Building resilience for sustainability of MSMEs post COVID-19 outbreak: An Indian handicraft industry outlook

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ABSTRACT

The handicraft business constitutes concept selling rather than mere product selling, which is highly dependent on demand. Handicrafts' Micro Small and Medium Enterprises (MSMEs) have an expanding market in developed countries. The impact of the pandemic on this industry is severe due to the industry's informal nature and seasonal demand. The survival and resilience of these handicraft MSMEs face many challenges in the post-COVID-19 outbreak. The focus of the present study is to understand and analyze the key challenges for building resilience in handicraft MSMEs by scrutinizing the existing literature and interactions with stakeholders. EFA and the Grey DEMATEL approach are used to analyze the challenges for the adoption of resilience. EFA is used to categorize the challenges into various dimensions. The study has divided the challenges for the inclusion of resilience into survivable, sustainable, and viable categories using EFA to plan for short- and long-term business growth. Grey DEMATEL is being utilized for understanding these contextual relationships for each resilience dimension. Grey systems theory is a methodology that enables the incorporation of improbability and vagueness into the analysis. Findings of the study revealed the influencing challenges for each of the dimensions such as competition from machine-made products, insufficient government support and incentives for export, and inefficient managerial concern and response to internationalization as the prominent challenges. The results of this study illustrate the causal relationships amongst the identified resilience challenges to the various stakeholders. These findings offer practical insights for the government to allocate resources and impose measures to ensure resilience, as well as understanding the cause-effect relationship. Managerial implications and Policy insights for building the resilience of handicraft MSMEs are discussed in detail.

1. Introduction

The Micro Small and Medium Enterprises (MSMEs) industries are the major drivers of the Indian Economy, significantly contributing to the Gross Domestic Product (GDP) of the nation [1]. This industry has immensely aided the economy in empowering MSMEs, specifically in semi-urban and rural areas. The Government of India has expected the Indian economy to double to US$ 5 trillion in the next five years based on MSMEs' inputs [2]. To accomplish this objective, career opportunities for the younger segment of the population were needed and MSMEs have the potential to give major employment opportunities. The Indian handicraft MSMEs are highly unevenly distributed with more than seven million rural artisans and over 67,000 exporters in the

national and international markets [2].

The pandemic of COVID-19 has disproportionately affected businesses worldwide [3]. The MSMEs sector which was earlier generating 11.6% employment opportunities and contributing a 13% stake in exports is the most affected in the Indian economy. The Indian government was earlier thinking about enhancing MSME's stake in exports, but with the current pandemic, the survival of many of these MSMEs is at risk [4] Support 2018).

This lockdown process which started with the closing of non-essential economic activities has badly impacted the Indian economy [5]; the announcement of the nationwide lockdown in 2020 severely hit the MSME owners and employers. The situation was worse for the handicraft MSMEs that were undergoing several existing challenges

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such as industrial and global development. The handicraft workers were already incapable of matching the industrial units which were highly organized and able to sell their products at cheaper prices; with the current pandemic and lower disposable income in the hands of consumers, this sector is witnessing its downfall.

The second largest industry in terms of employment in the nation after agriculture, the handicraft sector, suffered tremendously during Covid 19. The artisans, who have recently suffered from demonetization and the unexpected implementation of GST, were put in difficult circumstances during the pandemic. Thus it is essential to identify and explore the strategies to develop resilience in Handicraft MSMEs. There is a dire need to explore government reforms and reliefs, digital innovation [6], bridge the existing skill gap [7], and build strategies to curb unemployment. Thus, the research focuses on identifying prominent challenges, and the cause-effect relationship and further developing strategies for building resilience.

Handicraft MSMEs can emerge as a backbone of the economy and contribute in a valuable way to GDP growth, provided the right set of strategies, assistance, and enabling framework is in place. Amongst numerous challenges impeding the growth and development of MSMEs, limited access to financial resources, lack of infrastructure support, and inadequate linkages to domestic and global markets are a few of the bottlenecks that make these enterprises vulnerable, particularly in this period of economic downturn. Handicraft clusters and independent artisans are today connected to the world and operate in the global market, and seek better support from the government. Handicraft MSMEs were already facing numerous financial and international existence challenges, and the COVID-19 pandemic has added to them. The literature, however, has not given attention to the impact of COVID-19 on handicraft MSMEs. This pandemic has disrupted the supply chains of millions of MSMEs and led to a sudden downfall in revenue, leading to increased survival difficulties for employees. Thus, in the short and long term, companies need to redesign their business models to become sustainable, viable, and resilient [8]. Resilience is the ability of a business to quickly modify its operations to the challenges caused by disruptions in the supply chain. Resilience for the handicraft MSMEs during the pandemic means preparation, quick response, and recovery from the disturbances caused by COVID-19. The resilience of the handicraft MSME's supply chain is dependent on the disruptions and frictions caused by COVID-19; these can be overcome by reshaping their operations for sustainability in the long term. There is a need to encourage our traditional craft-making prepared by hand in this technology-driven era, where more handcrafted goods are created quickly, resulting in decreasing jobs and polluting the environment. We can say that handicraft products are entirely sustainable because they are made from natural materials, which eliminate the need for fuel in their production and do not produce pollution. They also contribute to sustainable development by generating local employment, enhancing traditional values, and preserving our cultural heritage. Therefore, it is important to identify and prioritize the challenges that can help handicraft MSMEs to survive, which include sustainable practices and increasing their resilience to this pandemic. Analysis of disruption to operations due to the pandemic is missing in the literature, which has a great deal of importance for MSMEs.

Since the onset of COVID-19, the Government of India has introduced many policies for handicraft MSMEs, aimed at enhancing their overall productivity, employment generation, and decent working conditions. Policies such as the Ambedkar Hastshilp Vikas Yojana [9], Mega cluster [10], and other marketing and research & development support, are providing consistent support to the sector. However, the resilience of these handicraft MSMEs regarding the inclusion of the benefits of these policies remains a major concern for policymakers. The majority of handicraft MSMEs are facing several challenges such as an abrupt drop in demand, logistics disruptions, working capital issues, vulnerabilities of business models in certain sectors, and a significant loss of employment. Knowing the importance of handicraft MSMEs in the Indian

economy, it is the responsibility of all the stakeholders to overcome these challenges and make the sector more resilient during the COVID-19 crisis (Bai et al., 2021). More attention is required to sustain the sector and provide consistent resilience, which is the motivation behind this study. The study's originality is in its ability to clearly depict the problems facing Indian handcraft MSMEs and to further deepen our understanding of the cause-and-effect relationships between these problems. In this current research, the objective is to understand how to enhance the resilience of MSME's supply chain operations during uncertain pandemic disruptions while maintaining the viability and sustainability of operations post-COVID-19.

To achieve this objective the study aims to answer the following research questions:

● How the COVID-19 pandemic has affected the MSMEs?
● What are the critical challenges instrumental in bringing resilience to MSMEs?
● How the challenges can be categorized for the short-term, long-term, and sustained growth of the handicraft MSMEs post-COVID-19?
● What is the contextual relationship by ranking the critical challenges faced by MSMEs post-pandemic?

For building a viable and resilient business model, MSMEs should identify and examine the relationship between the various challenges to understand the relative importance of every factor in the context of each other. Exploratory factor analysis (EFA) and the Decision making trial and evaluation laboratory (DEMATEL) method is utilized to evaluate the challenges. The EFA categorizes the challenges into survivability, sustainability, and viability, which signifies the short-term planning for overcoming the disruptions from the pandemic, the long-term commitment toward societal, ecological, and economic well-being, and the potential for growth in the post-COVID-19 era respectively. It includes factors that are needed for the growth and expansion of the business. DEMATEL is a method being utilized for understanding these contextual relationships. The vagueness in business decisions increases due to inappropriate human judgments and imprecise information. Since classical or crisp DEMATEL cannot effectively overcome these limitations, the grey systems theory-based DEMATEL method appears to be an important approach. Grey systems theory is a methodology that enables the integration of uncertainty and ambiguity into the evaluation process.

The paper is divided into the following sections. Section 2 elaborates on the extant literature and analyzes the research gap. Section 3 elaborates the research methodology followed by an integrated framework for MSME's resilience in Section 4. The results and discussions are given in Section 5. Policy implications and conclusions are provided in Sections 6 and 7, respectively.

2. Literature review

The current section discusses the status of resilience in the supply chain, challenges for implementing resilience, and methods for understanding contextual relationships in the supply chain.

The study by Ref. [11] defined supply chain resilience as "the ability of the chain to return to its original or more desirable state after being disrupted"; they concluded there are various pillars for building resilience in the supply chain. Further, a paper by Ref. [12] cited resilience as the capacity of businesses to overcome disruptions through redundancy, flexibility, and the right organizational culture. The review paper by Ref. [13] concluded that the major contributor to the inclusion of resilience is top management commitment [14]. suggested that partners can enhance supply chain resilience by increasing visibility, velocity, and flexibility. A paper by Ref. [15] developed an analytical model for assessing the resilience at the individual tiers of supply chains. The study by Ref. [16] suggested evaluating the disruptions to improve resilience in supply chain networks [17]. developed an integrated model for performance assessment of the supply chain based on sustainability and

resilience. A paper by Ref. [18] analyzed the motivation factors for building resilient supply chains. They concluded that the primary step in building collaborative resilience is to build internal resilience and then focus on the channel partners' efforts. A paper by Ref. [19]; suggested the assessment of all channel partners in global operations to enhance overall resilience due to growing disruption and vulnerabilities in their operations. The increasing vulnerability of sustainable operations is motivating businesses to redesign their operations to mitigate the associated risks and be more resilient. The outbreak of the recent pandemic has forced businesses to refocus their attention on their resilience to overcome this disruption. It has also clearly demonstrated the absence of resilience in operations of global businesses with the high level of failure in their supply chains and individual echelons. This surging failure emphasizes the necessity for analyzing the existing networks and inclusion of resilient analytics, which is deficient in the existing supply chain literature [20]. The study by Ref. [8] analyzed the survivability and viability of the interconnected supply chain networks to enhance resilience at individual supply chain echelons. The literature has also shed light on resilience-building abilities such as visibility, flexibility, redundancy, collaboration, and disaster readiness. A paper by Ref. [21] emphasized the need for environmental sustainability practices in businesses to overcome COVID-19 crises. The paper focused on resilience and sustainability as two practical approaches to adjusting to the new normal scenario. The paper by Ref. [22]; focused on the need for viability to recover and rebuild the supply chains after the global COVID-19 pandemic. A later paper by Ref. [23] considered resilience as an active, inherent, and value-creating framework for day-to-day operations against disruptions. Also, a study by Ref. [24] drew attention to the importance of CSR initiatives to increase the engagement of employees and customers, positively helping businesses to build positive impact and resilience.

Further, [25]; identified localization of the supply sources and technological advancements due to Industry 4.0 technologies in building resilience, given the COVID-19 pandemic. It can be observed that the majority of the papers focus on building resilience; however, the challenges faced by businesses for the inclusion of resilience specifically in the post-COVID-19 era are not addressed in the literature, which is the inspiration for the present study. A study by Ref. [26] stated that despite measures taken by the government for handicraft MSMEs, there are numerous challenges such as poor infrastructure, lack of marketing facilities, and financial problems that persist. The study concluded that the MSME is an engine of economic growth in India and needs more developmental opportunities from the government to upgrade this sector. MSMEs need diligent governmental support to survive in the changing business scenarios, as they are prone to failure. The government should provide regular financial support to these enterprises [27]. A study by Ref. [28] highlighted that certain unwanted government policies hinder the growth of MSMEs in India. The main problem of inadequate financing for MSMEs requires urgent attention among other things, such as adequate lending to MSMEs, better risk management, and technological upgradation. A series of problems and commercial practices of international firms can be observed and adapted, ensuring the competitiveness of Indian MSMEs.

A paper by Ref. [29] concluded that more effort should be put into removing certain challenges for MSMEs that would lead to better representation of MSMEs. These challenges range from more financial investment in technological up-gradation and research development activities, digitalization of the handicraft sector, better policies for employees, to better financial assistance from the government [30]. emphasized the need for the MSME sector to not only rely on government regulations and support but should assess the existing challenges and develop suitable strategic actions. A study by Ref. [31] also verified that the major challenges affecting MSMEs are difficulty accessing financial assistance and technology up-gradation, leading to competition from machine-made products, etc. He concluded that the important challenges should be dealt with at the earliest to enable better

functioning and sustainability of MSMEs [32]. concluded that SMEs are dealing with critical challenges such as international competition, ensuring improved quality, and skill up-gradation of existing labor. The paper stresses the need for the government to promote a "Vocal for local" strategy to help local players increase their access to new markets. Lastly, a paper by Ref. [33] concluded that India is home to several handicraft enterprises but a lack of quality standards knowledge, un-availability of adequate raw materials, inadequate designing skills, and other technical aspects, add to existing challenges for MSMEs.

A paper by Ref. [34] talked about the challenges that are faced both on the production front and at the time of sales by the handicraft sector. Procurement of timely and good-quality raw materials continues to be a major problem. Further, the non-availability of financial assistance at reasonable rates is preventing this sector from expanding. He also stated that competing with mechanically made products and lack of the initiation of modern technology within this sector has drastically affected its level of sales in recent years A study by Ref. [35] concluded that problems such as lack of exposure to new technologies, low educational levels, poor institutional set-up and being an unorganized sector continue to be a few of the many reasons contributing to the decline of the handicraft MSME sector.

In addition to the above-discussed challenges, the literature also explores international challenges faced by handicraft MSMEs which halt international endeavors and discourage expansion efforts. A study by Ref. [36] emphasized the challenges concerning the international presence of MSMEs. They researched small exporters and found that foreign exchange, cumbersome market entry formalities, and trust are the most critical challenges to them. Further, a study by Ref. [37] classified the exporting barriers under four headings, namely: "knowledge", "resources", "procedure" and "exogenous". These export barriers decrease the confidence of MSMEs and might lead to a negative attitude among exporters and delayed actions of the internationalization of MSMEs [38].

A study conducted by the Organisation for Economic Co-operation and Development (OECD) in 2012 also stated the barriers to handicraft MSMEs from foreign markets. They classified entry to foreign markets as being in two broad classes: internal and external export barriers. A later study by Ref. [39] stated that challenges occur due to external influence on the businesses, and involve international competition, improper trade institutions, political instability, differing exchange rates, international agreements, etc. [37] concluded that the present COVID-19 pandemic has further added to the sustainability issues of handicraft MSMEs. It has impacted domestic survivability and hampered the ability of MSMEs to go international. The effect of this outbreak will be more lethal and disastrous for international endeavors undertaken by MSMEs. These challenges very often act as threats to the export initiatives of these enterprises; they are discussed by different researchers in their respective studies but have never been discussed together in any past research. This motivated the authors to include all domestic and international challenges, as well as hurdles caused by the present pandemic, to access the resilience of handicraft MSMEs. Therefore the research might help MSMEs to develop sustainable strategies for recent future.

The rise of the pandemic in the last two years has seen a sudden spurt in research for building resilience in supply chain operations, which has a multitude of issues and requires deep analyses. This has led to the utilization of several multi-criteria decision-making (MCDM) models to understand the contextual relationship between the factors. MCDM helps in understanding the conflicting criteria in decision making. Structuring complex problems using MCDM leads to more informed and better decisions. Two major approaches for understanding this relationship are Interpretive Structural Modeling (ISM) and DEMATEL, which explain the interrelationship between factors [40]. The benefit of using DEMATEL is that it requires less computation and the model so formed can be used for a particular organization or setting [41]. Moreover, cause and effect and the strength of the relationships are

technique helps to look at the underlying structure of relationships or correlations among a big range of variables. To explain measured data in more comprehensive sets of latent variables, factor analysis uses a matrix of covariances among measured items [54]. To express data more meaningfully, intercorrelated variables are aggregated and organized into one cluster that is interpreted.

In the first phase of research, the categorization of challenges was done using EFA. A questionnaire was designed and administered to collect responses of MSMEs in the handicraft sector operating nationally and internationally; convenience sampling was applied to collect the responses. The questionnaire was distributed to 300 respondents for data collection; 150 completed responses were received out of which 125 were useable and considered for further analysis. The factor analysis helped us to derive three constructs and categorize the items.

In the second phase of this study, a Grey DEMATEL approach has been used to evaluate the challenges of inclusion of the resilience strategies in handicraft MSMEs. The selection of a particular multi-criteria decision approach is influenced by the problem definition and outcome. The present research utilizes the Grey DEMATEL technique for understanding the most influencing challenges in each category of resilience building – survivability, sustainability, and viability. Secondly, Grey DEMATEL is used to assess the strength of influence among these challenges. The output of the research will be a diagraph depicting the cause and effect relationships among the challenges. As compared to other multi-criteria approaches such as BWM, AHP, TOPSIS, etc., the particular method used here is to understand the interrelationships, which is the goal of the study. Linguistic experts are used to finding the dominant challenge that is influencing all the other challenges, thereby providing a roadmap to include resilience. The utilization of grey theory with DEMATEL methodology reduces both ambiguity and bias. A flow chart showing the methodology is provided in Fig. 1.

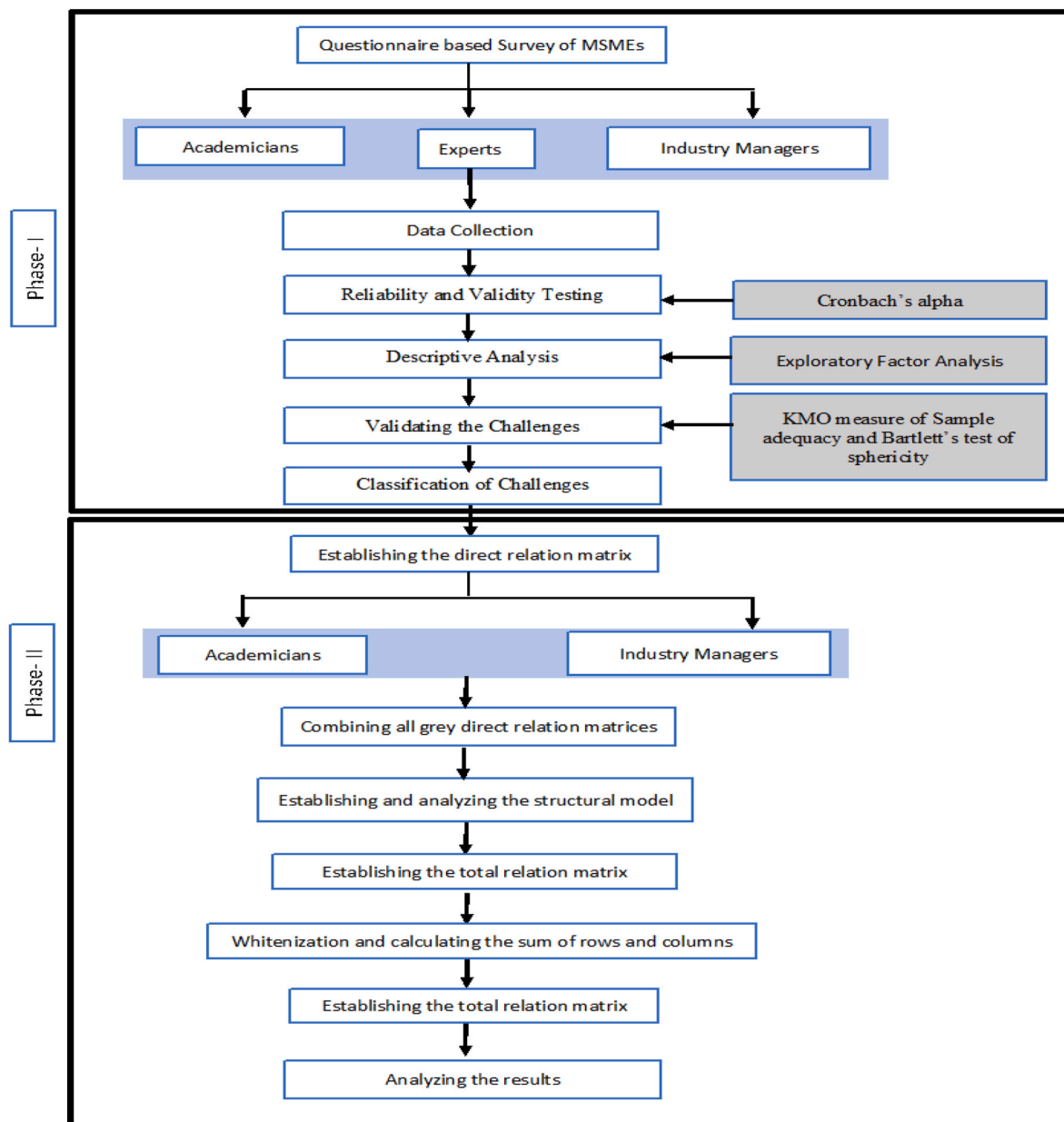The elaborated steps for performing the above-mentioned methodology are explained below:

Fig. 1. Flow chart of the research methodology.

3.1. Exploratory factor analysis

The objective of the EFA method is to understand the influence of constructs on the variables as EFA helps to understand the influence of the responses on the nature of the constructs. The potency of the link between the factors varies. According to Ref. [55]; "Explanatory factor analysis is used for data reduction and analysis".

3.1.1. Stage 1: item generation

The existing literature and industry experts helped us to generate items for the survey. An extensive literature review of past research focusing on the challenges faced by Indian Handicraft Manufacturers was conducted. The government reports and initiatives helped us to gauge the ongoing challenges but COVID-19 has increased the extent of some of the barriers. We conducted interviews with industry experts and academicians to obtain background on the real-time situation. The review of the previous literature and scales surrounding manufacturing, handicrafts, and COVID-19 contributed to the potential pool of scale items.

The literature review and interaction with industry experts helped in confirming the relevance of the research by ensuring we understood the real challenges faced by manufacturers. In addition to the literature, a search was conducted to identify transparency, visibility, and traceability literature where scales have been developed that explore the concept in other domains. After reviewing the extant literature, an initial pool of 25 items was generated to capture the challenges faced by handicraft manufacturers. Following item generation, five academics from leading universities evaluated the face validity of the 24 items. Based on feedback from these experts, a few items were deleted and 24 were adapted to bolster their face validity, eliminate ambiguity, and establish consistency across items. Table 2 presents the 24 final items identified for further analysis in Stage 2 of the scale development process.

3.1.2. Stage 2: scale development and validation process

The study started with the generation of items. The questionnaire was sent out and reviewed by ten Decision Makers (DMs) (industry experts from both academia and industry). The DMs helped us with the content validity and their feedback also helped us to improve our questionnaire. The survey instrument for this study used a five-point Likert scale, representing a range of opinions from very low (strongly disagree – 1) to very high (strongly agree – 5).

Companies involved in handicraft manufacturing were approached for the survey. The people involved in middle and top-level management were those approached as they understood the objectivity of the study and helped us with insights into the real-time challenges they faced. Respondents' titles were not considered, instead, the nature of their work was kept in mind when sending out the questionnaire, which was finally distributed to 300 respondents for data collection. 150 completed responses were received out of which 125 were useable and considered for further analysis. Of the 125 individuals who completed the survey, some were excluded from the final sample due to additional steps taken to ensure that participants were qualified and had carefully participated in the survey. An attention filter question was included which asked respondents "To verify your spot in the survey, please mark 'strongly disagree' for this question." An attention measure assists with eliminating respondents that are not conscientiously taking the survey and therefore could bias the results [67]. Incorrectly answering this question meant elimination from the sample, which resulted in the removal of 25 of the initial 150 responses. The items in the questionnaire are provided in the Appendix to this paper and the responders' practical experience in the actual industrial environment.

3.1.3. Stage 3: scale purification

A survey instrument was developed to enable the researchers to evaluate the dimensionality of the 24 items identified in Stage 1 of the

Table 2
Challenges in the Handicrafts sector.

S. no.	Challenge	Description	Reference
1	The high state of delusion	The handicraft sector is still organized. The government is putting consistent efforts to curb these challenges, yet decentralization remains a great challenge to expansion.	[56]
2	Lack of access to credit/Lack of finance	Lack of knowledge and limited funding support from the government leads to a lack of credit for this sector. Studies reveal that 40% of the credit is from informal channels which have twice the interest rate of the formal channels.	[57,58]
3	Lack of empowerment	Basic challenges limit the growth and empowerment opportunities for the sector.	[59]
4	Inadequate raw material input	Due to financial limitations procurement of raw materials becomes difficult. The only local territory is accessible for raw materials.	[59]
5	Inadequate Infrastructure and Technology/Outdated techniques for manufacturing	Lack of infrastructure facilities such as electricity negatively affects the productivity and profitability of MSMEs.	[60,61]
6	Limited access to markets	Decentralization, inadequate capital, inadequate use of marketing tools, etc. increase the struggles of MSMEs and limit their reach to access markets.	[57]
7	Competition from machine-made products	Machine-made products have drastically reduced the demand for handicraft products. Better finishing and less time taken by machine-made products have increased competitiveness.	[56]
8	Defective Marketing	Since the sector is unorganized, it faces inadequate use of marketing tools and outdated marketing strategies as important hurdles to reaching more markets.	[58]
9	Non-Availability of Raw Materials	Less credit and less likely financial assistance lead to difficulties in procurement of raw materials at times leading to non-availability of Raw Materials.	[62]
10	Complex Trade procedures	Cumbersome documentation processes and less assistance to MSMEs are demotivators of moving to international markets.	[63]
11	Shortage of skilled labor	The industry still faces a deficit in manpower that has the skill set required.	[59]
12	Lack of employee well-being and health & safety practice	Labor still works in stressful working conditions leading to bad health and reduced productivity. There is a need for well-being and safety measures.	[59]
13	Fewer opportunities for collaboration with channel partners	Preference for machine-made products has made collaboration with channel partners very difficult.	[63]

(continued on next page)

Table 2 (*continued*)

S. no.	Challenge	Description	Reference
14	Lack of Resource Conservation	Since the sector is focusing on sustaining domestic and international markets, resource conversation is less available. Government measures will help provide uniform laws for resource conversation.	[64]
15	Difficulty in implementing Waste Reduction	Waste reduction measures are adopted by a few companies. Proper promotion and adoption by the entire sector will lead to sustainability.	[40]
16	Shortage of funds (the working capital to finance the export activity)	Domestic sustainability is difficult for small ventures due to limited credit. More financial assistance is required for international operations.	[65]
17	Non-pre-emptive (not able to identify international business opportunities)	More government support and schemes for identifying international business opportunities would be motivating for MSMEs.	[66]
18	Lack of information to uncover foreign markets	The government needs to provide central database management and 24/7 assistance for increased export of Indian handicrafts.	[36,66]
19	Ineffective representation in foreign markets	Lack of assistance and government support leads to the ineffective representation of Indian handicrafts in foreign markets.	[37]
20	Inefficient managerial concern and response to internationalization	The government has introduced numerous policies and financial support to increase managerial response and management for foreign market penetration.	[36]
21	Shortage of skilled professionals for export operations	The entrepreneurs lack documentation and expansion knowledge, and lack of assistance decreases their confidence.	[66]
22	Inability to match competitors' pricing	Machine-made products reduce labor costs, giving an edge to competitors to sell the same product at a lower cost.	[36]
23	Insufficient government support and incentives for export	The government is increasing support and enabling schemes to support the handicraft sector to expand its international presence.	[36]; [66]
24	High transportation costs	Handicraft MSMEs are located in areas according to the availability of skilled and cheap labor. Increased fuel prices limit the transportation of products at nominal rates.	[63]

scale development. All items are evaluated on a five-point Likert scale and participants were asked to respond to the statements to indicate their level of agreement (or disagreement). The measurement instrument was hosted online and participants were recruited using a survey research firm. Recommendations from Ref. [68] were utilized in the survey administration.

EFA and reliability tests are used to validate the challenges in SPSS software Version 21.0. This study used the Kaiser-Meyer-Olkin (KMO) value, Bartlett's Test of Sphericity, factor loadings, and eigenvalue for analysis. According to Ref. [69]; "KMO index lies between 0 and 1, with

values greater than 0.50 considered appropriate for factor analysis, whereas scores over 0.80 were considered highly satisfactory". Bartlett's Test of Sphericity was significant for p < 0.05. The study by Ref. [55]; states that the factor loading for each challenge over 0.50 is needed to check the validity of the questionnaire. The challenges having an eigenvalue lower than 1.0 were removed from the factor list.

EFA helped us to classify the challenges into dimensions for an exhaustive understanding of the challenges faced by handicraft MSMEs and further helped in providing a resilience pathway in the post-COVID-19 era. MSMEs are facing several varied challenges, which makes their survivability complex. COVID has acted as a catalyst for the tough situations these firms were already facing.

3.2. Decision-making trial and evaluation laboratory

DEMATEL methodology is being extensively used in many business applications [70]. DEMATEL is founded on graph theory and is very effective to evaluate and formulate all intertwined cause and effect relationships in any structured model. Most of the other MCDM techniques such as Interpretive structural modeling (ISM) or analytical hierarchy process (AHP) focus on linear relationships, the non-linear aspect of the relationship is not captured by these techniques. DEMATEL helps understand the inter-relationships between the cause and effect factors, which makes it apt for the current study [71,72]; however, it is unable to incorporate uncertainty. To overcome this, the extensions of the DEMATEL method include but are not limited to fuzzy, Grey DEMATEL. The use of DEMATEL in supply chain applications can be seen worldwide. The ambiguity increases as human judgments are imprecise. Grey systems theory is an approach to integrating imprecision and uncertainty into the decision-making process. Computational steps of the grey-based DEMATEL are given below:

Step 1: The challenges for evaluation are defined and a grey linguistic scale is determined. The linguistic scale given as "No Influence (NI)" is represented as [0,0], "Very Low Influence (VL)" as [0,0.25], "Low Influence (L)" as [0.25,0.5], "High Influence (H)" as [0.5,0.75] and "Very High Influence (VH)" as [0.75,1].

Step 2: To measure the strength of relationships between challenges of resilience $C=\{C_i|i=1,2,\ldots,n\}$, the "k" decision makers are asked to construct initial direct relation (DR) grey matrix A as:

$$A^k = \begin{array}{c} C_1 \\ C_2 \\ \vdots \\ C_n \end{array} \begin{bmatrix} 0 & \otimes a_{12}^k & \cdots & \otimes a_{1n}^k \\ \otimes a_{21}^k & 0 & \cdots & \otimes a_{2n}^k \\ \vdots & \vdots & \cdots & \vdots \\ \otimes a_{n1}^k & \otimes a_{n2}^k & \cdots & 0 \end{bmatrix} \quad (1)$$

$\otimes a_{ij}^k = [\underline{a}_{ij}, \overline{a}_{ij}]$ are grey numbers and for $\otimes a_{ii}^k = [0,0]$ for $i=1,2,\ldots,n$.

Step 3: All the grey DR matrices are averaged by using Eq (2) to form the aggregate matrix Z.

$$Z = \left(\sum_{i=1}^{k} A^k \right) \Big/ k \quad (2)$$

The various matrices obtained from all the stakeholders are averaged using the above equation so that an aggregated matrix is formed which will be used in further calculations.

Step 4: The linear scale transformation is changed to a normalization formula. Let

$$\sum_{j=1}^{n} \otimes z_{ij} = \left[\sum_{j=1}^{n} \underline{z}_{ij}, \sum_{j=1}^{n} \overline{z_{ij}} \right] \quad (3)$$

The maximum value of the upper limit as given below is used to normalize the aggregated matrix.

$$r = \max_{1 < i < n} \left(\sum_{j=1}^{n} \overline{z_{ij}} \right)$$

The normalized DR grey matrix, G, is calculated by dividing the aggregated matrix Z by the maximum upper limit value given as $G = r^{-1} \times Z$

And

$$G = \begin{bmatrix} 0 & \otimes g_{12} & \cdots & \otimes g_{1n} \\ \otimes g_{21} & 0 & \cdots & \otimes g_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ \otimes g_{n1} & \otimes g_{n2} & \cdots & 0 \end{bmatrix}$$

Where

Step 5: The grey normalized DR matrix G is then transformed into the grey total relation matrix T:

$$g_{ij} = \frac{\otimes z_{ij}}{r} = \left[\frac{\underline{z_{ij}}}{r}, \frac{\overline{z_{ij}}}{r} \right] \tag{4}$$

Step 5: The grey normalized DR matrix G is then transformed into the grey total relation matrix T:

$$T = G + G^2 + \ldots + G^k$$
$$T = G(I - G)^{-1}, when \lim_{k \to \infty} G^k = [0]_{n \times n} \tag{5}$$

The total relation matrix is obtained by limiting the individual normalized matrices using equation (5).

$$T = \begin{bmatrix} \otimes t_{11} & \otimes t_{12} & \cdots & \otimes t_{1n} \\ \otimes t_{21} & \otimes t_{21} & \cdots & \otimes t_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ \otimes t_{m1} & \otimes t_{m2} & \cdots & \otimes t_{mn} \end{bmatrix}$$

And

$$\otimes t_{ij} = \left[\underline{t_{ij}}, \overline{t_{ij}} \right] \tag{6}$$

and

$$Matrix \left[\otimes t_{ij} \right] = \underline{G} \times \left(I - \underline{G} \right)^{-1}$$

The lower values of the matrices are obtained by multiplying the lower values of the G matrix with the inverse of the identity matrix minus the lower values G matrix.

$$Matrix \left[\otimes \overline{t_{ij}} \right] = \overline{G} \times (I - \overline{G})^{-1}$$

The upper values of the matrices are obtained by multiplying the upper values of the G matrix with the inverse of the identity matrix minus the upper values G matrix.

Step 6: Before calculating the sum of rows and columns, the grey total relation matrix T is whitened. The grey numbers are converted into crisp values by modifying Converting Fuzzy data into a Crisp Scores approach as given below.

$$\otimes \underline{t_{ij}} = \left(\otimes t_{ij} - \min \otimes \underline{t_{ij}} \right) \Big/ \Delta_{min}^{max} \tag{7}$$

$$\otimes \overline{t_{ij}} = \left(\otimes \overline{t_{ij}} - \min \otimes \overline{t_{ij}} \right) \Big/ \Delta_{min}^{max} \tag{8}$$

Where $\Delta_{min}^{max} = \max \otimes \overline{t_{ij}} - \min \otimes \underline{t_{ij}}$

$$Y_{ij} = \frac{\otimes \underline{t_{ij}} \left(1 - \otimes \underline{t_{ij}} \right) + \otimes \overline{t_{ij}} \times \otimes \overline{t_{ij}}}{1 - \otimes \underline{t_{ij}} + \otimes \overline{t_{ij}}} \tag{9}$$

$$z_{ij} = \min \otimes \underline{t_{ij}} + Y_{ij} \Delta_{min}^{max} \tag{10}$$

where z_{ij} are the crisp values. Then the sum of rows and columns are

separately denoted as d and r within the total relation matrix T as in Eq. (15).

$$T = \left[t_{ij} \right], i, j \in \{1, 2, \ldots, n\}$$

$$d = (d_i)_{n \times 1} = \left[\sum_{j=1}^{n} t_{ij} \right]_{n \times 1}$$

where d signifies the sum of row values of the total relation matrix.
and

$$r = (r_j)_{1 \times n} = \left[\sum_{j=1}^{n} t_{ij} \right]_{1 \times n} \tag{11}$$

where r signifies the sum of column values of the total relation matrix.

Step 6: (D + R*)* shows the effects among challenges and (D-R) shows the causal relations among challenges. If (D + R) is in the first quadrant of the diagraph, it means that the challenge has a cause and effect on others, and if (D-R) is in the fourth quadrant of the diagraph then the challenge is affected by the others.

4. Data analysis

The extensive literature review and experts' views helped us to decide on the 24 challenges considered in the paper. After a detailed review of the literature, a list of key challenges was extracted for the current study; the experts were approached to verify that list of their experience in the handicraft sector. MSMEs operating internationally helped us verify challenges for the presence of handicrafts in international markets, government regulations, trade policies, etc.

A self-administered questionnaire was used to survey the EFA; a copy of the questionnaire is provided in the Appendix. Various qualitative and quantitative tools such as Expert views, Instrument development, data collection, EFA, and DEMATEL were employed in the present study.

Response collection from the questionnaire was done by using the Convenience Sampling technique. Several MSMEs in the handicraft sector were approached. Personal contacts and information from the Internet helped us to reach the respondents. Several employees of MSMEs were also contacted individually. Questionnaires were shared via email and WhatsApp with the potential respondents. Reminder emails and messages helped us to gather 150 responses, out of which 125 responses were reliable and used for analysis.

After a review of the extant literature, 24 challenges were extracted for the current study. EFA with varimax rotation was performed on the constructs. The KMO measure determines that the sampling adequacy is 0.758, which is more than the 0.7 threshold limit. Similarly, Bartlett's Test of Sphericity is significant (p = 0.001), indicating sufficient correlation between the items to proceed with the analysis. At a minimum, a 0.4 loading of each item on its respective factor is considered adequate for that factor [73]. The EFA of 24 items has yielded three factors explaining 58.933% of the total variance.

Cronbach's measure of the reliability of construct is 0.962 [74]. allowed a slightly lower minimum limit, such as 0.6 for exploratory work involving the use of newly developed scales. Since Cronbach's is a value for each factor above 0.70, all factors are accepted as being reliable for the research. Table 3 shows the results of the EFA and reliability analysis. The first factor provided an eigenvalue of 24.561 with 45.2% of the variance. A second factor also appeared with an eigenvalue of 44.561.

In the current study, the challenges of having eigenvalues of discontinuity of more than 1.0 and factor loadings of more than 0.5, and Cronbach's alpha value above 0.7 were considered. Table 3 provides the results of EFA. Three dimensions of challenges Survivability (SU), Sustainability (SS), and Viability (V) were extracted; these dimensions cover 74.379% of the total variance.

Survivability (SU): This construct incorporates six challenges that

Table 3
Factor loading for challenges.

Constructs	Items	Item Loadings	Eigen-values	Cumulative Percentage
Survivability (SU)	Lack of information to uncover foreign markets (SU1)	0.954	4.243	25.461
	Ineffective representation in foreign markets (SU2)	0.938		
	Non-pre-emptive (not able to identify international business opportunities) (SU3)	0.927		
	Inadequate Infrastructure and Technology (SU4)	0.902		
	Competition from machine-made products (SU5)	0.835		
	The high state of devolution (SU6)	0.817		
Sustainability (SS)	Fewer opportunities for collaboration with Channel Partners (SS1)	0.844	3.528	44.561
	Shortage of working capital to finance the export activity (SS2)	0.777		
	Insufficient government support and incentives for export (SS3)	0.761		
	Limited access to markets (SS4)	0.752		
	Difficulty in implementing Waste Reduction (SS5)	0.752		
	Lack of Resource Conservation (SS6)	0.718		
	High transportation costs (SS7)	0.675		
	Inability to match competitors' pricing (SS8)	0.59		
	Inadequate raw material input (SS9)	0.556		
Viability (VA)	Lack of employee well-being and health & safety practice (VA1)	0.913	2.673	58.933
	Defective Marketing (VA2)	0.865		
	Complex Trade procedures (VA3)	0.781		
	Lack of empowerment (VA4)	0.75		
	Non-Availability of Raw Materials (VA5)	0.676		
	Inefficient managerial concern & response to internationalization (VA6)	0.612		
	Shortage of skilled labor (VA7)	0.517		

explained 25.461% of the variance. The items in this dimension represent the challenges contributing to operating difficulties for MSMEs in both national and international markets.

Sustainability (SS): This construct includes nine items and accounts for 44.561% of the variance. These items represent challenges in the day-to-day activities of the business, such as ethical and financial issues that lead to difficulties in businesses being sustainable in changing scenarios.

Viability (V): This construct includes seven items that accounted for 58.933% variance. These items represent challenges necessary for the long-term presence of firms in national and international business environments. These challenges lead to an understanding of the long-term

sustainability of businesses.

The KMO value is 0.758 which lies between 0 and 1; values greater than 0.50 are considered appropriate for factor analys. The Bartlett's Test of Sphericity was significant in this study ($p < 0.05$). The overall value of factor loading for each item is above 0.50 which confirms the meaningfulness of the questionnaire. The factors with an eigenvalue lower than 1.0 were not considered. Cronbach's alpha assesses the reliability, or internal consistency, of test items. As stated in Table 4 Cronbach's alpha for the study is 0.962 representing the ability and validity.

The framework discussed above is applied to identify the challenges for handicraft MSMEs to be more resilient in the post-COVID-19iod. The EFA has categorized the factors into survivable, sustainable, and viable. Survival mode is the short-term planning for overcoming the disruptions by the pandemic; it includes strategies for re-establishing the links with foreign markets and overcoming domestic competition. Sustainability, on the other hand, is the long-term commitment towards societal, ecological and economic well-being. The viability of the business is the potential for growth in the post pandemic era. It includes factors that are needed for growth and expansion of the business. The Grey DEMATEL framework provided in the research methodology section is used to define the contextual relationships between the resilience challenge categories: survivability, sustainability and viability.

Step 1 The set of decision makers comprising six domain specialists and four academicians are contacted through virtual platforms of MS-Teams and Zoom to assess the three resilience challenge categories. These selected experts have more than 12 years of working experience. The linguistic scale is to analyze the effect of each challenge over the other. This step is repeated for all three categories.

Step 2 To begin with 30 specific grey relationship matrices are constructed based on the inputs of the experts (ten each for every category).

Step 3 Equal weightage is given to the opinion of all experts to bring consistency in the decision making. The average grey matrix calculated using equation (2) for survivability challenges is given in Table 5.

Step 4 The structural model is analyzed using Eqs. 3-4 to develop the DR grey matrix, G as highlighted in Table 6 for survivability challenges.

Step 5 Obtain the total relation matrix T by using Eqs. (5) and (6), as highlighted and Whitenization of the grey values is carried out using Eqs. (7)–(10) highlighted in Table 7 for survivability challenges. The values which are more than the threshold average are highlighted in yellow; this shows the influence of these challenges.

Step 6 The R and D given by equation (11), denoting the aggregation of rows and columns for T respectively, (R + D) and (R-D) are determined as shown in Table 8 for survivability challenges. From the net impact and relationship among all the challenges in the sets, a diagram is constructed (refer to Figs. 2–4); all the connections meeting or surpassing the threshold value are featured in these figures.

Similarly the process is repeated for sustainability and viability challenges as given in Tables 9 and 10 respectively.

This causal diagram is highlighted in Figs. 2–4.

5. Discussion

Despite the efforts of the Government of India to promote the handicrafts sectors, since the onset of the pandemic the long-term sustaining of the handicraft MSMEs is a challenging task [75]. The absence of resilience in these firms is a major contributor to their decline.

Table 4
Cronbach's alpha.

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.962	.962	24

Table 5

Consolidated matrix of average of upper limit and lower limit for survivability challenges.

	SU1	SU2	SU3	SU4	SU5	SU6
SU1	[0,0]	[0.5,0.75]	[0.75,1]	[0.12,0.38]	[0.5,0.75]	[0.25,0.50]
SU2	[0.75,1]	[0,0]	[0.5,0.75]	[0,0.25]	[0.625,0.88]	[0.37,0.63]
SU3	[0.5,0.75]	[0.5,0.75]	[0,0]	[0.5,0.75]	[0.5,0.75]	[0.12,0.38]
SU4	[0.75,1]	[0.25,0.50]	[0.25,0.50]	[0,0]	[0.5,0.75]	[0.75,1]
SU5	[0.75,1]	[0.5,0.75]	[0.5,0.75]	[0.75,1]	[0,0]	[0.5,0.75]
SU6	[0,0.13]	[0,0]	[0.37,0.63]	[0.75,1]	[0.5,0.75]	[0,0]

Table 6

Consolidated direct-relation grey matrix for survivability challenges.

	SU1	SU2	SU3	SU4	SU5	SU6
SU1	[0,0]	[0.12,0.18]	[0.18,0.24]	[0.03,0.09]	[0.12,0.18]	[0.06,0.12]
SU2	[0.18,0.24]	[0,0]	[0.12,0.18]	[0,0.06]	[0.15,0.21]	[0.09,0.15]
SU3	[0.12,0.18]	[0.12,0.18]	[0,0]	[0.12,0.18]	[0.12,0.18]	[0.03,0.06]
SU4	[0.18,0.24]	[0.06,0.12]	[0.06,0.12]	[0,0]	[0.12,0.18]	[0.18,0.24]
SU5	[0.18,0.24]	[0.12,0.18]	[0.12,0.18]	[0.18,0.24]	[0,0]	[0.12,0.18]
SU6	[0,0.03]	[0,0]	[0.09,0.15]	[0.18,0.24]	[0.12,0.18]	[0,0]

Table 7

Total relation matrix for survivability challenges.

	SU1	SU2	SU3	SU4	SU5	SU6
SU1	9.40	6.65	9.37	8.76	10.29	7.57
SU2	10.94	6.47	10.07	9.37	10.92	7.99
SU3	10.12	6.57	8.42	8.37	9.98	7.14
SU4	12.06	7.65	11.26	9.11	12.15	8.56
SU5	16.56	9.70	15.05	13.18	14.69	11.22
SU6	6.16	4.23	5.92	5.45	6.26	4.57

Table 8

Cause and Effect relationship in survivability challenges.

	D	R	D + R	D-R	Cause/Effect
SU1	52.04	65.25	117.29	−13.21	Effect
SU2	55.76	41.27	97.03	14.48	Cause
SU3	50.61	60.09	110.70	−9.49	Effect
SU4	60.80	54.24	115.03	6.56	Cause
SU5	80.40	64.28	144.68	16.12	Cause
SU6	32.58	47.05	79.62	−14.47	Effect

Government policies such as the Ambedkar Hastshilp Vikas Yojana, Mega cluster and other marketing and R&D support are composite in nature providing consistent support to the sector; however, the resilience of these handicraft MSMEs towards the inclusion of benefits of these policies and sustenance in these sectors remains a major concern for stakeholders [76]. There are clearly many challenges for the adoption of resilience in this sector [77]. This study recognizes various challenges from both the existing research and discussions with stakeholders; these shortlisted resilience challenges are evaluated for cause and effect relationships in handicraft MSMEs.

The present paper shortlists 22 challenges which are hindering the inclusion of resilience in Indian handicraft MSMEs. These identified challenges are divided into survivability, sustainability and viability by using EFA. Each category is mapped to understand the cause and effect relationships among the challenges. This diagraph focuses on the causal set to extract the potential causes that are providing the highest and showing the maximum association and impact on the other challenges to the stakeholders. The challenges identified as the cause/causal set are crucial in building the resilience of handicraft MSMEs. From the analysis the challenges are ranked for each category as per (R-D) data values to understand the influence on other challenges.

The crucial causal set for the survivability SU5 (Competition from machine-made products) >SU2 (Ineffective representation in foreign markets) and >SU4 (Inadequate Infrastructure and Technology) for survivability, SS3 (Insufficient government support and incentives for export) >SS8 (Inability to match competitors' pricing) and >SS4 (Limited access to markets) for sustainability, and VA6 (Inefficient managerial concern & response to internationalization) >VA7 (Shortage of skilled labour) and >VA5 (Non-Availability of Raw Materials) for viability.

For the survivability challenges SU5 is the key driving challenge, with the maximum (R-D) value i.e. 16.12, as it affects many other challenges for survivability of the handicraft MSMEs in the post COVID-19 era, followed by the other challenges. As SU5, Competition from machine-made products, is the primary challenge in Indian handicraft MSME, it can observed that the price difference between man-made and machine-made products is huge. The beauty of the Indian handicrafts is more than their aesthetics; they also show the connection to the local cultures and help in sustaining the traditions of these communities. Hence, the stakeholders must promote the sector as one kind of product made by artisans, the "Make in India" initiative can significantly aid in this direction. This strategy has been supported by various researchers [78] and also endorsed by the Government of India. India has been known for its huge variety of craft-forms and astonishing artisanal skills globally. The prominence of this challenge was also revealed by one of the professionals of the expert panel, who said "One wonders, therefore, if enough is being done to maximise the potential of Indian handicrafts which contribute to improve the livelihoods of artisans at local community levels."

The sustainability category emphasizes the challenges that are hindering the long-term commitment towards societal, ecological and economic well-being. The maximum (R-D) value, i.e. 28.09, is SS3 which is "Insufficient government support and incentives for export". This challenge also has the highest capacity to impact the other challenges as found by the value of power impact index (R) which is 55.40. For the successful implementation of any scheme it is necessary to have the support of the government. Handicraft MSME exporters are facing huge shortages of skilled manpower and upgraded machinery. As the COVID-19 pandemic and the global lockdowns have significantly impacted livelihoods of artisans in India, the government should also place emphasis on the B2B buyers and brands, by enquiring from their vendors whether they are sourcing their products locally from small handicraft businesses, thereby promoting the "Vocal for Local".

The viability category focuses on VA6 which is "Inefficient managerial concern & response to internationalization" as the prominent challenge with a maximum (R-D) value of 104.96. With very few exhibitions, customers are shifting towards online platforms. This gives an opening for the producers — rural MSMEs, the artisans, the weavers —
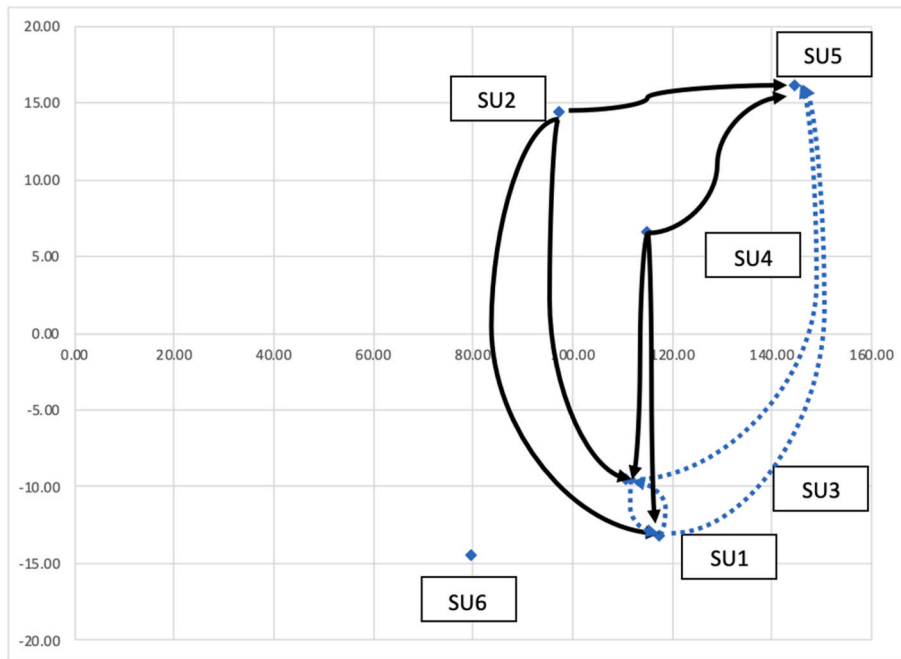
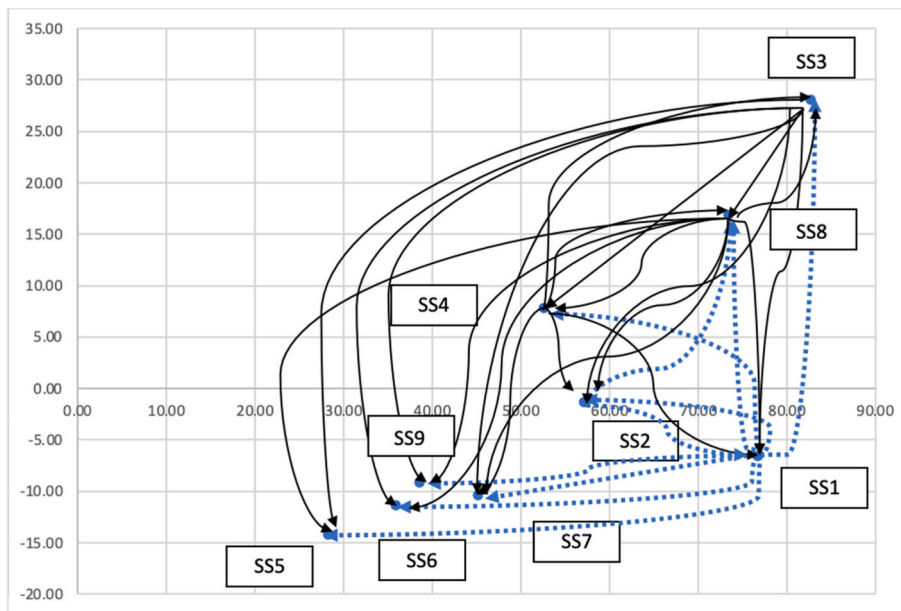**Fig. 2.** Diagraph for survivability challenges.

Fig. 3. Diagraph for sustainability challenges.

to sell their products and inventories online, not just for domestic customers but globally as well. More artisans, weavers, and clusters will be incentivised to begin listing their products on online marketplaces, start their own sales channels directly and become entrepreneurs. There is a need to amalgamate the entrepreneurs with these handicraft MSMEs to have more global exposure.

The effect set shows the challenges that have highly important but few associations; in fact, they are influenced by other challenges. In this group there are challenges based on (R-D) values namely, SU1 (Lack of information to uncover foreign markets), SU3 (Non-pre-emptive (not able to identify international business opportunities)), and SU6 (High state of devolution) for survivability challenges. The effect challenges for sustainability are SS1 (Fewer opportunities for collaboration with

Channel Partners), SS2 (Shortage of working capital to finance the export activity), SS5 (Difficulty in implementing Waste Reduction), SS6 (Lack of Resource Conservation), SS7 (High transportation costs) and SS9 (Inadequate raw material input). In the viability category they are VA1 (Lack of employee well-being and health & safety practice), VA2 (Defective Marketing), VA3 (Complex Trade procedures) and VA4 (Lack of empowerment).

Among those for survivability, SU6 which is "High state of devolution" received the highest (R-D) score of −14.47 which shows that this challenge has least influence. The high state of devolution among the handicraft MSME is because most of the artisans prefer to work alone. The highest (R-D) score for sustainability is for SS6 which is Lack of Resource Conservation the value is −11.38. It shows that this challenge
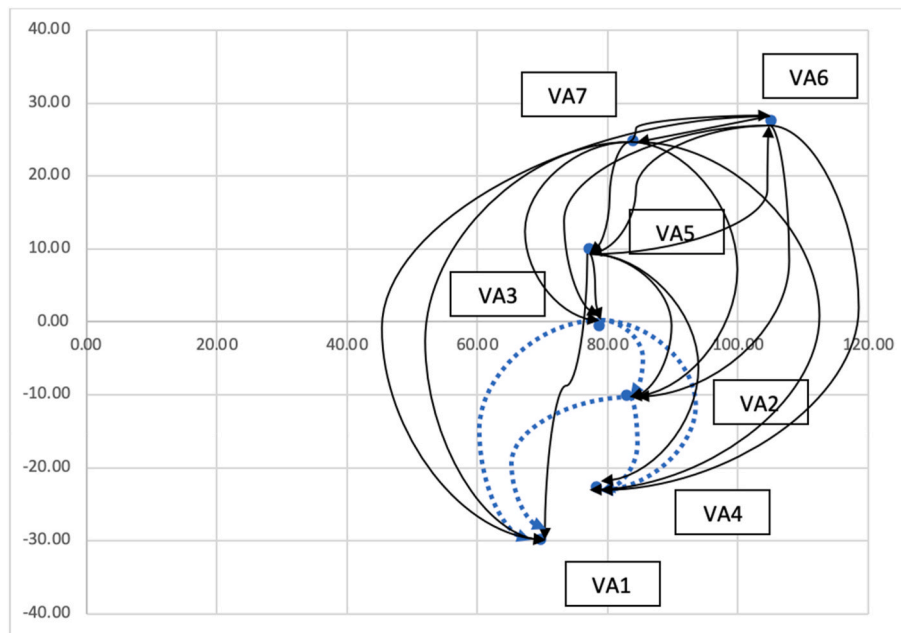
Fig. 4. Diagraph for viability challenges.

Table 9
Cause and Effect relationship in sustainability challenges.

	d	r	d + r	d-r	Cause/Effect
SS1	35.09	41.62	76.71	−6.53	Effect
SS2	27.92	29.20	57.11	−1.28	Effect
SS3	55.40	27.31	82.71	28.09	Cause
SS4	30.19	22.35	52.54	7.85	Cause
SS5	7.04	21.21	28.25	−14.17	Effect
SS6	12.22	23.61	35.83	−11.38	Effect
SS7	17.43	27.76	45.19	−10.33	Effect
SS8	45.13	28.23	73.36	16.90	Cause
SS9	14.73	23.86	38.59	−9.13	Effect

Table 10
Cause and Effect relationship in viability challenges.

	d	r	d + r	d-r	Cause/Effect
VA1	19.93	49.67	69.60	−29.74	Effect
VA2	36.38	46.44	82.81	−10.06	Effect
VA3	39.11	39.50	78.61	−0.39	Effect
VA4	27.81	50.42	78.23	−22.62	Effect
VA5	43.56	33.48	77.05	10.08	Cause
VA6	66.36	38.60	104.96	27.76	Cause
VA7	54.43	29.46	83.90	24.97	Cause

challenges can be interpreted, based on (R + D) values, as SS3 (82.71) as the highest value and SS5 (28.25) as the lowest value. For the viability challenge the most correlated factor is VA6 (104.96) and least correlated factor is VA1 (69.60). The evaluation and analysis of the challenges for resilience implementation in Indian handicraft MSMEs provide a framework, in terms of the cause/effect set, of meaningful guidelines for the Indian Export Council, Indian MSME stakeholders and other allied bodies to manage the recovery of the handicraft sector in the post COVID-19 era both efficiently and effectively. The implications of the study would guide the MSMEs to build resilience towards international competition, competition in local market, technological enhancement and skill development in the sector to attract more business.

6. Managerial implications

This section suggests policy recommendations for understanding the challenges faced by Indian handicraft MSMEs. The understanding of these challenges should lead to strategy development for resilience in changing market scenarios. The knowledge obtained from interaction with the decision makers and respondents is utilized to emphasise the need for policy redesign in order to develop resilience for current organizations. The government has framed certain schemes and policies for better representation of Indian handicrafts, yet the existing players feel that there are numerous hurdles which prevent them from being sustained for a long run in the market. The industry is not ready to face any external environment change, which makes the survivability of these firms very difficult. COVID-19 has led them to face severe complexities and survivability problems. For example, 70% of handicraft MSMEs were not able to pay salaries to their employees. This pandemic has led to an urgent need for resilience in the handicraft sector. Also, the available literature and roadmap of Sustainable Development Goals suggest agility and resilience for handicraft MSMEs for them to be able to continuously generate employment and improve their representation in international markets.

To function effectively in this rapidly changing business environment, the existing situation of organizations is lacking in terms of financial assistance and availability of skilled labor. The cause and effect analysis states that competition from man-made products, insufficient representation in foreign markets, and competitors' prices are a few of the major causes. The challenges identified as the cause/causal set are

is the least influential as most of these MSMEs work in poor conditions and with limited resources, therefore not thinking about resource conservation. The least influencing challenge for viability is VA1 which is Lack of employee well-being and health & safety practice, having (R-D) value of −29.74.

Correlation between the challenges shows the importance of highly associated challenges with others and is calculated by the (R + D) score of the challenges. The measure of significance of survivability challenges can be arranged in increasing order of (R + D) as: SU6 (79.62) <SU2 (97.03) <SU3 (110.7) <SU4 (115.03) < SU1 (117.29) <SU5 (144.68). Thus, SU5 challenge has the highest correlation with other challenges as competition from machine-made products is of utmost importance for the survivability of handicraft MSMEs. On the other hand, SU6 which is "High state of devolution" received the least correlation among the survivability challenges. Similarly relationships among sustainability

crucial in building the resilience of handicraft MSMEs. The fact is that MSMEs are currently struggling with the existing mismatch between available technology and skills and machine-made end products which would become even greater if not immediately addressed. The government has aided MSMEs with its "Make in India" initiative at the right time. Competition from machine-made products is the primary challenge; the price difference between man-made and machine-made products is huge. Thus there is an immediate need for initiatives for financial, health and well-being measures for local artisans. Inability to earn better livelihood forces them to leave the handicraft sector and shift to other employment options.

The international misrepresentation is another important challenge firms are dealing with. The government needs to work on providing special assistance and aid to all those firms trying to export Indian handicrafts. Indian handicrafts also are not available across the nation; the untapped local markets are another area demanding immediate intervention. The government should encourage B2B buyers and brands to enquire about their vendors if they are sourcing their products locally from small handicraft businesses, thereby promoting the "Vocal for Local" campaign. The government needs to emphasise the digitalization of handicraft MSMEs at the earliest as IT would help small enterprises to reach customers locally as well as globally. The current study will help the MSMEs dealing with handicraft to enable them for effective functioning and integrate sustainability in their operations. MSMEs will benefit in ensuring improved quality, and skill upgradation of existing labor. All this will provide the community benefit at the base level which will promote societal well being and provide stable income to the lower section of the society. The dying art of handicrafts is another problem faced by the government, by providing necessary incentives and overcoming the aforementioned challenges the government can help in preserving the handicraft sector.

Keeping this in view we make the following recommendations. 1. Infrastructure and technology upgradation of the handicraft sector to enable it to compete with machine-made products. 2. Better financial assistance and schemes to be introduced by the Government. 3. Skills training, well-being and financial constraints of employees to be taken care of. 4. Less cumbersome documentation process and schemes for motivating export activities. 5. Policy changes should be supported by continuous efforts of digitalization of the handicraft MSMEs sector.

Machine-made products and ineffective representation in foreign markets are two key challenges which need to be addressed as a priority for the effective resilience of handicraft MSMEs in the post COVID-19 era.

7. Conclusion and future scope

The current pandemic has raised the question of the survival of handicraft MSMEs in India. At a time when every industry is focusing on restructuring to recover from the economic impact of the pandemic, handicraft MSMEs, one of the worst hit sectors due to COVID-19, is still trying to find ways towards revival. The main reason for the anticipated slow recovery is low disposable income; handicraft items are not regarded as essentials and people would spend money on them only once their essential needs are met. The importance of the inclusion of resilience in the handicraft MSMEs is the need for the recovery of this sector. In the context of handicraft MSMEs resilience during COVID-19 is the preparation, quick response and recovery from disturbances cause by the pandemic. The survivability, sustainability and viability are the three pillars of resilience that the handicraft MSMEs must focus on to sustain their business. The adoption of these resilience strategies is, however, met with a number of challenges in India. The primary task in this direction is to understand the major challenges faced by handicraft MSMEs to survive, incorporate sustainable practices and increase their resilience to this crisis and viability, all of which create the motivation for the present study.

EFA has categorized the factors into survivable, sustainable and

viable. Survival challenges need to be overcome for short-term planning; sustainability, on the other hand is the long-term commitment for societal, ecological and economic well-being. The viability of the business is the potential for growth in the post COVID-19 era, which includes factors that are needed for both the growth and expansion of the business.

The Grey DEMATEL framework provided in the research methodology section is used to define the contextual relationships between the resilience challenge categories: survivability, sustainability and viability. The results of the study show that "Competition from machine-made products", "Insufficient government support and incentives for export" and "Inefficient managerial concern and response to internationalization" are the prominent challenges. Other causal challenges, such as SU2, SU4, SS4, SS8, VA5 and VA7 influence other challenges to resilience. Businesses need to accentuate the recommended challenges in this work and comprehend their impact level as referenced in the causal-effect set, in order to deal with the resilience in post COVID-19 MSMEs. This paper's findings and discussed implications may be critical in helping the stakeholders of handicraft MSMEs to successfully implement resilience in their operations.

The identified challenges can be tested using different MCDM techniques. Modeling of the shortlisted challenges can be further carried out to understand the resilience requirements in the handicraft industry. A practical case implementation is, however, needed when the results are to be incorporated countrywide.

CRediT authorship contribution statement

Vernika Agarwal: Conceptualization, Methodology, Writing – original draft. **K. Mathiyazhagan:** Formal analysis, Supervision. **Snigdha Malhotra:** Writing – review & editing. **Busayamas Pimpunchat:** Review and Editing.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.seps.2022.101443.

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