**Growth Challenges in Aligarh Locks Industry: An Interpretive Structural Modelling Approach**

**Abstract**

Despite being a major contribution to the country's overall lock manufacture, the Aligarh lock industry is on the verge of shutting down. The study attempts to provide a hierarchical structure that depicts linkages between the Aligarh lock industry's different issues in its growth and development. The research highlights the industry's biggest growth roadblocks in great detail. A structured literature search has been done focused on the Aligarh lock industry. Following, a content analysis of the interview transcripts gathered from the Aligarh lock industry's traders, manufacturers, and artisans was conducted to identify various issues. Finally, a computer-assisted Interpretive Structural Model has been developed based on 21 major growth issues that plague the Aligarh lock industry. The study finds that the industry does not generally plan or innovate. The ISM model depicts hierarchical relationships between elements following six levels of challenges. At the bottom of the hierarchy, widespread poverty, inefficient government programmes, a lack of education, and poor capital investments drive other growth obstacles. The research provides a methodical approach to problem-solving and focuses on the most important elements for recovering sick units in the unorganized sector. By offering a systematic depiction of the challenges, this study improves comprehension of the challenges that small and medium businesses experience in implementing suitable growth strategies. The purpose of the current study was to examine the lock industry in Aligarh, Uttar Pradesh, India, and determine the current state of affairs of the industry. The study is limited in its ability to generalize to other sectors, as it only focused on the case of Aligarh’s lock industry. Hence, the findings of this study may not be good to be generalized for other industries.

**Keywords:** Locks industry, growth challenges, Interpretive Structural Modelling

1. **Introduction**

Due to their significant contribution in terms of output, exports, and employment, small and medium enterprises play a vital role in the Indian economy (D.L., 2016). For a developing country like India, where more than 60% of the population lives in rural regions (Bhattacharya S., 2014), the small sector appears appealing as a source of employment for a huge labour force with limited resources (Nupur R., 2020). Small businesses require a low initial capital investment and a high labour absorption rate. This industry is second only to agriculture in terms of employment generation and labor-intensive production processes. SMEs promote private ownership, entrepreneurial abilities, and the ability to respond quickly to changes in demand and supply in the industrial market (Thangavel N., 2015). In India, SMEs help to alleviate poverty while also promoting long-term growth and equitable income distribution (Bose, 2013). Because of the importance of small businesses, India's Government has enacted a separate law for them: the Micro Small Medium Enterprises Development Act (MSMED). According to MSMED Act, 2018, Turnover limits were revised, and the Ministry of MSME (2018) has defined the businesses as per the investment bracket, which presents the industry as Micro(5Crore), Small(5-75Crore), and Medium(75-250Crore). SME's make up a substantial part of India's economy, but they also operate as a barrier for the country's unorganized sector, which goes unrecognized by the government and huge businesses because most initiatives and policies are targeted toward the organized MSME sector. A lack of availability of appropriate and prompt credit, a high cost of finance, uncompromised mortgage prerequisites, little awareness to equity capital, supply problems to government departments and agencies resulting in the sourcing of raw materials at a competitive price, storage, design, packaging, and product display problems, and a lack of reach to global markets are all issues that must be addressed in order for small businesses to thrive sustainably (K., 2019); (Sharma, N., 2015). Inadequate infrastructure facilities like power, water and roads, low technology and lack of access to modern technology, problems of skilled labour (Gill & Mand, 2013);(F.N.K., 2021), lack of sustainable business practices (Sujatha R., 2015), and many more challenges depending on the location of the business enterprises (Suresh & Mohideen, 2012);(GoI, 2010). As a result, the purpose of this study is to provide a comprehensive picture of unorganized small business firms facing various challenges in their growth and development by examining the lock industry of Aligarh, Uttar Pradesh, which falls under the unorganized business sector but is one of India's largest lock manufacturing industries.

1. **Literature review**

Since literature is scarce on the Aligarh lock industry, search boundaries were established to justify the articles included in the study. Only 21 articles have been identified on the Aligarh lock industry.

The lock industry of Aligarh city, established in 1842, is currently considered one of the giant lock-producing industries in India. The industry is termed as home-based and unorganized as majorly owned by family businesses. The lock industry gives significant business to Aligarh city. It employs lakhs of workers, artisans, and labourers in manufacturing a variety of locks such as padlocks, lever locks, mortise locks, cable locks, cycle locks, auto locks, shocker locks, deck locks, shutter locks and several other furniture fitting products. The raw material used in the industry is mainly metal (iron, brass, zinc, aluminium, silver, steel, and nickel) (Majumdar & Choi, 2011). Muslim artisans initially dominated the industry during independence, but many Punjabi Hindus migrated after separation, opened their lock manufacturing units, and started bulk production. Aligarh lock industry comes under the category of small and cottage industries, but regardless of its size, the Aligarh lock industry can process 100 tonnes of brass and 50 tonnes of zinc daily in mass hardware production. As per the All India Lock Manufacturers Association reports, it has started decreasing since 2003. Approximately 95 % of the locks in India were supplied from Aligarh. As per data available through reports published in 2013, the industry's total worth was estimated at around Rupees 900-crore (including brass components), declining at an annual rate of 15 per cent. An export decline was reported from 40% to 25%. Today, the Aligarh lock industry faces diminishing returns despite the immense financial potential. The lock industry faces several challenges, just like any other small and medium enterprise faced in a developing country. Most of the firms are unregistered operating in the industry as some of the lock manufacturers started their operational units in their residences. Other financial, environmental and infrastructure-related issues are also not allowing the industry to prosper. Challenges like intense foreign competition (specifically from China they are ready to offer the same products at considerably lower prices), technological backwardness (products are easily imitable), irregular supply of water and electricity, the high price of raw material, widespread poverty, unfair remuneration, child labour, untreated discharge of industrial effluents and non-adherence of standards and sustainable measures are the major growth challenges faced by the lock industry of Aligarh (Matin, 2019) (Laskar, 2000) (Sharma & Naqvi, 2005).

Aligarh lock industry generally relies more on its history and practice-based estimations. Most manufacturing units are owned and managed by non-engineers and non-managers unaware of standard models and procedures. This industry largely depends on the traditional production mode, resulting in high cost, low quality, and quantity of output. On the other hand, globalization impacts Aligarh and its industry workforce, particularly women, who are primarily unskilled labourers. As a result, they become incompatible with contemporary technologies and socially marginalized. Techniques such as galvanizing iron-sheet work began in 1923, work on die punch locks began in 1924, and later, the power press to cut plates for padlocks and polishing machines began. These techniques have remained unchanged without additional technological advancement. As a result, the sector is in a condition of ideal competition because the items are easily replicated; the industry only has brand value (Jain, 2020).

Most women labourers are also employed in the industry; most are engaged in liver chirai, assembling, and packing. Some are engaged in a hand press, and Chabi Bandhani work. Very few work on the power press, electroplating, buffing, and spray painting (Nasir & Mustafa, 2018). At least 5,000 lock manufacturing units established in the city employ nearly 2 lakh people directly or indirectly. On the other hand, the artisans and employees face a lack of job security. The Aligarh lock industry is organized into three types of players: the brand owner, the contractor, and the artisan. Lock manufacturing units are also classified as 'small' (more than 15 employees), 'little' (10–15 employees), and 'household' (less than 10 employees), which might be permanent, casual, or family-owned (Jain, 2020).

Mainly, Muslims (80%) form the artisans' community in the industry. In contrast, Hindus and Muslims own big manufacturing units and business houses (Naqvi & Barkat, 2020). Also, child labour conditions have deteriorated. They face many problems, such as low wages, long working hours, abuse, beating, and health problems (Parveen, 2015). They earn up to 5 to 10 rupees a day. The children often work between 15-20 hours a day, inhaling vast metal dust and emery powder (Burra, 1987). Around 7000-10,000 child workers are facing similar issues. Child labour is employed for polishing, electroplating, spray painting and hand presses in the lock industry as the work is monotonous. However, these activities are highly hazardous to their health (Qayyum et al., 2012) as they inhale rusted metal particles leading to severe respiratory disorders. The electroplating process also causes several skin diseases due to continuous contact with hazardous chemicals such as potassium cyanide, sodium phosphate, sodium silicate, hydroelectric acid, sulphuric acid, sodium hydroxide, chromic acid and barium hydroxide, and electric shocks from the electrodes. Around (46.9%) workers have dental caries in which (60.0%) reportedly have decayed teeth (Singh et al., 2015).

The Aligarh lock industry significantly contributed to the city's environmental pollution as well. Chemical used in electroplating; spray paint, moulding, directly discharged to the open drains, ultimately contaminating the groundwater. The pH range in water lies between 11.5 - 6.3 in Aligarh city(Husain et al., 2014). Water samples of Aligarh city do not comply with BIS standards and Indian Standards-10500-91(Priya, 2021). There are lots of heavy metals found in the groundwater of Aligarh, such as Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn (Mohammad Ajmal, 1984) (Tabrez & Ahmad, 2010). The water quality indices (WQI) reports that the water of Aligarh city is not suitable for drinking (Khan & Umar, 2018) (Ali, 2018). The industry considerably lacks corporate social responsibility practices and is consequently on the verge of winding up (Malik et al., 2019).

The Government has undertaken several initiatives to manage the declining state of the Aligarh lock industry. In 2001 the UN Industrial Development Organization (UNIDO) and the Indian Ministry of Micro, Small and Medium Enterprises decided to start a national level program to develop the Indian lock industry (Majumdar & Choi, 2011). Likewise, for the pollution hazards caused by the industry, a resettlement plan was launched by tin 1992 (Parveen, 2015). Specifically, after hitting badly by COVID-19, the industry needs effective revival strategies (Vadra, 2020). Nevertheless, the reach of such programmes and initiatives is narrow, as concluded after interviewing the lock manufacturers, traders, and artisans currently operating in the industry.

1. **Methodology**

The study's methodology is based on John Warfield's design for developing structural models. Interactive management (IM) is a method of assessing groups by using an action mapping model to generate outputs that incorporate contributions from persons with various viewpoints, backgrounds, and perspectives (Domegan et al., 2016). A hierarchical model has been created to show the various growth barriers that Aligarh's lock industry faces. To construct the model, a qualitative approach was used, which included the following stages:

**Stage I: Data collected from interviews and site visits**

|  |  |  |
| --- | --- | --- |
| **Group** | **No. of people interviewed** | **Interview method** |
| Traders  | 3 | Conversational interviews |
| Manufacturers  | 4 | Conversational interviews |
| Raw material suppliers | 2 | Conversational interviews |
| Artisans | 3 | Conversational interviews |

**Table 1- The table represents the group method and no.of people interviewed**

**Stage 2: Preparing interview transcript**

The most significant factor impeding progressive business thinking is a lack of education. Most people in the lock industry in Aligarh are undereducated, which prevents them from learning about changes in business patterns, government policies, grants, and concessions available to small businesses, new and updated tools and techniques, innovative and creative methods and procedures for carrying out business practises. Most of the people in the lock industry in Aligarh start their businesses with a small capital investment, which is insufficient to cover the production turnover because half of their capital is held by creditors. The credit collection period ranges between 15 and 30 days, which further halts production due to a lack of funds for procuring raw materials for the next production cycle. Loans and mortgages have exacerbated the problem, and credit limits have weakened the financial base of businesses that rely on bank funds, with most of the surplus paid in interest. Due to the non-uniqueness of product designs and patterns, the lock & hardware industry faces stiff competition because they are all capable of producing the same products at the same price. Because of the intense competition, manufacturers are willing to forego their profit margins. They are operating on a Re 1 profit margin. This makes the industry even more vulnerable and less appealing. The Aligarh lock industry is facing immense competition from Chinese products. The selling price of Chinese products is lower than the cost price of our products.

People who work in the industry are mainly from the working class; they work for their daily bread and butter. They have no training or knowledge of the job; they become skilled simply by doing it repeatedly. The Aligarh lock Industry is deteriorating because it has lost its quality and is unable to meet new demands. In Aligarh, very few businesses are concerned with quality. Only exporters can produce high-quality goods, but small businesses are more concerned with the production concept. The manufacture of electronic locks is still a pipe dream. Aligarh's small businesses' societal and environmental aspects are relatively weak. Unacceptable working conditions, untreated waste discharge, child labour, and women employed as day labourers for packaging and other laborious tasks. There is a significant lack of concern for environmental and sustainability issues. Government assistance has not been reached out properly; there are severe financial constraints or acquiring other business resources; taxes seem like a burden. Organizational and physical structures are not big enough that uphold more significant and growing businesses.

Despite the Aligarh lock industry's major contribution to India's overall lock and hardware production, no research and development units are set up for the industry's growth and development. The industry needs major revival strategies and innovative business practices to keep the pace going.

**Stage 3: Content analysis**

The transcript was crystallized using content analysis, which condensed the meaning units. After that, the condensing units are categorized using the proper codes and classifications. Nine main themes have been discovered and will be further developed. Content analysis helps to crystallize lower-level abstractions into higher-level abstractions (Erlingsson & Brysiewicz, 2017).

**Table 2: Schematic depiction of conversion of interview transcript to meaningful themes**

|  |  |  |
| --- | --- | --- |
| Higher-level abstraction through systematic interpretation of interview transcript | Overarching theme | Growth challenges residing in the Aligarh lock industry |
| **Theme** | Societal issues and challenges  |
| **Category** | Lack of education |
| **Code** | Social issue |
| **Condensed meaning units** | (*Lack of education is the most impeding factor*) |
| Lower-level abstraction extracted directly from the interview transcript | **Meaning unit** | The most significant factor impeding progressive business thinking is a lack of education.  |

Source: Concept adapted from (Erlingsson & Brysiewicz, 2017)

**Stage 4: Challenges identified through literature review and content analysis**

**Table 3- Challenges derived from content analysis and identified through literature review**

|  |  |  |
| --- | --- | --- |
|  | **Challenges** | **References** |
|  | **Lack of education** | Content analysis  |
|  | **Widespread poverty** | (Majumdar & Choi, 2011) |
|  | **Inequitable participation of women workforce** | (Nasir & Mustafa, 2018); (Majumdar & Choi, 2011) |
|  | **Child labour** | (Majumdar & Choi, 2011); (Laskar, 2000) |
|  | **Unregistered business** | (Majumdar & Choi, 2011) |
|  | **Family-owned businesses** | (Majumdar & Choi, 2011) |
|  | **Low capital investment**  | Content analysis  |
|  | **Lack of infrastructure**  | (Vadra, 2020); (Majumdar & Choi, 2011) |
|  | **High cost of credit**  | Content analysis  |
|  | **Intense global competition** | (Majumdar & Choi, 2011) |
|  | **Incompetent and traditionally skilled workforce**  | (Nasir & Mustafa, 2018); (Vadra, 2020); (Majumdar & Choi, 2011) |
|  | **Untreated discharge of industry waste** | (Habib & Shams, 2011): (Mohammad Ajmal, 1984); (Majumdar & Choi, 2011); (Fazili & Ahmad, 2014); |
|  | **Exposure to hazardous operations** | (Parveen, 2015); (Majumdar & Choi, 2011); (Vadra, 2020); (Qayyum et al., 2012) |
|  | **Lack of innovative business practices**  | Content analysis  |
|  | **Lack of access to modern technology** | Content analysis  |
|  | **Lack of research and development units**  | Content analysis  |
|  | **Lack of entrepreneurial management**  | Content analysis  |
|  | **Inefficient government programmes**  | Content analysis  |
|  | **Lack of job security**  | (Jain, 2020); (Majumdar & Choi, 2011) |
|  | **Unfair remuneration to artisans** | (Majumdar & Choi, 2011) |
|  | **Stiff domestic competition** | (Jain, 2020) |

**Stage 5: Interpretive Structural Modelling (ISM)**

Interpretive structural modelling is based on the principles of the interactive management process, a computer-aided technique formulated by John N. Warfield in 1974 (Warfield, 1974). ISM help groups and individuals to identify relationships and well-defined structure among different ideas and variables through software (Agarwal et al., 2007);(Hasan et al., 2013). (Watson, 1978);(Farris & Sage, 1975). It is a very effective methodology for qualitative research. Interpretive structural modelling involves several steps (Dwyer et al., 2014); (RezaeiZadeh et al., 2017):

1. Identification of the list of factors or ideas; through a systematic literature review, the authors identified 21 factors for the ISM modelling.
2. Clarification of a 'relational question' for identifying relationships among different factors (e.g. 'Does factor 1 aggravates idea 2?'). Along with two lock industry manufacturers, the authors discussed the relational question between different pairs of factors. A "yes" vote was considered if the majority decided a relationship between the two factors; otherwise, NO vote was entered.
3. Development of a hierarchical graph by exploring the relational question to identify connections between different pairs of factors
4. Display and explanation of the different relationships emerged out of the graph.
5. Adjustment in the graph if required. There were no changes made in the graph resulting from this study.

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**Figure 1: Interpretive structural model of the growth challenges faced by the Aligarh Lock Industry**

1. **Findings**

For the interpretive structural modelling, a total of twenty-one factors were considered. (Figure 1). The model is read from left to right, implying that issues on the left aggravate challenges on the right. Six levels of problems have arisen as a result of this structural map. The model (Figure 1) consists of 21 growth barriers that prevent small enterprises in the Aligarh lock industry from growing and developing. Computer-aided ISM (Figure 1) is developed to analyze the interaction among the identified challenges. It detects a hierarchy and its relationships, representing the strategic information to support management's decision-making regarding small businesses' efficiency. It is also articulated through a literature review that non-entrepreneurs and non-manager majorly dominate the Aligarh lock industry.

India has plenty of government credit support programmes for small and medium-sized businesses. A distinct allocation of cash for SMEs is made in the annual budget. However, in small towns like Aligarh, their execution is insufficient. People are less aware of government programmes, forcing them to rely on expensive private financing. Chinese products pose a significant threat to the Aligarh lock and hardware business in terms of price, quality, and finish. Small cities could potentially benefit from more prominent government projects to help them become more commercialized and dynamic.

In the above figure, widespread poverty (V2) and inefficient government programmes (V18) resulted as driving challenges leading to other challenging growth barriers. Widespread poverty leads to lack of education (V1) which further leads to unregistered businesses (V5), lack of entrepreneurial management (V17), and family-owned businesses (V6). If we look at the case of the Aligarh hardware sector, we can see that these are the same issues that every other commercial firm in the industry has. MSMEs are also underperforming in their overall growth due to ineffective government roles (V18). The Government has implemented many schemes and programmes, but small entrepreneurs' lack of access and reach have not yielded the expected results. Despite many active government programmes for SMEs in India, many firms, like the Aligarh lock industry, are at the mercy of private banks and loan schemes.

Unfair remuneration to artisans and workers (V20), lack of job security (V19), child labour (V4), incompetent and traditionally skilled workforce (V11), Lack of entrepreneurial management (V17), and lack of innovation and opportunity-seeking (V14) are the factors responsible for monotonous and routine operational work lacking creativity and innovation both strategically and operationally. This is why having a professional and knowledgeable workforce is essential for every firm. Furthermore, a lack of entrepreneurial and strategic enterprise management exacerbates all other concerns, as the human mind devolves its strength and power to other corporate tasks to create and innovate.

Due to limited capital investments (V7), small and micro-businesses cannot afford to invest large sums of money in human resource training (V7). As a result, because the job is mostly repetitive and tedious, these small units even employ women and children. That is why both inequitable participation of women (V3, *Not read by the software*) and child labour (V4) are prevalent in such industries. Many traders and manufacturers, including well-known players in the Aligarh lock industry, have expressed dissatisfaction with the industry's lack of real-time research and development (V16). In addition, no sound decision-making mechanism exists in any organization, and business owners make most decisions without discussing or informing their employees. Despite the industry's hazardous working conditions (V13), it also has an emotionally and technically unsuitable climate that prevents workers from sharing their vital inputs. These issues necessitate in-depth questioning or counselling of employees, yet the sector lacks the resources to do so. As a result of these variables, workers feel insecure about their employment (V19), and they are not loyal, leaving the company whenever they receive a better offer elsewhere.

Inadequate infrastructure (V8), such as a lack of energy and water, technology lag, inadequate working conditions, and transportation facilities, are important problems for the successful operation of a business. These are the obstacles that the Government must address, as financial limits impede infrastructure development in these industries.

Due to the tremendous social and environmental havoc they are causing, factors such as lack of sustainable business practices, untreated discharge of industrial effluents (V12), and exposure to hazardous operational procedures (V13) have been heavily examined recently. There is a major lack of sustainable business practices in the Aligarh lock sector. People are unconcerned about the hygiene of their surroundings, disposing of all types of industrial trash directly into open sewers without treatment. Regardless of people's concerns, they do not have the financial resources to construct waste treatment plans or adopt long-term operational procedures in their firms.

Moreover, these small business units face stiff competition in national (V21) and international markets (V10). Competition is mostly based on product price in the domestic market, and the situation worsens when the same product is provided at a lower price in the international market. Chinese locks compete fiercely with Aligarh locks, and they are also supplied at a lower price, sometimes even below the manufacturing cost of Aligarh locks. As a result, product demand in overseas markets is decreasing. There is also a scarcity of strategic partnerships, such as resource-based collaborations between businesses, that could aid these small businesses in overcoming innovative manufacturing techniques, an efficient supply chain network, and infrastructure hurdles. Foreign direct investments are revoked when enterprises are incompetent and unorganized because foreign corporations adhere to conventional procedures and working methods.

1. **Conclusions**

This study presents a list of 21 challenges that must be addressed to improve the overall productivity, growth, and development of the Aligarh lock industry. An ISM model was built to investigate the interactions among the listed difficulties. It represents strategic information to enhance management's decision-making linked to SME efficiency by identifying a hierarchy and its relationships. The model elucidates the interdependencies between problematic elements that crystallized complexity and establishes a framework for addressing them. Building up more basic operational capabilities, craft and technical capabilities for efficient acquisition, assimilation, and incremental upgrading of new ways is more important for SMEs' efficient growth.

1. **Managerial implication**

The study takes a systematic approach to problem-solving and focuses on the most critical aspects of recovering sick units in the unorganized sector. The research Proposed a hierarchical framework for the hurdles that disorganized businesses encounter, with stages illustrating the driving challenges that lead to higher-level growth issues. The study has brought to light a dwindling but economically significant industry. On the other hand, many other unorganized businesses face similar problems that go unrecognized by academics and management.

1. **Limitation of the study**

The study was limited in its ability to generalize to other sectors, as it only focused on the case of Aligarh's lock industry. Hence, the findings of this study may not be good to be generalized to other sectors. This is because industries have different characteristics and requirements, which may not be similar to Aligarh's lock industry.

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