↓	**LIK**	**LMC**	**LSW**	**LOF**	**LIT**	**LCU**	**PI**	**FF**	**LDC**	**LGP**	**PRD**
LIK	1	V	O	O	O	O	V	V	A	A	O
LMC	A	1	A	A	V	A	A	A	V	A	V
LSW	O	V	1	O	O	O	V	V	O	A	O
LOF	O	V	O	1	V	O	O	V	O	A	V
LIT	O	A	O	A	1	O	O	V	V	A	O
LCU	O	V	O	O	O	1	V	V	O	A	O
PI	A	V	A	O	O	A	1	V	V	A	O
FF	A	V	A	A	A	A	A	1	A	A	A
LDC	V	A	O	O	A	O	A	V	1	A	O
LGP	V	V	V	V	V	V	V	V	V	1	V
PRD	O	A	O	A	O	O	O	V	O	A	1

Step 2: Initial Reachability Matrix

The initial reachability matrix, as presented in Table 6.6, is derived from the conversion of SSIM. The steps to be followed to obtain the initial reachability matrix were mentioned in the previous section 5.2.1.

i / j	**LIK**	**LMC**	**LSW**	**LOF**	**LIT**	**LCU**	**PI**	**FF**	**LDC**	**LGP**	**PRD**
LIK	1	1	0	0	0	0	1	1	0	0	0
LMC	0	1	0	0	1	0	0	0	1	0	1
LSW	0	1	1	0	0	0	1	1	0	0	0
LOF	0	1	0	1	1	0	0	1	0	0	1
LIT	0	0	0	0	1	0	0	1	1	0	0
LCU	0	1	0	0	0	1	1	1	0	0	0
PI	0	1	0	0	0	0	1	1	1	0	0
FF	0	1	0	0	0	0	0	1	0	0	0

LDC	1	0	0	0	0	0	0	1	1	0	0
LGP	1	1	1	1	1	1	1	1	1	1	1
PRD	0	0	0	0	0	0	0	1	0	0	1

Table 6.6: Initial Reachability Matrix

Step 3: Final Reachability Matrix and Leveling of Barriers

The final reachability matrix is derived by identifying the indirect relationships between the barriers through transitivity analysis. Transitivity analysis involves identifying relationships among elements such that if element *i* is related to element *j*, and element *j* is related to element *k*, then element *i* is also considered related to element *k*. The transitivity links are indicated by entries marked with the symbol 1*. The final reachability matrix is shown in Table 6.7, and the levels are shown in Table 6.8.

Table 6.7: Final Reachability Matrix

i / j	**LIK**	**LMC**	**LSW**	**LOF**	**LIT**	**LCU**	**PI**	**FF**	**LDC**	**LGP**	**PRD**
LIK	1	1	0	0	1*	0	1	1	1*	0	1*
LMC	1*	1	0	0	1	0	0	1*	1	0	1
LSW	0	1	1	0	1*	0	1	1	1*	0	1*
LOF	0	1	0	1	1	0	0	1	1*	0	1
LIT	1*	1*	0	0	1	0	0	1	1	0	0
LCU	0	1	0	0	1*	1	1	1	1*	0	1*
PI	1*	1	0	0	1*	0	1	1	1	0	1*
FF	0	1	0	0	1*	0	0	1	1*	0	1*
LDC	1	1*	0	0	0	0	1*	1	1	0	0
LGP	1	1	1	1	1	1	1	1	1	1	1
PRD	0	1*	0	0	0	0	0	1	0	0	1

Table 6.8: Level partitions of barriers

Sr. No.	**Barrier**	**Reachability set**	**Antecedent set**	**Intersection set**	**Level**
1	LIK	1,2,5,7,8,9,11	1,2,5,7,9,10	1,2,5,7	II
2	LMC	1,2,5,8,9,11	1,2,3,4,5,6,7,8,9,10,11	1,2,5	II
3	LSW	2,3,5,7,8,9,11	3,10	3	IV
4	LOF	2,4,5,8,9,11	4,10	4	III
5	LIT	1,2,5,8,9	1,2,3,4,5,6,7,8,10	1,2,5	II

6	LCU	2,5,6,7,8,9,11	6,1	6	IV
7	PI	1,2,5,7,8,9,11	1,3,6,7,9,10	7	III
8	FF	2,5,8,9,11	1,2,3,4,5,6,7,8,9,10,11	2,5,8,9,11	I
9	LDC	1,2,7,8,9	1,2,3,4,5,6,7,8,9,10	1,2,7,8,9	I
10	LGP	1,2,3,4,5,6,7,8,9,10,11	10	10	V
11	PRD	2,8,11	1,2,3,4,5,6,7,8,10,11	2,8,11	I

Step 4: Formation of the ISM model

Figure 6.2 illustrates the levels obtained in Table 6.8 for modeling barriers in the adoption of augmented reality in the Indian handloom sector.

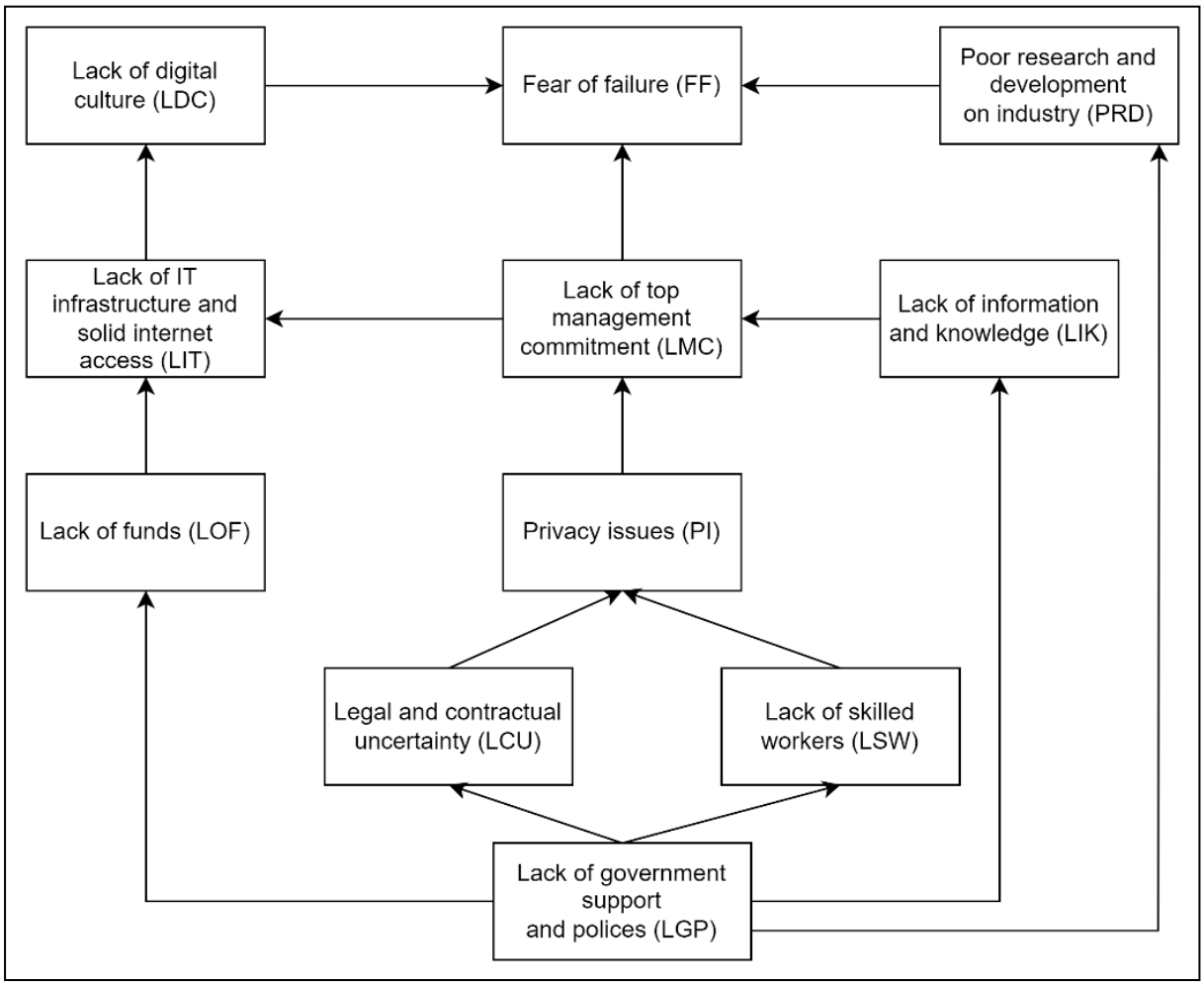

Figure 6.2: ISM Framework for AR implementation

6.2.2 MICMAC analysis

The MICMAC analysis was developed by Michel Godet and François Bourse (Chandramowli et al. 2011). The MICMAC analysis is conducted to classify the elements based on their driving and dependence power in the model (Shaik and Dhir 2021). According to Jasiulewicz-Kaczmarek et al. (2021), the MICMAC method allows one to determine interactions between factors and grouping factors into clusters, which helps reduce the size of some complex problems. Ahmad et al. (2019) describe that MICMAC analysis involves the development of a graph that classifies factors based on driving power and dependence power and is used to validate the interpretive structural model factors in the study to reach their results and conclusions. The uniqueness of MICMAC analysis over other MCDM techniques is its ability to consider and quantify all the possible indirect relationships among the considered set of factors. Thus, the classification of factors so obtained is subjected to minimal biases of the respondents towards any specific factors.

The driving power indicates the number of barriers influenced by a specific barrier, while the dependence power represents the number of barriers influencing it. The Y-axis represents the driving power, and the X-axis represents the dependence power. Based on the relationships among the barriers, four clusters are formed:

a) Autonomous barriers, which have weaker connections with other barriers

b) Linkage barriers, which are highly related to each other

c) Driving barriers, which have a greater influence on other barriers

d) Depedent barriers, which are influenced by other barriers

For example, a lack of funds (LOF) has a driving power of six and a dependence power of two, indicating that LOF influences six barriers and is influenced by two barriers.

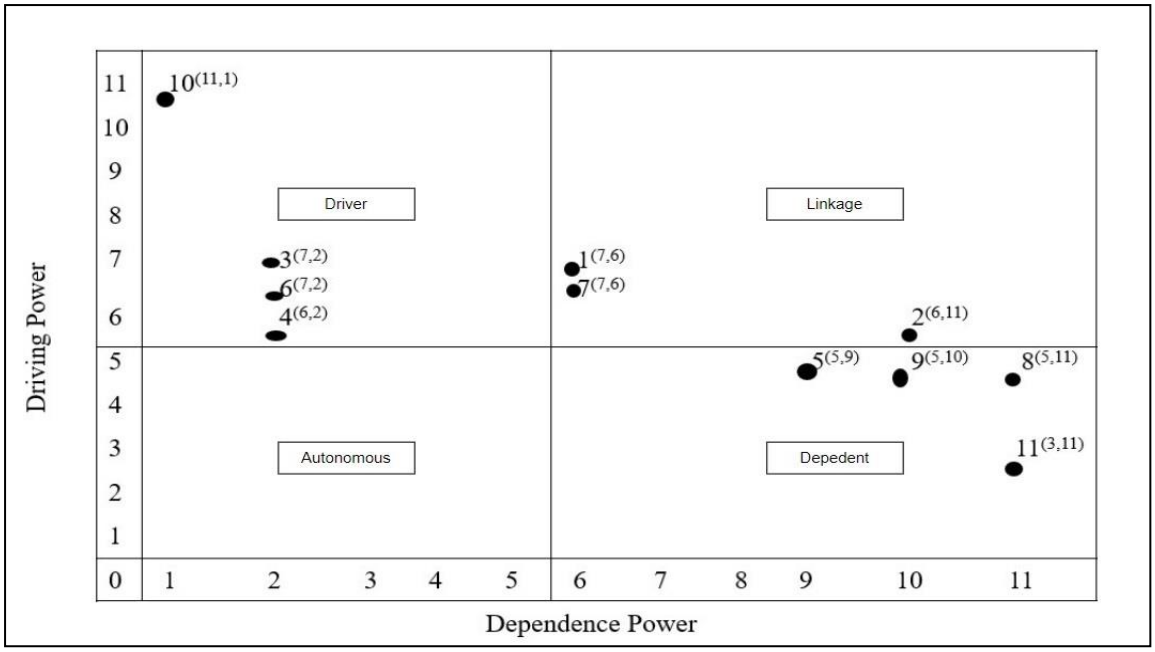

Figure 6.3: Driving power and dependence power on barriers

The MICMAC analysis shows the position of the 11 barriers concerning their driving and dependence power. The four barriers are classified as the driving barriers: i) lack of government support and policies, ii) lack of skilled workers, iii) lack of funds, and legal and iv) contractual uncertainty. There are no barriers in the autonomous category. Lack of IT infrastructure and solid internet access, lack of digital culture, fear of failure, and poor research and development in the sector are classified as the dependent barriers. The linkage barriers are lack of information and knowledge, lack of top management commitment, and privacy issues. Figure. 6.3 provides information about the mitigation priority of the group of barriers. For example, no barrier lying in the autonomous clusters suggests that all the barriers obstructing the implementation of the AR in the handloom sector are associated with one another, i.e., these barriers are internal to the handloom sector or its allied partners who have direct control over it. Thus, no barrier requires a special approach for its mitigation. The driving group suggests that when these barriers are mitigated, they will also mitigate the other barriers. Thus, when resource permits, the manager should go for mitigating the driving group barriers. Linkage group barriers have

high driving and dependence values. Thus, they are also called sensitive group barriers. Because a slight change in one barrier is going to affect most of the other barriers, these barriers need to be mitigated first, followed by the driving group barriers. The fourth group is called the dependence group barrier. These barriers are given list importance because they may be the result of other barriers or when other barriers and their impact is minimized, these barriers and their impacts automatically get eradicated.

6.3 Results and discussion

The previous section highlights the various interrelated barriers that hinder the implementation of augmented reality in the handloom sector. The SSIM matrix in Table 6.5 depicts the interrelationships among these barriers using symbols A, V, X, and O. Through transitivity analysis, indirect relationships among the barriers are also identified and shown with 1* in Table 6.7. The barriers are then categorized into five levels based on their interdependence, with level five barriers being the most influential. These levels and their causal relationships are visually represented in the digraph shown in Figure 6.2. The hierarchy indicates that the higher-level barriers are i) lack of digital culture (LDC), ii) fear of failure (FF), and iii) poor research and development on industry (PRD), which drive lower-level barriers. The second level includes i) lack of IT infrastructure and solid internet access (LIT), ii) lack of top management commitment (LMC), and iii) lack of information and knowledge (LIK). The third level includes i) lack of funds (LOF) and ii) Privacy issues (PI). The fourth level comprises i) Legal and contractual uncertainty (LCU) and ii) Lack of skilled workers (LSW). The fifth level includes a lack of government support and policies (LGP).

The fifth level barrier, lack of government support and policies (LGP), influences the fourth level barriers LCU and LSW, third level barriers LOF, and the Fourth level

barrier LIK. It is because the government helps in providing skill training to the workers to deal with new technology, and it plays a major role in providing the legal framework to the sector. Besides, it also establishes guidelines for formulating the standard contract between two working partners with respect to the industry. The government helps the sector in the adoption of new technology for business by providing information about the adoption of technology and funds at subsidized rates or without collateral. Simultaneously, the LCU and LSW barriers are influencing the PI. Without skilled workers, maintaining the data's privacy is difficult; changing contractual terms will also affect the industry's privacy. The lack of top management commitment (LMC) in level three is affected by the LIK of level three and PI of level four, and it shows that because of a lack of knowledge of AR and concern about the privacy of data, the management is not showing commitment to adopt AR implementation. The Fear of failure (FF) is the most dependent barrier, and it was directly affected by the LDC, PRD, and LMC. It signifies that lack of top management commitment, poor research about AR in the sector, and lack of digital culture are creating fear of failure in AR implementation in the handloom sector.

In the handloom sector, government support and policies (LGP) at level five are crucial for the adoption of new ideas and opportunities. The study conducted by Luthra and Mangla (2018) also reveals that government support and policies are the top barriers to the adoption of technology. Müller et al. (2018) suggested that the industry needs initial support from the government to adopt new technology. Although the government provides different tax and non-tax benefits to industries, the handloom sector needs more support from the government to adopt AR in the handloom sector. Legal and contractual uncertainty (LCU) is one of the main barriers after LGP. Kamble et al. (2018) study also shows that LCU is an important barrier, and industry practitioners must take necessary actions to eradicate this barrier. Similarly, Schmitt et al. (2019) mention that legal

uncertainty is a challenge for organizations and is slowing down technology adoption. The lack of skilled workers is one of the second important barriers to be mitigated in the handloom sector. The study of Oke and Arowoiya (2022) also highlighted that businesses are facing the challenge of adopting AR due to skill shortages. Another study by Dalili Saleh et al. (2022) also revealed that the shortage of skilled human resources is an obstacle to AR use in organizations. The high cost of augmented reality technology is one of the barriers to its adoption (Boyles 2017). Whereas in India, most of the handloom units are located in rural areas and don't have sufficient funds to invest in the business (Goswami et al. 2019). The Privacy issues are caused by a lack of skilled workers, as most of the handloom units are managed by semi-literate and illiterate weavers (Durlov et al. 2019). There is a possibility of mismanagement, which can lead to the loss of valuable data of businesses and customers. Wilkowska and Ziefle (2011) also show that there is a direct relationship between privacy and technology adoption. Lack of IT infrastructure and solid internet access (LIT), Lack of top management commitment (LMC), and Lack of information and knowledge (LIK). Lack of digital culture (LDC), Poor research and development on industry (PRD), and Fear of failure (FF) are the barriers that are preventing the implementation of augmented reality in the handloom sector.

Figure 6.3 illustrates the driving power and dependence power of 11 barriers identified in the MICMAC analysis. The driving barriers influence the dependent barriers, and dependent barriers are a lack of IT infrastructure and solid internet access (LIT), a lack of digital culture (LDC), a fear of failure (FF), and poor research and development on industry (PRD). There are linkage barriers that have both strong driving power and dependence power, and they are lack of information and knowledge (LIK), Privacy issues (PI), and lack of top management commitment (LMC). The barriers belonging to the driving cluster will influence most of the other barriers, and they are almost unaffected by

any other cluster barriers. They are lack of skilled workers (LSW), Legal and contractual uncertainty (LCU), Lack of funds (LOF), and Lack of government support and policies (LGP). There are no barriers in the autonomous cluster. Significantly, there are no weak driving and weak dependence barriers. So, it is recommended first to mitigate the driving cluster barriers, followed by the linkage and dependent cluster barriers.

6.4 Conclusion

The research preliminarily explored the critical barriers to adopting augmented reality (AR) in the Indian handloom sector. The study combines an extensive literature review, sector reports, and expert feedback to identify and analyze 11 key barriers. The ISM method and MICMAC analysis are utilized to develop a hierarchical model and evaluate the interrelationships between the factors. Based on the results, the study classifies the barriers into four clusters, in which "LIT," "LDC," "FF," and "PRD" are classified as dependent barriers and "LSW," "LCU," "LOF," and "LGP" as driving barriers. The analysis reveals that the lack of government support and policies (LGP) is the most significant barrier to the adoption of AR in the Indian handloom sector. Finally, there is a need for the company to realize the requirement of updation with the technological developments to meet the customers' needs, as the technology is changing very fast. Thus, the government must support the handloom sector by guiding AR technology adoption and making flexible policies that encourage AR implementation in the Indian handloom sector.

The findings have several implications for industry practitioners. First, it identifies eleven barriers to the adoption of augmented reality technology. Policymakers and practitioners can work on these barriers to minimize their impact on successfully implementing Augmented reality technology. Using AR technology, handloom units can achieve more sales, allowing for the digital transformation of sales. Second is the insight

this study provides for the relationships between identified barriers and clusters them based on their driving and driven power. These relationships will give policymakers and practitioners a detailed understanding of AR adoption barriers in the handloom sector. Policymakers and sector practitioners can use this ISM framework to understand the interrelationship between the barriers. The findings can guide policymakers and sector practitioners in developing effective strategies to overcome the identified barriers and accelerate the adoption of AR in the Indian handloom sector. The study also highlights that the Lack of Government Support and Policies (LGP) barrier holds the utmost importance and directly and indirectly controls every barrier. Policymakers need to design policies that can overcome the effect of the LGP barrier in adopting AR technology in the handloom sector.

The present study has identified eleven barriers that hinder the adoption of AR in the Handloom sector. However, some barriers might need further consideration, which may significantly impact the adoption of AR in different industrial contexts. The data was also exclusively collected from sector experts and academicians in the handloom sector. Therefore, examining the relationship between these barriers is essential before generalizing the results to other industries. It is worth noting that this study is based on subjective analysis, and any bias in the experts' judgments could influence the results. As such, it is recommended that future research should use structural equation modeling to validate the developed model statistically.