

A Study on Issues and Challenges in MSME Financing in the State of Bihar

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Executive Summary

The developing world is full of entrepreneurs and visionaries, who with access to education, equity, and credit, would play a key role in developing the economic situations in their countries.

~ **Muhammad Yunus** ~

Bihar is the third most populous state in India, enjoys a rich demographic dividend as 58% of the state population is below 25 years of age. However, a rural population exceeding 89% of the total state population, coupled with one of the lowest urbanization rates in India, offers limited full-time service class employment opportunities to all. To tackle the situation, the state government of Bihar in line with central government initiative have brought radical policy measures to boost the growth of micro, small, and medium scale enterprises. Most importantly, 95% of the industries operating in Bihar fall under MSME; thus, the industry serves as the lifeline and is core to the economic prosperity of the state. The employment opportunities generated via MSMEs are bridging the income divide and thus serves as a vehicle to foster social equity.

Despite all the combined efforts, MSMEs suffer umpteen hurdles. One such major issue hampering operations of MSMEs is access to finance. In our research focusing around the financing related issues with the MSMEs operating in Bihar, we observe the credit supply to remain smooth and unbiased irrespective of the industry, sector type, and the type of ownership of an MSMEs operating in Bihar. However, the real bottleneck arises with the working capital management of the sanctioned, the onus of which falls under the discretion of an MSME applicant. The findings showcase poor management of working capital by allocating more share to short term loans by MSMEs applicants with lower education and digital awareness level. Since the early launch phase of a new venture is characterized by negative cash flows and marginal profit, the likelihood of repayment of

short-term debt is abysmally low. In further endangers sustainable business operations of the enterprise in the long run, and the fallout of such ventures in futures can have cascading effects on the banks, resulting in piling up of NPAs in coming future.

Hence, the need of the hour is to put a special impetus on education precisely, financial literacy and vocational training. It should be further coupled with digital awareness campaigns to be organized in collusion with banks, with the state acting as an enabler by facilitating penetration of such programs at grass root levels. Another important observation is MSMEs operating in rural and allied services shooting up in the state of Bihar. With the nation already struggling with low agricultural productivity, special emphasis has to be given to MSMEs operating in such sectors. Most importantly, stimulated effort from central and state government and banks have streamlined the credit supply to new ventures at grass-root level. However, an ill-equipped and less trained worker would further lead to diminishing returns, thus crippling the economy further. The findings pave the way to explore further the working capital management in MSMEs that have attained healthy cash flows and are operative at a later stage of the business cycle. Noteworthy, an optimal short term to long term debt would sufficiently provide enough leverage to enterprises and sustain business operations in the long run.

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Chapter 1

Introduction

1. Introduction

The goals of a welfare economy are yet to be realized in a developing nation such as India, where millions live at the bottom of the pyramid. Until and unless the bridge amid the rich and the poor, the haves and the have nots exists, issues of social decay, political chaos, environmental degradation, desperation, and widespread poverty will derail the process of growth and development. To precisely target the masses lying at the lower strata of the economic pyramid, a proposed economic solution is nurturing of micro, small, and medium scale enterprises (MSMEs). MSMEs are fundamental for the all-encompassing development and improvement of developing economies around the world. They assume a huge job in the business movement of a nation. The multi-faceted exercises performed by MSMEs straightforwardly or in a roundabout way contribute to the monetary development of a nation (Salvato et al., 2007).

Additionally, MSMEs fill in as nurseries for vast upcoming endeavors and supply auxiliary materials to extensive firms. MSMEs being Labor-escalated endeavors certainly give a substratum to creating a workforce in an economy. An energetic MSME part advances rivalry and a culture of business enterprise. Besides, the MSME part is additionally accepted to make blue sea procedures, and consequently, it consistently cultivates the soul of advancement and dynamism to enhance effectiveness at work put. According to Ayyagari et al. (2011), MSMEs establish 95% of the world's mechanical texture and 60% of the private segment work. These numbers are fundamentally higher when casual MSMEs are incorporated. As indicated in the 2010 report of International Finance Corporation, formal MSMEs contribute up to 45% of the complete business and up to 33% of the total national output (GDP) in developing economies.

In emerging economies like India, MSMEs are one of the key drivers in charge of change from an agrarian to an industrialized economy (Chandraiah and Vani, 2014; Katyal and Xaviour, 2015; Gade, 2018). Appendix 1 provides information on the classification of Micro,

Small, and Medium Enterprises as per the MSMED Act 2006. The classification is based on capital investment made in plant and machinery, excluding investments in land and building. In India, 90% of the modern field is established by MSMEs. There are around 55.8 million units all through the topographical stretch of the nation MSMEs contribute around 7% of the assembling GDP and 31% of the GDP from administration exercises and along these lines add roughly 37% to India's absolute GDP¹. These organizations give work to around 124 million people and contribute around 46% of the general fares from India. As per the current statistics, MSMEs contribute around 45 percent of the manufacturing sales, more than 40 percent of the total exports of the nation, and around 8 percent of the nation's GDP². Despite their importance, MSMEs are confronting various difficulties that are confining their development and growth (Khanna and Singh, 2018; Gaziasayed and Najmussaharsayed, 2018). The focal issue of worry for the development of MSMEs is the infrastructural bottlenecks. It is fundamental to give the genuinely necessary 'level playing field' to MSMEs through infrastructure improvement. India being a federal construct, the onus of economic upliftment is cooperatively shared by the center and state.

India is a federal union of 29 states and nine union territories. Industrially. They are not equally developed. While North (Uttar Pradesh, Haryana, Punjab), South (Tamil Nadu, Kerala, Andhra Pradesh, Karnataka), and West Indian states (Maharashtra, Gujarat) are industrial developed, East Indian states (Bihar, Bengal) are relatively less developed. Appendix 2 depicts the number of MSMEs across the states. Appendix 2 shows that the state of Uttar Pradesh tops the list with 14.20% of total MSME units, followed by West Bengal (14%). Noteworthy, Bihar accounts for approximately 5% of the total share of MSMEs registered in India and stands at the 6th position among all the states.

¹ Financing India's MSMEs: Estimation of Debt Requirement of MSMEs in India, November 2018. Published by International Finance Corporation (World Bank Group) <https://www.intellecap.com/wp-content/uploads/2019/04/Financing-Indias-MSMEs-Estimation-of-Debt-Requireme-nt-of-MSMEs-in-India.pdf>

² Annual Report 2018-19, Ministry of Micro, Small and Medium Enterprises, Government of India.

The landscape of MSME in India is still poor. Of the total, just about 15 percent MSMEs are registered. In order to promote ease of business and to know the socio-economic structure (for example, ownership structure, industry of Machinery, equipment in the operation, geography of operation, etc.) of the MSMEs across the country, beginning September 2015, the Ministry of Micro, Small and Medium Enterprises, Govt. of India has introduced a new registration process, reduced the two-stage registration process to one-step filling of memorandum. Based on self-declared information, an online filing system under Udyog Aadhar Memorandum (UAM) has put in place. This has boosted the number of registered MSMEs across the states. In the last five years, the number of registered MSMEs has increased manifold. As per the Annual Report 2018-19, Ministry of Micro, Small and Medium Enterprises, till the end of May 2019, 68.25 lakh MSMEs have already registered through the UAM portal. Surprisingly, the less developed industrial state 'Bihar' has seen the highest number of registrations. Appendix 3 depicts the state-wise distribution of Udyog Aadhar Memorandum (UAM) filings until May 2019.

Although Bihar has registered the highest number of MSMEs in the current era of entrepreneurship development where the MSMEs have been contributing significantly to the expansion of many Indian states, the MSMEs of less developed states like Bihar are not doing well. Due to financial, technological, and infrastructure constraints, the MSMEs of Bihar are not able to widen their domain across sectors of the economy, not able to do product innovation to meet the demands of domestic and global markets. Lack of adequate and timely access to finance continues to remain the biggest challenge for the MSMEs of the state and has constrained its growth. Financial institutions have limited their exposure to the MSMEs of the state because of the small ticket size of loans, higher cost of servicing the segment, and the limited ability of MSMEs to provide immovable collateral. The financing needs of the MSMEs depend on the size of operation, industry, customer segment, and the stage of development. If

supported and developed well, the MSMEs of the state have the potential to contribute immensely to the socio-economic development of the state facing scarcity of presence of large-scale industries. Ironically, Bihar has the least Gross State Domestic Product (GSDP) per capita income among all the other states and Union Territories³. The MSMEs are the one area that can help the state to boost its per capita income.

Thus, the development of MSMEs is now occupying a central position in the state's industrial and economic policy. For this reason, the current study aims to provide an assessment of the MSMEs sector finance in the state of Bihar. The study highlights the key characteristics of the MSME sector of Bihar and assesses the issues related to the flow of credit into the sector. The study evaluates the gap in the financing needs of MSMEs of the State of Bihar. Finally, it suggests the potential interventions required to boost the flow of financing needs of the sector. For the same, we have conducted an overall assessment of the MSMEs in Bihar, with an emphasis on two major stakeholders in the overall economic model, i.e., the MSME themselves and the banks. As per the recent Reserve Bank of India (RBI) report, only 5% of MSMEs of the State of Bihar are exposed to banks. Importantly, 95% of the industries in Bihar fall under the MSMEs category.

1.1 Current Economic and Financial Status of Bihar from MSMEs Prospective

Before delving into the work environment of MSMEs, it would be better to have a small glimpse of the economy of Bihar as the overall economic scenario impacts the MSMEs exogenously. With a geographical area of 94,163,00 Sq. Km, the state hosts a population of

³ Source: Indian states by GDP per capita, <http://statisticstimes.com/economy/gdp-capita-of-indian-states.php>

104 million people. Most importantly, as per the 2011 census, Bihar has a literacy rate of 61.80%⁴. Noteworthy, a low literacy rate could be a detrimental factor in MSMEs' operations, right from venturing into small scale business to fund management and to reach out to viable markets for final product selling. Co-incidentally, the state enjoys various location-specific advantages owing to its proximity to huge markets of eastern and northern India, accessibility to the ports of Kolkata and Haldia, raw material sources, and mineral reserves in adjacent states. It gives a competitive edge to the MSMEs, but how far it has been capitalized is a matter of concern. Noteworthy, the availability of sound infrastructure has a direct impact on the economy, and hence the state of Bihar has made considerable advancements in the development of rail and road networks, civil aviation, irrigation facilities, information technology infrastructure, and availability of power.

Amongst all the sectors, the most opted by the people of Bihar is agriculture. With a net sown area of 5278.32 hectares, Bihar's economy is majorly based on agriculture, with around 80% of the population employed in agriculture and allied activities⁵. In the current year's Bihar has witnessed a huge boost in agricultural productivity due to better irrigation projects and watershed development programs. Bihar currently stands at the fourth-largest agricultural produce and eight largest fruit producer in the whole of India. As per the Census of 2012, Bihar has a livestock population of 3.2 million with milch animals constituting 60.1 percent. The fisheries sector in Bihar occupies an important position in the socio-economic development of the people, particularly in the rural areas serving as a productive source of livelihood for a large proportion of landless laborers and smallholders. Dairy farming also contributes significantly towards growth & development in the state by providing additional

⁴ Bihar Population 2011-2019 Census, <https://www.census2011.co.in/census/state/bihar.html>

⁵ Information About Bihar: Agriculture, Industries, Economy Growth, Geography. <https://www.ibef.org/states/Bihar.aspx>

employment opportunities. Dairy activities majorly include providing fresh milk and processing milk products.

Apart from the primary sector, the government of Bihar has elaborately planned for the development of industries in the state. Quite recently, the highest growth rate was observed in the tertiary sector (12.8%), thus adding to the Gross State Domestic Product of Bihar. Most common small scale industries are operative in the field of food processing, rubbers and plastics, chemicals, textiles, and leather. In addition to this, Bihar is also known for its traditional art and craft industries of Mithila paintings, Bhagalpuri Tasar silk, etc. Importantly, in the past decade, industries such as food processing, dairy, and sugar manufacturing have shown double-digit growth. At the same time, the state has given special impetus on the development of the education sector along with tourism, IT, and renewable energy. However, these are still in the nascent phase; with time, the operations will expand. To facilitate rapid socio-economic development via the development of secondary and tertiary sectors primarily, the government has come up with certain policy measures. The state government envisages to align the National Manufacturing Policy and Make in India initiative of central government with Bihar's Industrial growth rate, thus targeting a growth rate of 15%. The objective is building a conducive environment for business, which will further boost the economic prowess of the region. For the same, the government of Bihar came up with the following policy measures:

- **Industrial Investment Promotion Policy, 2016:** To promote high priority sectors viz Electronic System Design and Manufacturing (ESDM), textile and leather sector, IT and IT-enabled Services sector (ITeS), and food processing. Most importantly, the socially marginalized groups and women entrepreneurs lie at the core of the initiative and are offered added benefits and specialized package to aid them in business development. Since its inception, 1028 industrial proposals with a capital investment

of Rs 14200.22 crores have been given clearance by the State Investment Promotion Board.

- **Bihar Start-Up Policy, 2017:** The policy aims to build an ecosystem for start-ups, especially ventured by the local youths. For the same, the state is acting as an enabler by facilitating a set of the corpus of 500 – crore, with an initial seed funding of Rs 10 lacs for the first ten years.
- **Chief Minister SC/ST Udyami Yojana:** A special scheme was formulated for the scheduled caste and tribes of the state of Bihar. The objective was to enable prospective entrepreneurs from SC/ST category to become entrepreneurs by providing financial assistance up to 5 lakhs.

Importantly, in all these policies, the state not only worked as an enabler and vehicle for change but also facilitated the fund requirements of new ventures. Noteworthy, the demography of Bihar is skewed towards the younger age group as per the 2011 census. Most importantly, a majority of these young force lies below 25 years of age group and constitute 58% of the state population, indicating a sizable prospective workforce. Ironically, despite having enormous human capital, Bihar's industrial sector employees constitute only 0.8 percent of the total population. Given the labor abundance, Bihar has the potential to be developed as a major industrial hub and a host to numerous small-scale enterprises. Apparently, the relative abundance of human capital, coupled with a cost-effective industrial labor force makes it a suitable destination for diversified industries.

Appendix 4 displays the contribution of Gross State value added by states in India. As we can observe, Bihar lags in terms of value contribution in comparison to other states. Moreover, the contribution follows a downtrend from 2014-15 to 2016-17. The data raises serious concerns about the growth trajectory of the industrial sector in Bihar. Moreover, the

annual growth rate of the secondary sector was unstable over the years (Appendix 5) and had an only moderate impact on overall economic growth, and hence special importance was given to boost MSMEs in Bihar. The two nodal offices of Micro, Small and Medium Enterprises Development Institute (MSME-DI) Patna and Muzaffarpur take care of the same. The institute aids in the promotion and development of MSMEs in the state of Bihar through implementing policy guidelines issued by the Ministry of MSMEs, Government of India. Since its establishment in 1957, the institute has been working for economic up-gradation and employment generation through industrial development. Apart from maintaining a close liaison between the central ministries, state governments, financial institutions and other organizations responsible for the development of MSMEs, the MSME-DI provides techno-economic and management consultancy, aids in the development of human resources through training and skill up-gradation, provides economic information services and coordinates policies and programs for MSME promotion. The Institution caters to the following matters in terms of MSMEs in the state of Bihar:

1. Technical services
2. Vendor development programs
3. Economic investigation and statistical services
4. Management development programs and consultancy
5. Skill development training
6. Export promotion
7. National awards to MSME units
8. State-level advisory board on MSME
9. Library

In addition to the skill development programs, the state government facilitates easy disbursal of collateral-free credit to bridge the barrier arising due to lack of initial paid-up capital.

Moreover, the assistance given in terms of technology up-gradation helps the MSMEs to stay competitive in the market. Most importantly, the state also aids in devising marketing strategies for the end sale of the output. Noteworthy, under the Chief Minister's Micro and Small Industries Cluster Development Programme, Common Facility Centres are developed for the fostering of small-scale industries. The National Small Industries Corporation (NSIC) works to enhance the competitiveness of MSMEs by providing integrated support facilities for marketing, technology, finance, and international consultancy services. All these schemes and services are penetrated constructively in the state via numerous schemes and programs. Apart from the state government initiative, the central government also facilitates financing and development of small scale industries via SIDBI (Small Industries Development Bank of India) through direct and indirect assistance. To avail infrastructure for MSMEs operation, the state of Bihar under the Bihar Area Development Act 1974, established BIADA for land acquisition to be used later for industrial purposes.

For facilitating the ease of doing business and delivering simpler, speedy and hassle-free regulations for business, a portal named "Udyog Samvaad" has been launched by the state of Bihar, enabling clearances for 16 different Departments. This portal also provides a link to "Industrial Financing" for providing a hand to existing entrepreneurs for financial assistance at cheaper rates. Under the Ministry of MSMEs, the Government of India has launched a new program called Udyog Aadhaar for enabling ease of registration via self-declaration of an enterprise's existence, bank account details, and other minimum additional information. A registered enterprise becomes eligible to avail government benefits such as easy loan financing coupled with low-interest rates. Apart from registration, the government initiated Udyog Mitra to guide, supervise the enterprises to build the business project strategy, and remove hurdles during project roll on. In addition to this, Udyog Mitra works as a vehicle to bridge the shortage of capital funds to MSMEs by organizing investor meets and conferences to elaborate on the

scope of MSMEs operative in the state of Bihar. Thus, apart from guiding the enterprises, it also works as a promotional agency. Udyog Mitra has categorized sectors into priority sectors and high-priority sectors depending on the potential of growth, employment generation, and investment. The high-priority sector includes businesses in food-processing, IT & electronics, and textiles & leather. The priority sectors are healthcare, technical education, tourism, renewable energy, manufacturing (small machines), plastic & rubber, and sugar industry.

Interesting to note that Bihar had been a land of artisans well equipped in making traditional handicrafts. During British administration, the traditional industry was destroyed and limited to selected few individuals who continued to earn their livelihood via handicrafts. To scale up the production output of this industry, the government of India formed a statutory body Khadi and Village Industries (KVIC) to promote rural industries, especially khadi producing units. The KVIC works in close coordination with the nodal agency Office of Development Commissioner (Handicraft). In line with the central government initiative, the Bihar State Khadi Gramodyog Board and Upendra Mahrathi Shilp Anusandhan Sansthan aim to research, promote, and preserve the traditional Bihari handicrafts. As we have seen, the state, as well as the central government, has acted as an enabler to promote MSMEs via state and nodal agencies working in close coordination. However, at the same time, due to the acute shortage of skilled and semi-skilled labors, the ongoing initiatives would stagnate. Hence, certain skill development programs, especially eyeing on the young demography of the state has been rolled on. Bihar skill development agency and Kushal Yuva program particularly aims to trains youths in the age group 15-28 years. The vocational training initiatives are on the go; however, still, there is a dearth of semi-skilled labor in Bihar. Currently, the pace with which the promotion of MSMEs in Bihar is going on is unmatched to the supply of skilled and semi-skilled labor, thus highlighting a mismatch in labor demand and supply.

The District Industries Centres (DIC), set up by the State Government in all the 38 districts of Bihar, provide execution management to MSMEs in manufacturing and service industries, make recommendations for the import of raw materials and capital goods and promote uniform growth of industries. The DICs also facilitate the progress of Prime Minister's Employment Generation Programme, and Prime Minister's Mudra Yojana has had a significant contribution to the promotion of MSMEs. The Pradhan Mantri Mudra Yojana (PMMY) entitles micro enterprises for loans up to 10 lakhs and aims at "creating an inclusive, sustainable, and value-based entrepreneurial culture." As per the Bihar Industrial Investment Promotion Policy (BIIP - 2016), priority is given to MSMEs in terms of registration, stamp duties, land-related fees, loans, clearance, etc.

To channelize proper and timely disbursement of Loan to MSMEs, Bihar has a massive banking infrastructure, especially rural branches. Appendix 6 details the distribution of all banking branches from the year 2013-18. As we can observe, Bihar has relatively more marginal increments in semi-urban and urban branches year by year from 2013 to 2018. Importantly, the population proportion of Bihar in the total population of the country stands at 8.6%; however, the percentage share in banks is 4.8% (Appendix 7), thus leaving a scope to increase branches with more rural penetration. At the same instant, in comparison to Bihar's populations, its share in total deposits and total credit is substantially low, though the growth rate in deposits and credit is on par with the national average. Most importantly, the **credit deposit ratio** of Bihar is second lowest, with Jharkhand being at a minimal level (Appendix 8). It indicates enormous efforts to be put in, to disburse loans bring credit deposit ratio on par. Importantly, banks operating in Bihar primarily the nationalized banks have suffered an escalating burden of Non-Performing Assets (NPAs) due to non-repayment of disbursed loans in the past. Thus, a high possibility of bank officers being adamant for loan sanctioning has arisen in the state of Bihar. The situation has been coupled with the fall of the microfinance

institutions and NBFCs that have availed loans to the Self Help groups in the past. The study aims to excavate the prime reasons for such failures of MSMEs, as the situation, if left unaddressed will create a spiral down effect leading to a credit crunch in the future in the state of Bihar.

Importantly, the economy of Bihar is on a continuous growth path owing to adequate development strategies and increased state expenditure for the promotion of infrastructure, facilitating business and industrial growth. Bihar being endowed with sufficient labor capital, adequate land, and raw materials, a subtle input in terms of financial & technological resources would enable faster socio-economic growth and development of the region. Deliberate and measured planning and initiatives in the MSMEs sector present a lucrative opportunity for increasing revenue by growth in industries, more employment opportunities in manufacturing and service sectors, rising exports, and thus improved contribution of the state of Bihar to India's economy.

Figure 1 is a simple representation of the current enabling framework under which MSME operates. Noteworthy, we have captured only the major stakeholders to give a simplistic diagrammatical representation. However, as we go deep in the value chain of procurement of raw materials, machinery, etc. the above diagram would be more complex. Importantly, the major factors of production viz. land, labor, and capital will be discussed with reference to the relationship that exists between the banks and the loan. The relationship will be further empirically analyzed and statistically tested for its relevance. To do the same, we conducted a primary survey encompassing MSMEs and Bank officers operating in Bihar. The two samples viz. the MSMEs and Bank officers provided valuable input to their questionnaire. The characteristics of the survey output are discussed in detail in section 1.7 and 1.8. The expected outcome of the study is to re-surface the structural bottlenecks in the existing macroeconomic framework under which the MSME's operate.

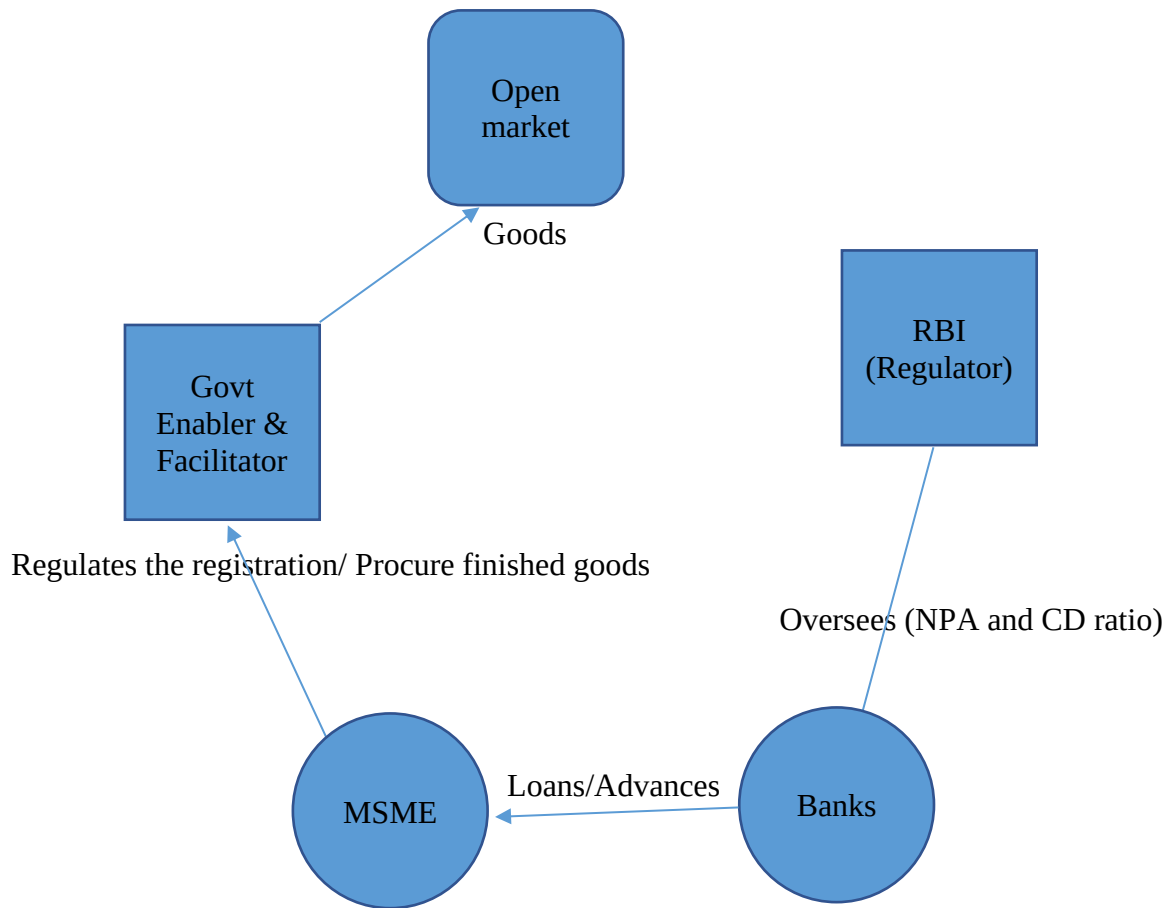


Figure 1: An Existing model of MSME work environment

The flow of the rest of the study will be as follows. Section 1.3 discusses the research work done in the context of Indian states and provides a comparative benchmarking for the current study. Section 1.4 explains the data collection. Section 1.5 provides the most relevant hypothesis and parametric and non-parametric methodology used in the study, respectively. Section 1.7 and 1.8 critically analyze the hypothesis set in the study. Section 1.9 incorporates multivariate analysis and section 1.10 summarizes the findings of the study.

Chapter 2

Literature Review on MSME Sector in India

2. Literature Review on MSME Sector in India

An umpteen literature revolves around the study of MSME, especially concerning India. Gupta et al. (2009) analyzed the MSME sector in Bihar; owing to the absence of large industries, MSMEs are the mainstay of private investments. The study aims to identify the impediments that stop the MSME from reaching its full potential in the state of Bihar. However, the study is more concerned with the policy issues that hinder the MSME operations. It has further been segregated into Taxation, Regulatory, and political framework. In yet another study, Jahanshahi et al. (2011) investigated about the relationship between government policies and the growth of entrepreneurship in micro, small and enterprises in India and revealed that micro, small and medium enterprises are acting as a critical economic factor in India because they are contributing a significant portion to GDP, where MSMEs make majority of the domestic business transactions. The findings demonstrated that among the firms with high levels of agglomeration, the relation between competitive aggressiveness and innovativeness is very strong.

In another related to government policy actions and MSMEs, Khaksar (2011) explained the role of government policy and the growth of entrepreneurship in MSMEs and revealed that a mix of policy options that policymakers should consider. Such factors are the structure of labor force, prevailing attitudes of population towards entrepreneurship, the role and size of government in executing the services, and finally, the prevalence of existing level of entrepreneurial activity and the existing MSMEs. Researchers further concluded that employment in agriculture is declining at an increasing rate, and the main responsibility of job creation lies with the unorganized sector, including the service sector and small and medium enterprises. Some researchers investigated the performance of MSMEs such as Muthu (2015) researched the cause of sickness in micro, small, and medium enterprises in India. The study shows that the number of sick units in the MSME sector has declined from 1.77 lakh in 2001-

02 to 0.90 lakh in 2010-11. The researchers suggested that new approaches like the cluster approach or harnessing the power of industry associations should be encouraged to prevent the major sickness in the MSME sector in India.

Some academicians worked on the skill level of the MSMEs employees like Devi and Ramachandran (2016). They have investigated about training and skill development activities for MSMEs in India. The focus of the study is on the training activities of MSME – DIs and from the angle of enterprise technology innovation, put forward the enterprise training strategies which should be adopted in small and medium-sized enterprises. Pandya (2017) Studied about awareness and availing of various direct and indirect fiscal incentives and its impact on financial and strategic decisions of MSMEs. Researchers attempted the study to examine the different types of incentives given to the MSMEs through the interview cum survey method. The outcomes of the research are, the government should improve awareness of incentives and reduce the procedural complexities to avail it.

Some researchers studied financial constraints and suggested ways to improve financial efficiency. Athaide and Pradhan (2017) analyzed and argued the credit constraints faced by MSMEs and the old methodologies the policymakers use to judge the credit constraints. The researchers came with an augmented model based on the framework Peterson model and carpenter and Peterson model for a robust ascertaining of credit constraints in Indian MSMEs where the old methodologies are prepared for western economies where short term working capital is not at all a constraint. Garg and Agarwal (2017) examined the issues facing by MSMEs in the current scenario, like access to finance, infrastructure, human resource, and marketing. Researchers revealed that these issues are not only important to understand the issues faced by them, but also to find solutions. In yet another study Garg (2017) studied an important element in improving the financial efficiency of the MSME sector in India. The empirical study on exploring the perceptions towards financial factors of MSMEs-

owners/managers about the awareness of financial schemes or subsidies provided by various governments that are trying to boost the economic growth with the alignment of boosting the MSME exports as well as employment. Quite recently, Kumar et al. (2018) analyzed the relationship between capital expenditure and employment in the states of India. Census data from decades briefed that the state which has high capital expenditure recorded huge growth in employment, but in the recent year they are forming a negative relationship. The authors have identified the different tendencies to identify the cause.

Some academicians explored the role of government to bridge the glitches in credit shortage. In a seminal work, Maiti (2018) discussed the scope for alternative avenues to promote financial access to MSMEs in India. The MSME funding by domestic banks is high dominant over cross border banks. The alternative tools and avenues, friendly government policies, improving the legal system make the business environment suitable for the MSME sector. Shankar (2019) performed the research analysis to initiate credit rating to MSMEs, which will help to attain speedy access to get finance from formal financial institutions. Most of the MSMEs' information is asymmetrical, and information opacity is very less as they do not maintain the accounting records, no collateral, etc. are the key challenges to access finance.

Figure 2 displays the bibliometric analysis of the literature that explores and investigates the issues related to MSMEs. As we can observe that a mix of issues such as financing, manufacturing, Indian economy, investments, entrepreneurship, sustainability, etc. are the most popular topics related to the research of MSMEs, especially in the context of India. Recently Singh and Paliwal (2017) discussed the growth and potential of the Indian MSME sector. Researchers discussed various policy measures undertaken by the government to strengthen Indian MSMEs. Researchers proposed various strategies to strengthen the sector to enable the growth and the potential to make India a 20 trillion-dollar economy. In this study,

we undertake a comprehensive approach incorporating major factors that explicitly impact Msme's performance, such as credit facility, skill level, government initiatives, etc.

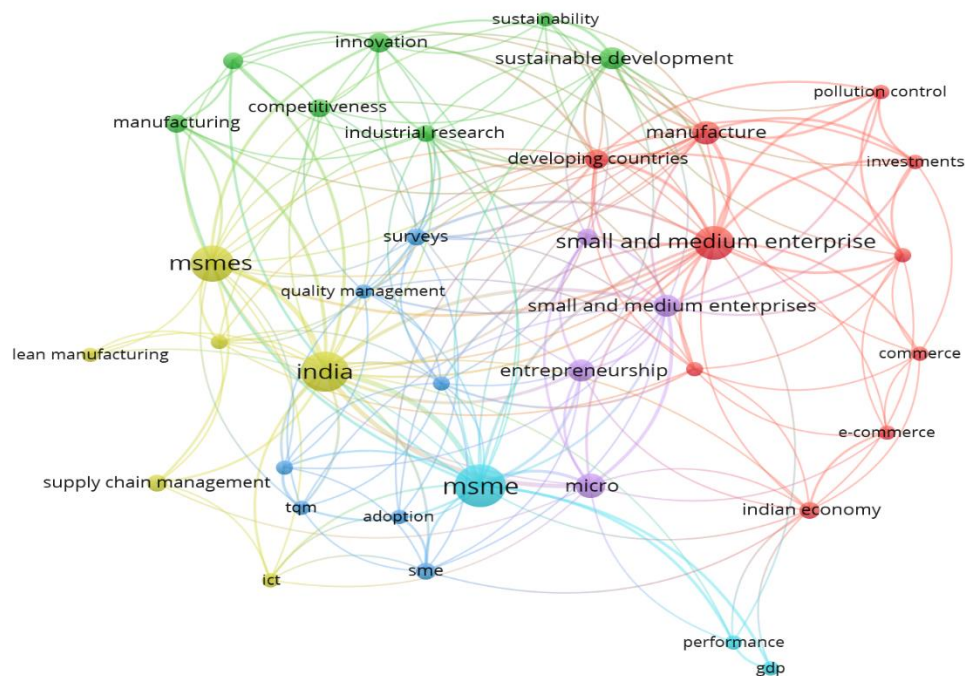


Figure 2: Bibliometric analyses of studies related to MSME in India

Chapter 3

Data Collection

3. Data Collection

For this study, the data has been collected from the different districts of Bihar. The state of Bihar has two distinct regions viz. districts lying in the North of Ganges River and Districts lying in the South of Ganges River. The North of Ganges River comprises of following 21 districts: Begusarai, Khagaria Saharsa, Madhepura, Kishanganj, Darbhanga, Madhubani, Samastipur, Saran, Siwan, Gopalganj, West Champaran, Supaul, Araria, Katihar, Muzaffarpur, Sitamarhi, Vaishali, East Champaran, Shivhar, and Purnea. The South of Ganges River comprises of following 17 districts: Patna, Bhojpur, Munger, Nalanda, Jamui, Buxar, Rohtas, Bhabhua, Aurangabad, Gaya, Jehanabad, Bhagalpur, Banka, Lakhisarai, Sheikhpura, Arwal, Nawada. Appendix 9 exhibits the same. Both the area is alluvial plain and is primarily an agricultural area. Agriculture is the main source of the economy of both areas. Ironically, despite having higher yield per hectare, due to excessive pressure of population on land and frequent flood, the per capita income of the people of the North of Ganges River is lower than the South of Ganges River region. Other than some giant industrial complexes (like Barauni Refineries and Fertilizers Factory, etc.) the North of Ganges River region has a good number of sugar mills. While the South of Ganges River region is mostly having a concentration of handlooms and power looms in addition to stone quarries, rice mills, and a few sugar factories. After the formation of Jharkhand, the state is hardly left with any mineral wealth. Only the area close to Jharkhand, i.e., some areas of South of Ganges River region, has some mineral wealth. The same has some forest area too.

Two separate bodies have been formed to look after the development of MSMEs in the North and South of the Ganges river. They are viz. MSME-DI Muzaffarpur and MSME-DI Patna. Besides, separate regional offices of the Bihar Industrial Area Development Authority are in place in the North and South Ganges river to oversee MSME functioning. For this research, the data has been collected from both the regions, i.e., from the North of Ganges

River region and South of Ganges River region. The MSME nodal offices of both the region have been approached to support in data collection, i.e., office of MSME-DI Patna and MSME-DI Muzaffarpur. Besides, the support of some local industrial organizations active in MSME development is also taken. Due to time and resource constraints, data from limited district regions are collected. Furthermore, data has been collated with the help of a structured questionnaire. The questionnaire is inspired by the research gap found in the kinds of literature related to MSMEs.

A separate set of questionnaires has been prepared for the two major stakeholders of the macroeconomic system under which MSMEs operate. For the MSMEs, the questionnaire has been segmented into four components viz. categorization, Awareness, Education, Financing. For the banks, only one segment is made to have an insight into the loan related matters. While categorization segment details about the “Classification” of industry, “Sector” in which the firm operates, and “Business type.” The set of questionnaires framed for MSMEs and bank officers is shared in Appendix 10. A total of 100 respondents from MSMEs and 50 respondents from banks were covered.

Most importantly, the glitch in money supply accounting to various factors have been cited by many researchers as a major hurdle. For that reason, in our research, we focus on the issues related to financing, precisely the loan process. To capture the “Loan Process,” we focussed on major factors that impact the loan disbursal, i.e., ease of getting the loan sanctioned, Time Taken for loan sanctioning, loan approved, or not, Loan sanctioned Amount and Long-term, short-term loan proportion. Out of these factors, three variables viz. Loan Status, Time Taken for Loan to Sanctioned, Difficulty in processing the Loan, fall in the nominal scale. The remaining two factors, “The Loan Sanctioned amount” and the “Loan Mix,” i.e., Short-term Loan Proportion and Long-term Loan Proportion, are continuous variables.

3.1 Sample Characteristics using Classification of MSMEs Sector

Table 1 gives a layered table constituting the categorization segment. As we can observe from Table 1, proportionately more firms belong to Agriculture and Allied, followed by the Garment, Jute & Textile sector. Noteworthy, based on questionnaire responses, certain sectors were clubbed together for dimensionality reduction of the variables. On the classification side, the number of firms belonging to manufacturing supersedes the service segment. While on the part of ownership status, an asymmetry exists within the sectorial and industry classification. For certain sectors, the venture is collectively operated by a group of individuals, whereas for certain sectors such as Agriculture and Allied, the ownership is limited to select few partners. Quite less common, single ownership is observed across the sector and classification.

Table 1: Classification of Sector * Type of Business Unit * Sectorial Categorization

Sectorial Categorization			Type of Business Unit			Total
			Company	Partnership	Proprietorship	
Agriculture & Allied	Manufacturing	Count	10	18	4	32
		% within Classification of Sector	31.30%	56.30%	12.50%	100%
		% within Type of Business Unit	83.30%	81.80%	66.70%	80%
		% of Total	25.00%	45.00%	10.00%	80%
	Service	Count	2	4	2	8
		% within Classification of Sector	25.00%	50.00%	25.00%	100%
		% within Type of Business Unit	16.70%	18.20%	33.30%	20%
		% of Total	5.00%	10.00%	5.00%	20%
	Total	Count	12	22	6	40
		% within Classification of Sector	30.00%	55.00%	15.00%	100%
		% within Type of Business Unit	100.00%	100.00%	100.00%	100%
		% of Total	30.00%	55.00%	15.00%	100%

Sectorial Categorization				Type of Business Unit			Total
				Company	Partnership	Proprietorship	
Processed Food Items	Classification of Sector	Manufacturing	Count	3			3
			% within Classification of Sector	100.00%			100%
			% within Type of Business Unit	60.00%			60%
			% of Total	60.00%			60%
	Service		Count	2			2
			% within Classification of Sector	100.00%			100%
			% within Type of Business Unit	40.00%			40%
			% of Total	40.00%			40%
	Total		Count	5			5
			% within Classification of Sector	100.00%			100%
			% within Type of Business Unit	100.00%			100%
			% of Total	100.00%			100%
Rubber & Plastics	Classification of Sector	Manufacturing	Count	6	6		12
			% within Classification of Sector	50.00%	50.00%		100%
			% within Type of Business Unit	100.00%	100.00%		100%
			% of Total	50.00%	50.00%		100%
	Total		Count	6	6		12
			% within Classification of Sector	50.00%	50.00%		100%
			% within Type of Business Unit	100.00%	100.00%		100%
			% of Total	50.00%	50.00%		100%
Engineering & Electricals	Classification of Sector	Manufacturing	Count	3		4	7
			% within Classification of Sector	42.90%		57.10%	100%
			% within Type of Business Unit	60.00%		80.00%	70%
			% of Total	30.00%		40.00%	70%
	Service		Count	2		1	3

Sectorial Categorization		Type of Business Unit			Total	
		Company	Partnership	Proprietorship		
Total		% within Classification of Sector	66.70%		33.30%	100%
		% within Type of Business Unit	40.00%		20.00%	30%
		% of Total	20.00%		10.00%	30%
	Total	Count	5		5	10
		% within Classification of Sector	50.00%		50.00%	100%
		% within Type of Business Unit	100.00%		100.00%	100%
		% of Total	50.00%		50.00%	100%
	Garment, Jute & Textiles	Manufacturing	Count	17		7
% within Classification of Sector			70.80%		29.20%	100.0%
% within Type of Business Unit			73.90%		70.00%	72.7%
% of Total			51.50%		21.20%	72.7%
Service		Count	6		3	9
		% within Classification of Sector	66.70%		33.30%	100%
		% within Type of Business Unit	26.10%		30.00%	27.3%
		% of Total	18.20%		9.10%	27.30 %
Total		Count	23		10	33
		% within Classification of Sector	69.70%		30.30%	100%
		% within Type of Business Unit	100.00%		100.00%	100%
		% of Total	69.70%		30.30%	100%
Total	Manufacturing	Count	39	24	15	78
		% within Classification of Sector	50.00%	30.80%	19.20%	100%
		% within Type of Business Unit	76.50%	85.70%	71.40%	78%
		% of Total	39.00%	24.00%	15.00%	78%
	Service	Count	12	4	6	22
		% within Classification of Sector	54.50%	18.20%	27.30%	100%

Sectorial Categorization		Type of Business Unit			Total
		Company	Partnership	Proprietorship	
Total	% within Type of Business Unit	23.50%	14.30%	28.60%	22%
	% of Total	12.00%	4.00%	6.00%	22%
	Count	51	28	21	100
	% within Classification of Sector	51.00%	28.00%	21.00%	100%
	% within Type of Business Unit	100.00%	100.00%	100.00%	100%
	% of Total	51.00%	28.00%	21.00%	100%

3.2 Sample Characteristics using Educational Classification

If we consider the education segment, we find more than half of the respondents lie on the less educated front. Figure 3 – Panel A1 depicts the same. A clear trend can be observed among the owner’s education level and the industry viz. manufacturing or service they opt to operate (Figure 3 – Panel B). Whereas, in the case of unit type and education level, the people of uneducated and Post-graduation groups are more into single ownership.

On the other hand, people having a college degree have more proportion in “Company” or joint ownership (Figure 3 – Panel C). With respect to sector’s, Agriculture & Allied sector has more MSME from people who either are uneducated or have a college degree, whereas the Processed Food item industry has only people with Post Graduation (Figure 3 – Panel D). Also, for the Engineering and Electricals segment, we have people from College degrees only. Importantly, the sectors with most of the people working viz. Agriculture & Allied and Garment, Jute & Textile, most of the owners are uneducated (Figure 3 – Panel D). The nominal variables are tested in the first three sub-sections of Section 1.7, whereas continuous variables are further explored in Section 1.8.

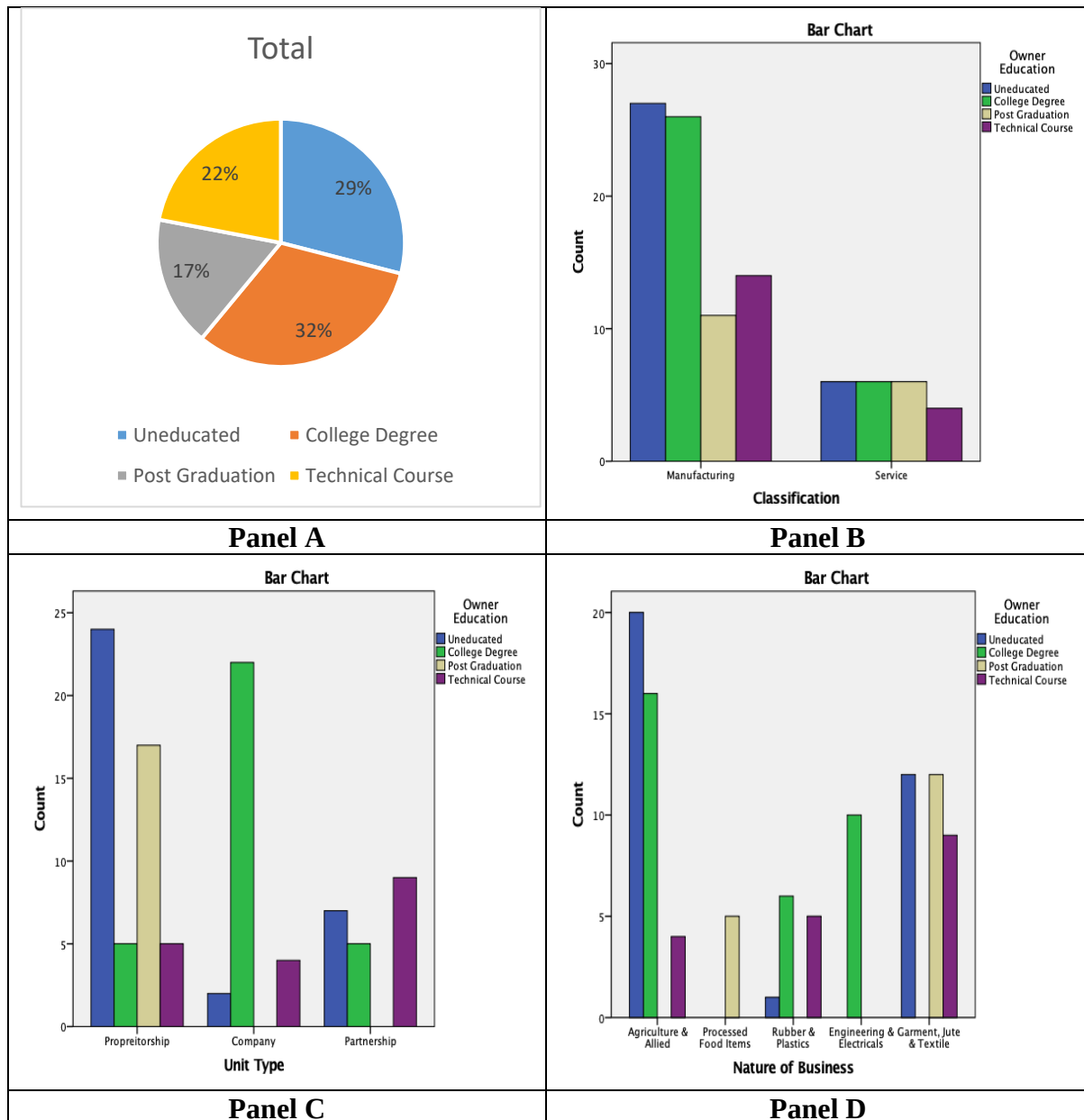


Figure 3: Sample Characteristics using Educational Classification

Chapter 4

Hypothesis for Understanding the Financing and Capital Issues

4. Hypothesis for Understanding the Financing and Capital Issues (Loan Process)

This section builds a set of hypotheses to understand the nature of financing and capital issues for the MSMEs of the state of Bihar. Noteworthy, the attributes of the Loan process are covered in the “Financing” of the questionnaire. Importantly, the nature of an MSME, i.e., (Industry type, sector to which it belongs and the type of ownership), the Awareness level of an MSME applicant, Educational Level of the MSME applicant may impact the “Loan process.” Hence, we frame a hypothesis to test the attributes that may impact the Loan process. For the same, a subset of the hypothesis has been framed to test each attribute across different factors of the loan process. Notably, the factors of loan process covered in the manuscript are “Loan Status,” “Difficulty of getting Loan,” “Time Taken for Loan Sanctioning,” “Short-Term Loan Share,” “Long-Term Loan Share,” “Loan Demanded,” “Loan Sanctioned.” Figure 4 is representing the hierarchical structure of segments of the questionnaire.

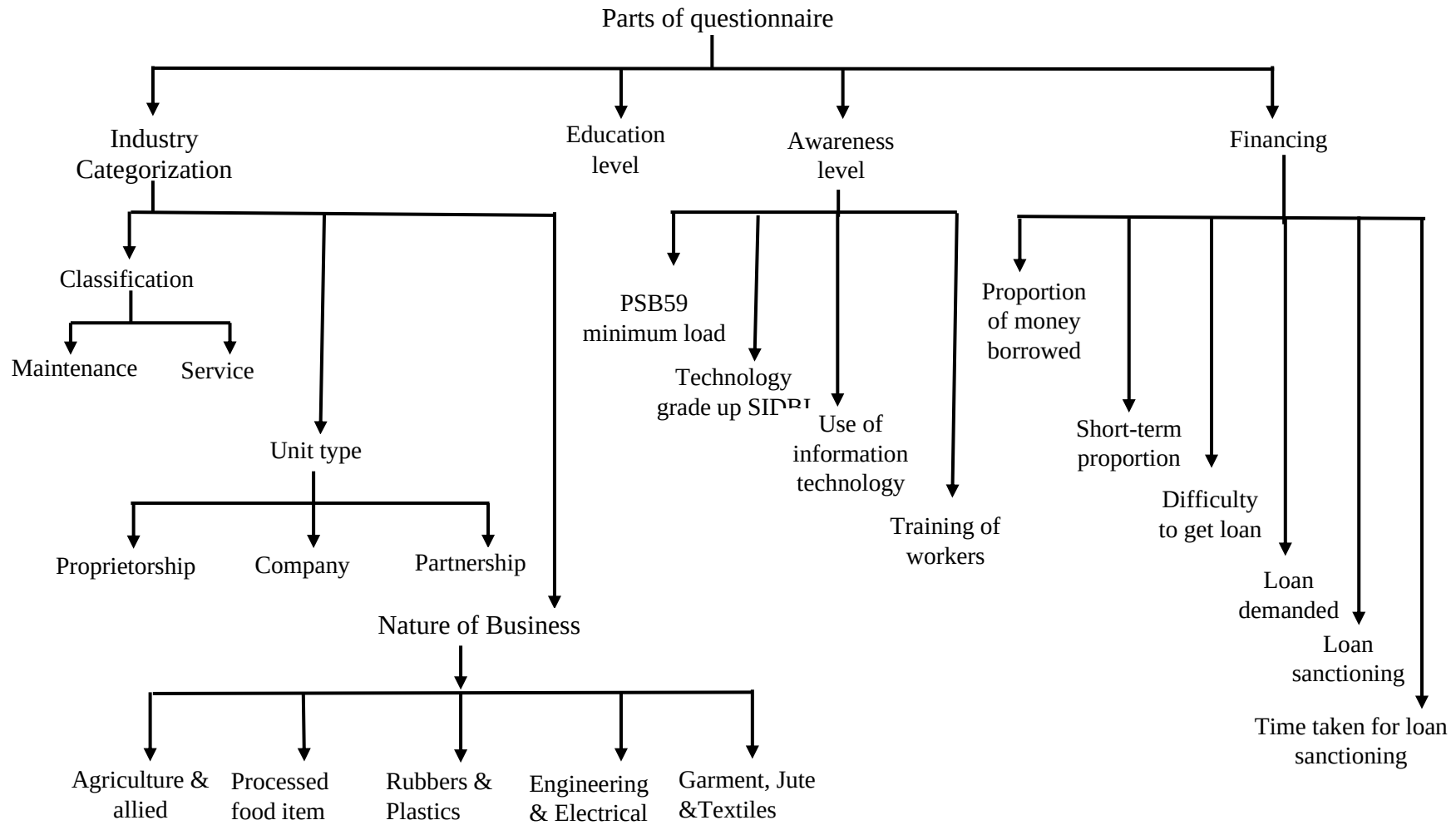


Figure 4: Hierarchical Structure of Segments of the Questionnaire

4.1 Hypothesis for Industry Categorization

Under Industry Categorization, we have three sub-segments viz. Industry Classification (Manufacturing, Service), Unit Type (Proprietorship, Company, Partnership), Nature of Business (Agriculture & Allied, Processed Food Items, Rubbers & Plastics, Engineering & Electricals, Garment, Jute & Textile). Since we have seven variables in the financing process that impact the loan process, hence we frame seven hypotheses, each with every sub-segment of Industry categorization. The hypothesis to be tested are listed below:

4.1.1 Hypothesis for Industry Classification

Hypothesis 1.1a: To investigate the relationship between the Loan status and Industry Classification

Ho: Loan status is independent of the Industry Classification

H1: Loan status is not independent of the Industry Classification

Hypothesis 1.1b: To investigate the relationship between the Difficulty of getting loan and Industry Classification

Ho: Difficulty of getting Loan is independent of the Industry Classification

H1: Difficulty of getting Loan is not independent of the Industry Classification

Hypothesis 1.1c: To investigate the relationship between the Time taken for loan sanctioning and Industry Classification

Ho: Time taken for loan sanctioning is independent of the Industry Classification

H1: Time taken for Loan sanctioning is not independent of the Industry Classification

Hypothesis 1.1d: To compare the distribution of Short-Term Loan share across the group classified by Industry Classification

H₀: There is no significant difference between the distribution of Short-Term Loan shares across the group

H₁: At least one of the group distributions differs significantly from the rest.

Hypothesis 1.1e: To compare the distribution of Long-Term Loan share across the group classified by Industry Classification

H₀: There is no significant difference between the distribution of Long-Term Loan shares across the group

H₁: At least one of the group distributions differs significantly from the rest.

Hypothesis 1.1f: To compare the distribution of Loan Demanded across the group classified by Industry Classification

H₀: There is no significant difference between the distribution of Loan Demanded across the group

H₁: At least one of the group distributions differs significantly from the rest.

Hypothesis 1.1g: To compare the distribution of Loan Sanctioned share across the group classified by Industry Classification

H₀: There is no significant difference between the distribution of Loan Sanctioned across the group

H₁: At least one of the group distributions differs significantly from the rest.

4.1.2 Hypothesis for Industry Business Unit Type

Hypothesis 1.2a: To investigate the relationship between the Loan status and Unit type

H₀: Loan status is independent of the Unit Type

H₁: Loan status is not independent of the Unit type

Hypothesis 1.2b: To investigate the relationship between the Difficulty of getting Loan and Unit Type

H₀: Difficulty of getting Loan is independent of the Unit Type

H1: Difficulty of getting Loan is not independent of the Unit Type

Hypothesis 1.2c: To investigate the relationship between the Time Taken for loan sanctioning and Unit Type

Ho: Time Taken for loan sanctioning to get Loan is independent of the Unit Type

H1: Time Taken for loan sanctioning to get Loan is not independent of the Unit Type

Hypothesis 1.2d: To compare the distribution of Short-Term Loan share across the group Unit Type

Ho: There is no significant difference between the distribution of Short-Term Loan shares across the group

H1: At least one of the group distributions differs significantly from the rest.

Hypothesis 1.2e: To compare the distribution of Long-Term Loan share across the group Unit Type

Ho: There is no significant difference between the distribution of Long-Term Loan shares across the group

H1: At least one of the group distributions differs significantly from the rest.

Hypothesis 1.2f: To compare the distribution of Loan Demanded across the group Unit Type

Ho: There is no significant difference between the distribution of Loan Demanded across the group

H1: At least one of the group distributions differs significantly from the rest.

Hypothesis 1.2g: To compare the distribution of Loan Sanctioned share across the group Unit Type

Ho: There is no significant difference between the distribution of Loan Sanctioned across the group

H1: At least one of the group distributions differs significantly from the rest.

4.1.3 Hypothesis for Nature of Business

Hypothesis 1.3a: To investigate the relationship between the Loan status and Nature of Business

Ho: Loan status is independent of the Nature of Business

H1: Loan status is not independent of the Nature of Business

Hypothesis 1.3b: To investigate the relationship between the Difficulty of getting Loan and Nature of Business

Ho: Difficulty of getting Loan is independent of the Nature of Business

H1: Difficulty of getting Loan is not independent of the Nature of Business

Hypothesis 1.3c: To investigate the relationship between the Time Taken for loan sanctioning and the Nature of Business

Ho: Time Taken for loan sanctioning to get Loan is independent of the Nature of Business

H1: Time Taken for loan sanctioning to get Loan is not independent of the Nature of Business

Hypothesis 1.3d: To compare the distribution of Short-Term Loan share across the group Nature of Business

Ho: There is no significant difference between the distribution of Short-Term Loan shares across the group

H1: At least one of the group distributions differs significantly from the rest.

Hypothesis 1.3e: To compare the distribution of Long-Term Loan share across the group Nature of Business

Ho: There is no significant difference between the distribution of Long-Term Loan shares across the group

H1: At least one of the group distributions differs significantly from the rest.

Hypothesis 1.3f: To compare the distribution of Loan Demanded across the group Nature of Business

Ho: There is no significant difference between the distribution of Loan Demanded across the group

H1: At least one of the group distributions differs significantly from the rest.

Hypothesis 1.3g: To compare the distribution of Loan Sanctioned share across the group Nature of Business

Ho: There is no significant difference between the distribution of Loan Sanctioned across the group

H1: At least one of the group distributions differs significantly from the rest.

4.2 Hypothesis for Relationship of Education Status with Loan Process

Hypothesis 2a: To investigate the relationship between the Loan status and Owners Education

Ho: Loan status is independent of the Owner's Education level

H1: Loan status is not independent of the Owner's Education Level

Hypothesis 2b: To investigate the relationship between the Difficulty in getting loan and Owners Education

Ho: Difficulty in Getting Loans is independent of the Owner's Education level

H1: Difficulty in Getting Loans is not independent of the Owner's Education Level

Hypothesis 2c: To investigate the relationship between the Time Taken for Loan Sanctioning and Owners Education

Ho: Time Taken for Loan Sanctioning is independent of the Owner's Education level

H1: Time Taken for Loan Sanctioning is not independent of the Owner's Education Level

Hypothesis 2d: To compare the distribution of Short-Term Loan share across the group Owner Education

Ho: There is no significant difference between the distribution of Short-Term Loan shares across the group

H1: At least one of the group distributions differs significantly from the rest.

Hypothesis 2e: To compare the distribution of Long-Term Loan share across the group Nature of Owner Education

Ho: There is no significant difference between the distribution of Long-Term Loan shares across the group

H1: At least one of the group distributions differs significantly from the rest.

Hypothesis 2f: To compare the distribution of Loan Demanded across the group Owner Education

Ho: There is no significant difference between the distribution of Loan Demanded across the group

H1: At least one of the group distributions differs significantly from the rest.

Hypothesis 2g: To compare the distribution of Loan Sanctioned share across the group Owner Education

Ho: There is no significant difference between the distribution of Loan Sanctioned across the group

H1: At least one of the group distributions differs significantly from the rest.

4.3 Hypothesis for Relationship of Awareness Level of Owner's with the Loan process

Hypothesis 3a: To investigate the relationship between the Awareness Level & Loan Status

Ho: Awareness Level is independent of the Loan Status

H1: Awareness level is not independent of the Loan status

Hypothesis 3b: To investigate the relationship between the Awareness Level & the Difficulty of getting Loan

Ho: Awareness Level is independent of the Difficulty of getting Loan

H1: Awareness level is not independent of the Difficulty of getting Loan

Hypothesis 3c: To investigate the relationship between the Awareness_Level & Time Taken for Loan sanctioning

Ho: Awareness Level is independent of the Time Taken for Loan sanctioning

H1: Awareness Level is not independent of the Time Taken for Loan sanctioning

Hypothesis 3d: To compare the distribution of Short-Term Loan share across the group Awareness Level

Ho: There is no significant difference between the distribution of Short-Term Loan shares across the group

H1: At least one of the group distributions differs significantly from the rest.

Hypothesis 3e: To compare the distribution of Long-Term Loan share across the group

Awareness Level

H₀: There is no significant difference between the distribution of Long-Term Loan shares across the group

H₁: At least one of the group distributions differs significantly from the rest.

Hypothesis 3f: To compare the distribution of Loan Demanded across the group

Awareness Level

H₀: There is no significant difference between the distribution of Loan Demanded across the group

H₁: At least one of the group distributions differs significantly from the rest.

Hypothesis 3g: To compare the distribution of Loan Sanctioned share across the group

Awareness Level

H₀: There is no significant difference between the distribution of Loan Sanctioned across the group

H₁: At least one of the group distributions differs significantly from the rest.

4.4 Hypothesis for Loan Demanded and Loan Sanctioned

Hypothesis 4: To compare the median of Loan demanded and Loan sanctioned from the bank

H₀: There is no significant difference between the median value of Loan demanded and Loan sanctioned

H₁: The median value for Loan demanded differs significantly from Loan Sanctioned

Note: Tolerance limit for all the hypothesis test is $\alpha = 0.05$

Chapter 5

Methodology

5. Methodology

5.1 Parametric Tests Used in the Study

Chi-square test

A chi-square test statistic is the most commonly used parametric test to check the association among two categorical variables. For a given contingency table 2, the chi-square test statistics are computed as the aggregate sum of the square of the difference of the observed frequency and expected frequency divided by expected frequency. Noteworthy, the null hypothesis states that variable Gender and Study behavior are independent. In that case, the frequency count observed in Table 2 should be the same as expected. The chi-square statistics is computed as given below:

Table 2: Contingency Table depicting Frequency Count

Gender/Study Behaviour	Boy	Girl	Row total
Studying	a	b	a+b
Non-studying	c	d	c+d
Column Total	a+c	b+d	a+b+c+d (=n)

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

Where O is the observed frequency count, and E is the expected frequency count for each cell. Note in case of independence, the expected count equates to the ratio of total frequency count of a row divided by the total number of elements. In case of table 2, expected count ratio of row 1 (Non- studying) equals $(a+b)/n$. Thus, the expected frequency count at cell position (1,1), i.e., (Boy, Non-studying) equals to $\{ (a+c) * (a+b)/n \}$. In the case of complete independence, the observed frequency count equals the observed, thus reducing the chi-square test statistics to zero. The null hypothesis states the same. More positive the chi-square test statistics, the more is the deviation from independence between the two

variables and more is the association. Noteworthy, the chi-square test comes with the assumption that not more than 20 percent of the cell frequency count should be less than 5. In such a case, the distribution deviates from chi-square distribution, and hence we opt for a non-parametric test.

Shapiro-Wilk Test

Shapiro – Wilk test is deployed to test the dataset distribution (normal distribution). The null hypothesis states that a given continuous variable coming from a random sample The W test statistics is computed as follows

$$w = \{(\sum_{i=1}^n a_i x_i)^2\} / \{\sum_{i=1}^n (x_i - \bar{x})^2\}$$

More the small value of “w” more is the deviation from normality. In the above equation x_i are the ordered sample values with i values ranging from $(1 \dots n)$ and a_i are the constants generated from the mean, variances, and covariances from a normal distribution. For a given level of tolerance, the null hypothesis states that the data is normally distributed. A p-value observed to be less than the tolerance rejects the null hypothesis implying that the data is not normally distributed.

5.2 Non-Parametric Test

Kolmogorov-Smirnov Test

Kolmogorov- Smirnov test is a non-parametric test to decide the distribution to which a sample belongs. The K-S test is basically based on the empirical distribution function. Given an N ordered data X_i , i ranging from $\{1 \dots n\}$, ECDF is defined as

$$E_n = n(i)/N$$

Where $n(i)$ represents the number of points less than X_i . The null hypothesis of the K-S test states that the data follows a certain distribution. At a given tolerance level (α), the Kolmogorov- Smirnov test statistics is computed as

$$D = \max (1 \leq i \leq N (F(X_i) - (i - 1)/N, i/N - F(X_i))$$

Where F is a theoretical cumulative, continuous distribution. The null hypothesis is rejected in case the value of D test statistics exceeds the critical value.

Fischer-exact Test

It is a non-parametric test to test the statistical significance of the non-random association of two variables of a contingency table, Table 2. Quite contrary to the chi-square test where we assume the frequency count of no more than 20% of the dataset to be below 5, Fisher exact test has no such underlying assumption. The mathematical formulation of the test first involves computing the sum of each row and each column of the matrix. As we can observe from Table 2, the two-row sum and column sum can be represented safely as

$$R_i = \sum r_i ,$$

$$C_i = \sum c_i$$

where R_1 equals $(a+b)$ and R_2 equals $(c+d)$ respectively, similarly we can see the two-column sum equating to $(a+c)$ and $(b+ d)$ respectively. Thereafter, the total sum can be computed as the sum of rows and columns, i.e., $(a+b+c+d = n)$. After that, the conditional probability of getting a particular row and column is given by

$$P = \frac{(a + b)! (c + d)! (a + c)! (b + d)!}{a! b! c! d! n!}$$

The formula is a multivariate generalization of a hypergeometric probability function. We then compute the P-cut-off for all possible cell combinations and sum that P-cut-off, whose value is less than the observed table 2. In case the summation of all those P-values sums is less than the tolerance, we reject the null hypothesis. Thus, leading to the conclusion that a significant non-random association exists between Gender and study behavior of a student.

Spearman's Rank-Order Correlation

A non-parametric equivalent to Pearson correlation deployed when the continuous variables to be tested deviate from normality assumption. Just like the Pearson correlation coefficient, the Spearman rank-order computes a coefficient termed as “ ρ .” It measures the direction and strength of association among the variables. The only assumption of the test is that the variables are at least on the ordinal scale. The rank-order correlation coefficient is computed as follows:

$$\rho = 1 - (6 * \sum_{i=1}^n d_i^2) / (n * (n^2 - 1))$$

The spearman coefficient can take any value from -1 to +1. In the equation, d_i is the difference in the rank of each i^{th} element.

The Kruskal-Wallis H test

The test is a non-parametric equivalent of ANOVA and is deployed when mean is not a right reflector of central tendency. It happens mostly in the case of data being highly skewed; hence, the comparison of mean is not the right reflector. The test checks for

significant dispersion of the median between the two groups. Noteworthy, in case of the presence of a number of outliers, the dataset deviates from normality assumption. Thus the ANOVA test fails to apply. In that situation, the Kruskal Wallis test H test can be deployed where the H-test statistics can be computed as follows:

$$H = \frac{12}{n(n+1)} \sum_{j=1}^k \frac{R_j^2}{n_j} - 3(n+1)$$

Here, R_i is the rank sum for the i^{th} group, and n is the total sample size, whereas k is the number of groups. After that, the H-test statistics are compared with the critical value test statistics at $K-1$ degree of freedom. In case the H-test statistics are greater than the critical value, we reject the null hypothesis. It implies that the median across the group is not the same.

5.3 Reliability Test (Cronbach's Alpha)

The test is used to test the internal consistency of the scale. It helps to figure out the inclusion of variables that keep the internal consistency values on the higher side. Table 3 displays the α value to reflect internal consistency. Higher the α value, the higher is the consistency. The minimum desired level for α is 0.7. Suppose that we want to measure a quantity, which is the sum of K components. After that, the α value can be computed as follows:

$$Y = X_1 + X_2 + \dots + X_k$$

$$\alpha = (k / k-1) * (1 - (\sum_{i=1}^k X_i^2 / X^2))$$

Where k is the number of variables included, and X_i is the corresponding values. Table 3 displays the internal consistency values with the scale. As we can observe, that α value

above 0.7 is desirable. Thus after running the Cronbach's Alpha test, we include only those variables that keep the α value above 0.7

Table 3: α Value to reflect the Internal Consistency

Cronbach's alpha	Internal consistency
$0.9 \leq \alpha$	Excellent
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

5.4 Ordinal Logistic Regression

The ordinal logit model is a regression method for an ordinal response variable. The purpose of the analysis is to establish the degree of significance up to which a response variable can be predicted by predictors. Noteworthy, the predictors can be continuous or categorical variables. A major assumption of ordinal logit is proportional odds, i.e., the effect of a predictor variable is constant for increment in the level of response.

$$Y = \beta * X + \varepsilon$$

The above equation represents a simplest ordinal logit model, with the response variable Y on the ordinal scale and the predictor variable X being either categorical or continuous. Apart from β , i.e., the coefficient of the predictor variable, proportional to odds, i.e., β_m is computed to identify the likelihood of getting higher values of the response variable with an increment in the predictor variable. Suppose the proportion of members of the statistical population on the ordinal scale is p_i for different levels at the ordinal scale $\{i \in (1, n)\}$. Thus, the probability of the odds can be computed as

$$P_i = \log (p_i / \sum_{i=1}^n p_i)$$

After that, maximum likelihood is computed to measure the goodness of fit of the model. In case the significance value is less than α the ordinal logit model is a good fit.

5.5 Hosmer-Lemeshow Test

This statistical test is used to check the goodness of fit of a logistic regression model. To compute the test statistics, the data is divided into groups and the observed values are matched with the computed values from the logit model to be factored into the chi-square test statistics.

$$X^2_{HL} = \sum_{i=1}^n (O_i - E_i)^2 / \{ E_i * (1 - E_i / j_i) \}$$

Where O_i signify the observed events, E_i signifies expected events computed via logit model, “j” signifies number of observations for the i^{th} group, and “n” denotes the number of the groups. Noteworthy, the test statistics follow a chi-square distribution with (n-2) degrees of freedom. Most importantly, a small value of p, i.e., less than the tolerance signify a poor fit, whereas a large p-value closer to 1 signify a good fit of the logit model.

5.6 Likelihood – Ratio Test

This test is used to determine the goodness of fit amongst the two nested models. Noteworthy, a no model with zero predictors too can be used to cross compare with a fitted multinomial model. A best fit model is the one that maximises the likelihood function. It deploys the log-likelihood equation as the objective function with maximization.

$$LRT = - 2 \ln (L_i / L_j)$$

where L_i & L_j denotes the log likelihood maximized values for the two models to be compared. It follows a chi-square distribution with degrees of freedom as the difference in

the number of parameters plugged in for fitting the model. The level of significance is measured via p-value. In case the significance level lies below tolerance (α), indicates the model in the denominator to be a good fit. The purpose is to reject the null hypothesis via significance level to choose between the two models.

5.7 Binary Logistic Regression

The statistical model uses a logistic function to model a dichotomous dependent variable. For categorical responses the dependent variable is dummy coded to fit the logit model. Assuming a simple model with two predictors x_1 and x_2 , the response variable can be estimated via following equation:

$$\text{Ln} (p/1-p) = \beta_0 + \beta_1 * x_1 + \beta_2 * x_2$$

Chapter 6

Analysis of Hypothesis Testing for Loan Process

6. Analysis of Hypothesis Testing for Loan Process

The results obtained in the present study has been divided into the following sections:

6.1 Relationship of MSMEs Categorization with Loan Process

In this section, we opt for hypothesis testing across four major groups in which the MSMEs can be classified one) Industry to which it belongs, i.e., “Manufacturing or service”, 2) Type of Business Unit, i.e., Proprietorship, Company, Partnership, 3) Sector in which firm operates, i.e., Agriculture & Allied, Processed Food Items, Rubber & Plastics, Engineering & Electricals and Garment, Jute & Textiles. We frame the hypothesis for these groups to investigate the relationship with three dependent variables, i.e., “Loan status” and “Difficulty of getting Loan” and “Time Taken for Loan Sanctioning.” The purpose is to figure out whether some degree of association exists across the groups when it comes to loan sanctioning or the time to get the loan disbursed. For the same, we frame the hypothesis across the four groups. Importantly, the five major factors that impact the Loan process viz. Time, Ease, Approval, Amount, Mix. In our research, through our questionnaire, we have collected these five vital factors that give an insight over the loan process. For time, we have the variable “Time Taken for Loan Sanctioning,” for ease the variable is “Difficulty of getting Loan,” for approval it is “Loan Status” and for amount and mix, we have “Loan Sanctioned,” “Short-term loan share” and “Long-term loan share” respectively. In the current section, we focus on the first three-factor only, i.e., Time, Ease, and Approval, whereas the other two factors are tested in section 1.8.

6.1.1 Hypothesis Testing for Industry Classification

- Hypothesis test 1.1a: To investigate the relationship between the Loan status and Industry Classification
- Hypothesis test 1.1b: To investigate the relationship between the Difficulty of getting loan and Industry Classification
- Hypothesis test 1.1c: To investigate the relationship between the Time Taken for loan sanctioning and Industry Classification

From Figure 5 - Panel A, we observe that MSMEs operating in the manufacturing sector have more Loans approved than rejected. To understand whether any kind of linear association exists between the industry classification and Loan approval, we perform a chi-square test statistic. Importantly, not more than 20% of the observed frequency count of Loan status (“Yes” and “No”) across the group manufacturing and services do not fall below “5”. Hence the assumptions of the chi-square test are satisfied, and we proceed further to run the test. As we can observe from Table 4, Panel A that the chi-square test statistic is much above the tolerance level, i.e., 5%, thus we cannot reject the null hypothesis. It signifies that possibility to get a loan and the industry to which an MSME belongs has no linear association. Importantly, from the loan manager perspective, no differentiation is made on the basis of the industry to which an MSME belongs while passing the loan. The second hypothesis test the linear association between industry classification and the difficulty of getting a loan. Figure 5 - Panel B displays the frequency count of the three options under the Difficulty of getting Loan (“yes,” “no,” and “It was easy, but the loan officer did not know the proper procedure”). As we can observe that the assumptions are fulfilled to run chi-square test statistics, as the frequency count below “5” does not fall below 20% of the total counts. Table 4 - Panel B displays the chi-square test

statistics, and we can observe that chi-square statistics lie much above the tolerance level; hence, we do not have enough statistical evidence to reject the null hypothesis. It implies that no matter to which industry an MSME belongs, the difficulty of getting a loan is invariant. The next is to investigate the association of Time taken for loan sanctioning and Industry Classification. Figure 5 - Panel C displays the frequency count of Time for Loan sanctioning with options (“within one week,” “more than two months,” “never”). As we can observe that the majority of the approved loan took more than two months for disbursal irrespective of the industry the MSME belongs, be it manufacturing or service. Whereas, disbursal of loan within one week is abysmally low. Thus, we run chi-square test statistics to check whether the time taken for loan sanctioning is associated with industry classification or not. As we can observe, that the significance level is much higher than tolerance Table 4 - Panel C, implying that we cannot reject the null hypothesis. Hence it can be concluded that industry classification has no association with time duration to get the loan sanctioned. Thus, the three factors of the loan process viz. Loan Status, Difficulty of getting Loan, Time Taken for Loan Sanctioning bears no linear association with the industry to which an MSME belongs. The other two factors, i.e., Loan Sanctioned and the Loan Mix (subdivided into short term loan proportion and long-term loan proportion are tested in section 1.8.

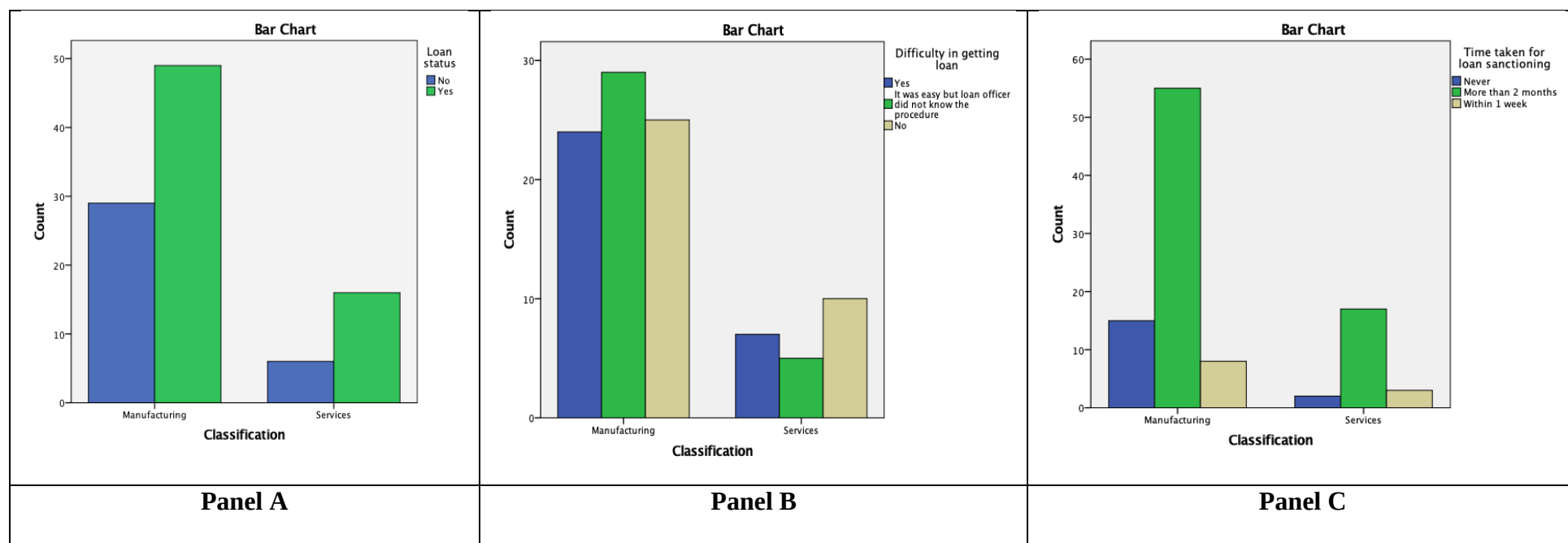


Figure 5: Relationship between Industry Classification and Loan Status, Difficulty in Getting Loan, Time for Loan Sanctioning

Table 4: Hypothesis Test Statistics between Industry Classification and Loan Status,
Difficulty in Getting Loan, Time for Loan Sanctioning

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	.740 ^a	1	.390	.456	.275
Continuity Correction ^b	.369	1	.544		
Likelihood Ratio	.762	1	.383		
Fisher's Exact Test					
Linear-by-Linear Association	.733	1	.392		
N of Valid Cases	100				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.70.

b. Computed only for a 2x2 table

Panel A: Classification * Loan Status

Chi-Square Tests			
	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	1.941 ^a	2	.379
Likelihood Ratio	1.990	2	.370
Linear-by-Linear Association	.394	1	.530
N of Valid Cases	100		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.82.

Panel B: Classification * Difficulty in Getting Loan

Chi-Square Tests			
	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	1.325 ^a	2	.516
Likelihood Ratio	1.471	2	.479
Linear-by-Linear Association	1.123	1	.289
N of Valid Cases	100		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.42.

Panel C: Classification * Time for loan sanctioning

6.1.2 Hypothesis for Industry Business Unit Type

The next segment in MSME categorization is the type of Business Unit, for which we test the hypothesis as similar to industry type. The hypothesis to be tested are listed below.

- **Hypothesis test 1.2a:** To investigate the relationship between the Loan status and Unit type
- **Hypothesis test 1.2b:** To investigate the relationship between the Difficulty of getting loan and Unit Type
- **Hypothesis test 1.2c:** To investigate the relationship between the Time Taken for loan sanctioning and Unit Type

Figure 6 - Panel A, B, C display the frequency count of the three Loan process factors, i.e., Loan status, Difficulty of getting Loan, Time taken for Loan sanctioning. The first observation is that the maximum loan rejection has happened with single ownership of MSME, i.e., Proprietorship (Figure 6 - Panel A). On the “Difficulty of getting loan” front, almost all the three possible outcomes, i.e., (yes, no, it was easy, but the loan manager did not know the procedure) lie close enough to each other in frequency count for the three types of business unit Figure 6 - Panel B). However, the last factor, i.e., Time Taken for Loan Sanctioning, has skewed observation with the majority of loans being sanctioned in more than two months (Figure 6 - Panel C). Thereafter, we run the chi-square test to measure the degree of association of the three factors with the Business Unit type. Noteworthy, the frequency count for Time for Sanctioning Loan drops less than 5 for more than 20% observation; hence, we opt for an extended version of the Fisher-exact test, i.e., Freeman Halton test.

As we can observe from Table 5 - Panel A, B that Loan status and Difficulty of getting Loan is independent of the Unit Type, as we cannot reject the null hypothesis due

to significance level $>$ tolerance. It implies irrespective of the ownership type of an MSME business the chances of loan approval or rejection is equally likely. Thus, the bank remains unbiased while sanctioning loan and ownership type is not considered a significant factor to approve or reject the loan. Even the level of difficulty to get loan sanctioned remains independent of ownership type, implying that the possibility of hassle-free loans with a certain kind of ownership is pretty low. For the third factor, i.e., Time taken for Loan sanctioning, we run the Freeman-Halton test (Table 5 – Panel C). Since the p-value is significantly lower than the tolerance, we reject the null hypothesis, implying that the Time Taken for loan sanctioning is not independent of Unit Type. Even from Panel C- Figure 6, we can observe that unit type “partnership” has significantly lower frequency count of “Time Taken {More than two months}” in comparison to Proprietorship (single ownership) and Company (more than two owners). Importantly, the “Loan demanded” be a plausible reason for the asymmetry. For the same, the “Loan demanded” distribution will be tested across the groups in section 1.8.

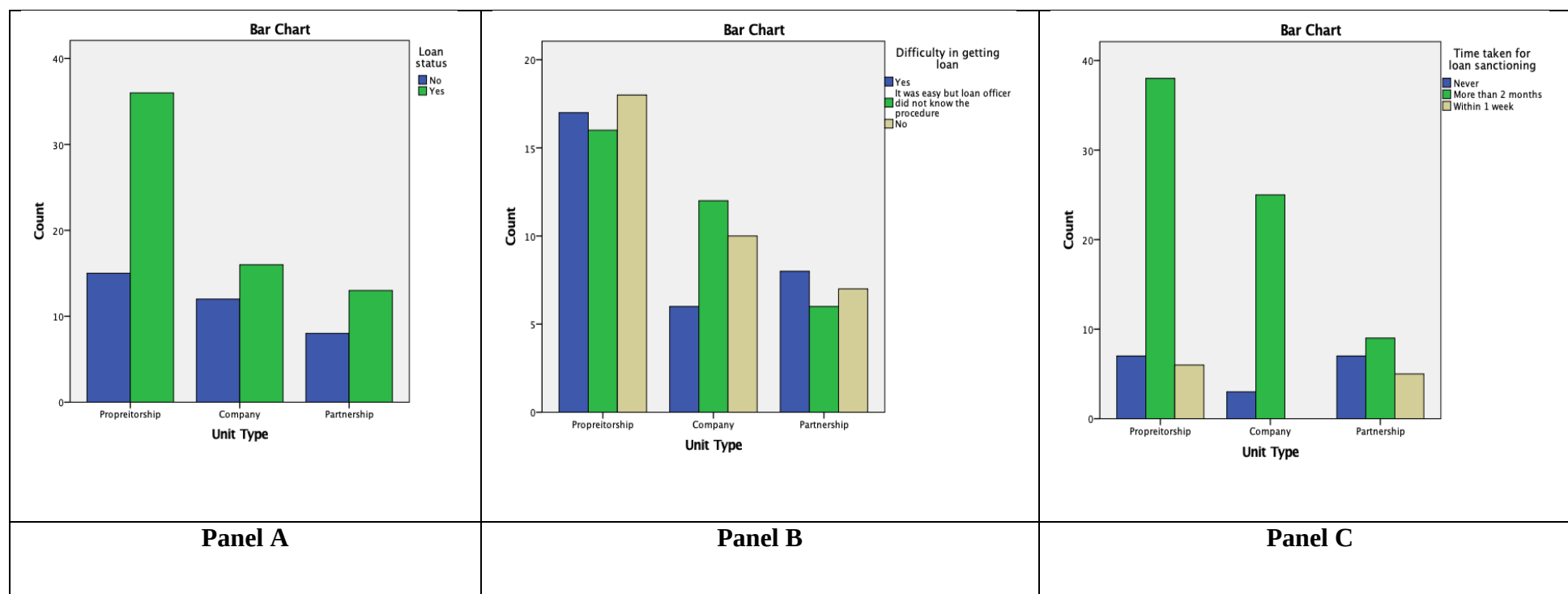


Figure 6: Relationship between Unit Type and Loan Status, Difficulty in Getting Loan, Time for Loan Sanctioning

Table 5: Hypothesis Test Statistics between Unit Type and Loan Status, Difficulty in Getting Loan, Time for Loan Sanctioning

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.548 ^a	2	.461
Likelihood Ratio	1.545	2	.462
Linear-by-Linear Association	.846	1	.358
N of Valid Cases	100		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.35.

Panel A: Unit Type * Loan

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.212 ^a	4	.697
Likelihood Ratio	2.251	4	.690
Linear-by-Linear Association	.015	1	.902
N of Valid Cases	100		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.51.

Panel B: Unit Type * Difficulty of Getting Loan

Freeman – Halton		
p-value	0.004285	
alternative hypothesis: two.sided		

Panel C: Unit Type * Time for Loan Sanctioning

6.1.3 Hypothesis for Nature of Business

The next categorization segment is the “Sectorial classification” captured via the Nature of Business. For the same, a hypothesis has been framed to test the association with the three Loan process factors.

- **Hypothesis test 1.3a:** To investigate the relationship between the Loan status and Nature of Business
- **Hypothesis test 1.3b:** To investigate the relationship between the Difficulty of getting loan and Nature of Business
- **Hypothesis test 1.3c:** To investigate the relationship between the Time Taken for loan sanctioning and the Nature of Business

From Figure 7 - Panel A, B, C we can observe that the frequency count is of category, Processed Food, Rubber & Plastics and Engineering and Electricals under grouping “Loan Status,” “Difficulty in getting Loan” and “Time for Loan Sanctioning” is less than 5. In cases when more than 20% of the value falls below 5, the dataset does not follow chi-square distribution. Hence, we opt for the Freeman Halton test. Table 6 depicts the test statistics of the same. As we can observe, none of the p-values is less than the tolerance level (0.05) to reject the null hypothesis, implying that the three factors of the Loan process tested here are independent of the Nature of Business. It signifies, no matter to which sector an MSME belongs, the possibility of getting Loan sanctioned, the ease of getting loan sanctioned, and Time Taken for Loan sanctioning is equally likely. None of the industry enjoys any edge to have smoothened “Loan process.” Thus, among all the three sub-segments of Industry categorization, we find that in just one case where we have grouped data for Unit Type * Time Taken for loan sanctioning, the null hypothesis is rejected. For rest, of the groupings, no linear association is found.

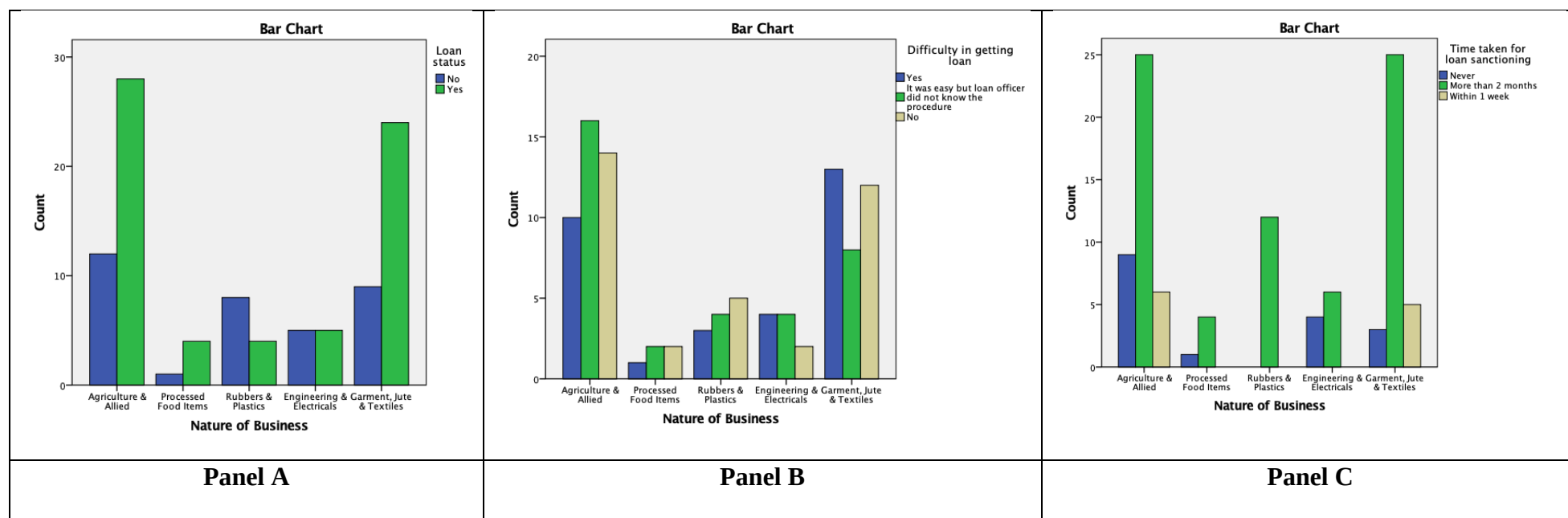


Figure 7: Relationship between Nature of Business and Loan Status, Difficulty in Getting Loan, Time for Loan Sanctioning

Table 6: Hypothesis Test Statistics between Nature of Business and Loan Status,
Difficulty in Getting Loan, Time for Loan Sanctioning

	Nature of Business * Loan Status	Nature of Business * Difficulty in getting Loan	Nature of Business * Time for loan sanctioning
p-value	0.09456	0.8381	0.1154

6.2 Relationship of Education Status with Loan Process

This section deals with the hypothesis testing of the next major segment, the Education status of an MSME owner with the three nominal variables of the Loan process. The aim is to investigate whether any relation or association exists between owner education level with the Loan process specifically related to Approval, Ease of getting Loan, and Time duration.

- **Hypothesis test 2a:** To investigate the relationship between the Loan status and Owners Education

Table 7 – Panel A displays the chi-square test statistics between Owner education and Loan status. As the significance level is higher than the tolerance, we do not find statistically significant evidence to reject the null hypothesis. Hence, the Owner's level of education has no significant role in aiding the loan sanctioning.

- **Hypothesis test 2b:** To investigate the relationship between the Difficulty in getting loan and Owners Education

As we can observe from Table 7 – Panel B, the level of significance of the chi-square test statistics is more than the tolerance. Thus we do not find enough statistical evidence to reject the null hypothesis. Hence, the Difficulty of getting loans is independent of the Owner's education level, i.e., the possibility of getting a loan has nothing to do with the education status.

- **Hypothesis test 2c:** To investigate the relationship between the Time Taken for Loan Sanctioning and Owners Education

As observed in Table 7 – Panel C, the contingency table, more than 20% of the cells have a frequency count of less than 5. Thus, it does not follow a chi-square distribution. To resolve this, we undertake correspondence analysis between the two nominal variables, i.e., Time Taken for Loan Sanctioning and Owner’s Education Level. Table 7 – Panel D represents the correspondence table and the test statistics for adding a dimension in the analysis. As can be observed, the two dimensions can explain the pattern of the dataset, about which variable lie in close vicinity and which are separated far apart. As can be observed from Figure 8, only Education Level (College Degree & Post Graduation) lies in close vicinity to the Time Taken for Loan sanctioning (More than two months). The “Uneducated” lot lies closer to the “Time taken for Loan Sanctioning – “Never,” while “Loan Sanctioning – within one week” is almost equidistant from “Technical course,” and College Degree, Post - Graduation. Thus, we see some relationships exist between the Owners' education and Time Taken for Loan Sanctioning. Hence, we reject the null hypothesis and conclude that Time Taken for Loan sanctioning is not independent of the Owner’s Education Level. The MSMEs with Technical course is the one for whom the possibility of loan gets sanctioned within one week is high, followed by the post-graduate and college degree holders for whom it may take to 1 month. While for the uneducated, the rejection rate is highest when the loan never gets approved. Thus, the educational level of the applicant plays a crucial role in getting timely disbursement of the loan.

Table 7: Relationship between the Owners Education and Loan Status, Difficulty in Getting Loan, Time for Loan Sanctioning

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.121 ^a	6	.229
Likelihood Ratio	8.321	6	.215
Linear-by-Linear Association	.062	1	.804
N of Valid Cases	100		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.27			

Panel A: Owner Education * Difficulty of getting Loan

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.519 ^a	3	.138
Likelihood Ratio	5.571	3	.134
Linear-by-Linear Association	1.807	1	.179
N of Valid Cases	100		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.95.			

Panel B: Owner Education * Loan Status

Count					
		Time Taken for loan sanctioning			Total
		Never	More than 2 months	Within 1 Week	
Owner Education	Uneducated	9	18	6	33
	College Degree	5	27	0	32
	Post-Graduation	3	14	0	17
	Technical Course	0	13	5	18
Total		17	72	11	100

Note: 6 cells (50.0%) have expected count less than 5. The minimum expected count is 1.87.

Panel C: Contingency Table - Owner Education * Time Taken for loan sanctioning

Crosstabulation

Summary						
Dimension	Singular Value	Inertia	Proportion of Inertia		Confidence Singular Value	
			Accounted for	Cumulative	Standard Deviation	Correlation
1	.308	.095	.764	.764	.027	-.193
2	.171	.029	.236	1.000	.034	
Total		.124	1.000	1.000		

Panel D: Correspondence Table

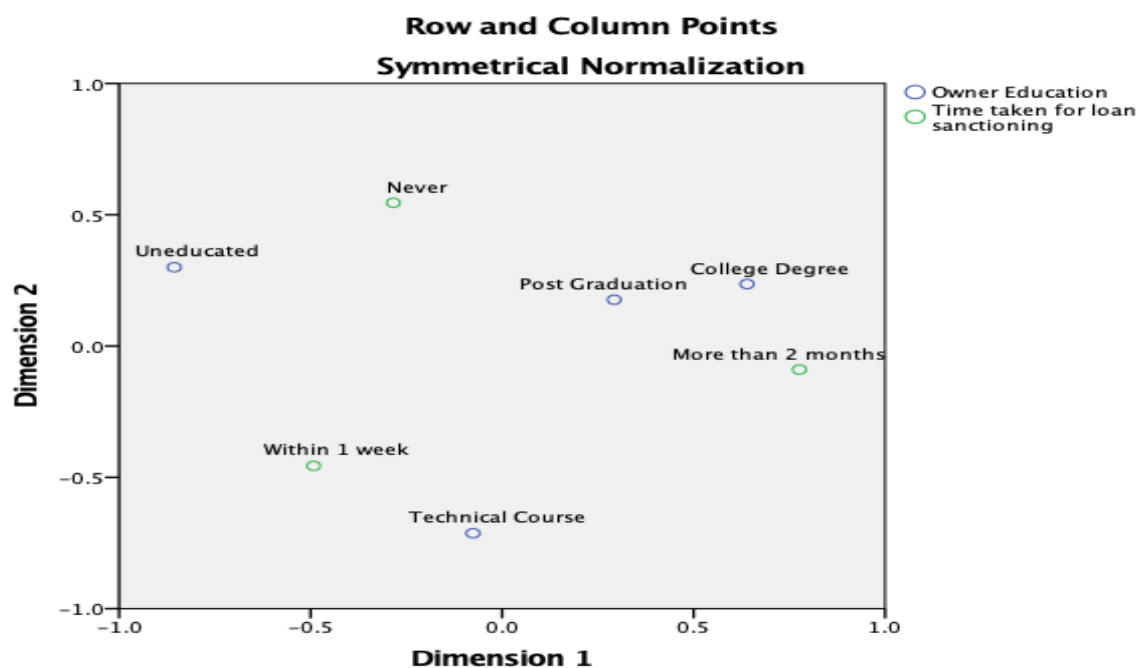


Figure 8: Dimensional Analysis for Owner Education and Time Taken for Loan Sanctioning

6.3 Relationship of Awareness Level of Owner's with the Loan process

This section aims to investigate the awareness level of MSME loan applicants with the three nominal factors that impact the Loan process. For the same, we have created an awareness level index based on the respondent's data related to their awareness about government schemes, Knowledge of IT technology, Training of Workers, etc. As we can

observe that, on all the subsegments of the awareness section, less number of respondents know the schemes related to government, banks, and adoption of IT. Figure 9 - Panel A, Panel B, Panel C, D exhibits the same.

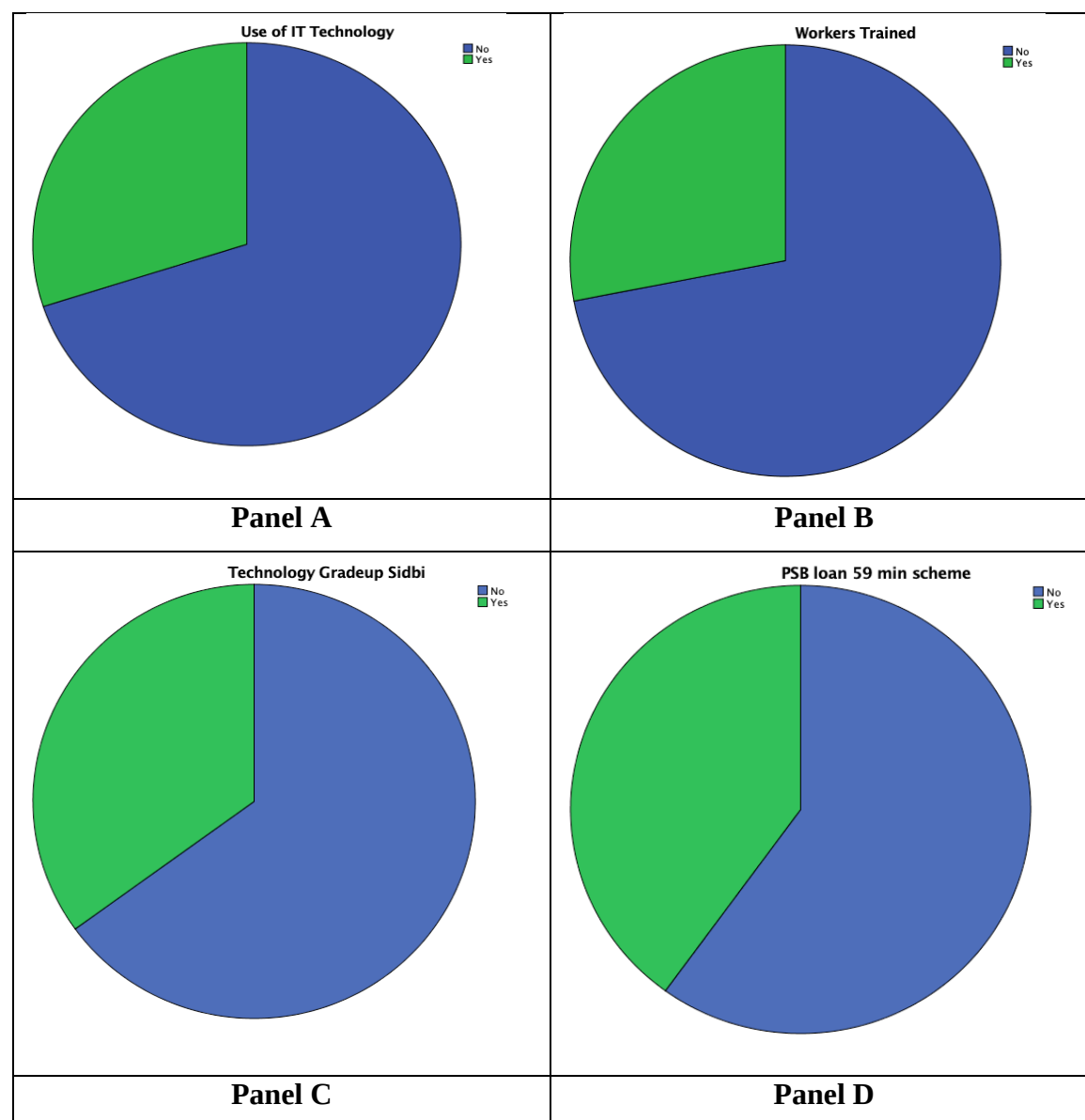


Figure 9: Awareness about Knowledge of IT Technology, Training of Workers
Government Schemes

Moving with the assumption that all the four sub-segments, i.e., “PSB 59 min loan initiative, Technology Gradeup Sidbi, Use of IT, and Workers Training to be included for

making an index of Awareness Level. Hence, we first run a reliability test “Cronbach’s Alpha” to figure out which sub-segments to be included to create the “Awareness Level.” The aim is to include those sub-variables, the inclusion of which keeps the internal consistency on the higher side, thus capturing the awareness level in true sense. A reliability test is performed on the aggregate subscales of the Awareness segment. Table 8 – Panel A gives the reliability test Cronbach’s Alpha index. As we can observe that the Cronbach’s alpha value with all the four subscales within the Awareness segment lies pretty below the standard value of 0.7 (Section 1.7.2 Table 3), we check the change in the value of Cronbach’s alpha with a drop of each variable. Table 8 - Panel B represents the new “ α ” value with the deletion of any subscale. As we can observe with the removal of subscale “Workers Training,” the reliability parameter value will be at par with the standard range of 0.7. Hence, the subscale “Workers Training” is dropped from the Awareness segment.

Table 8: Reliability Statistics using Cronbach's Alpha

Cronbach's Alpha	N of Items
0.601	4

Panel A: Reliability Statistics

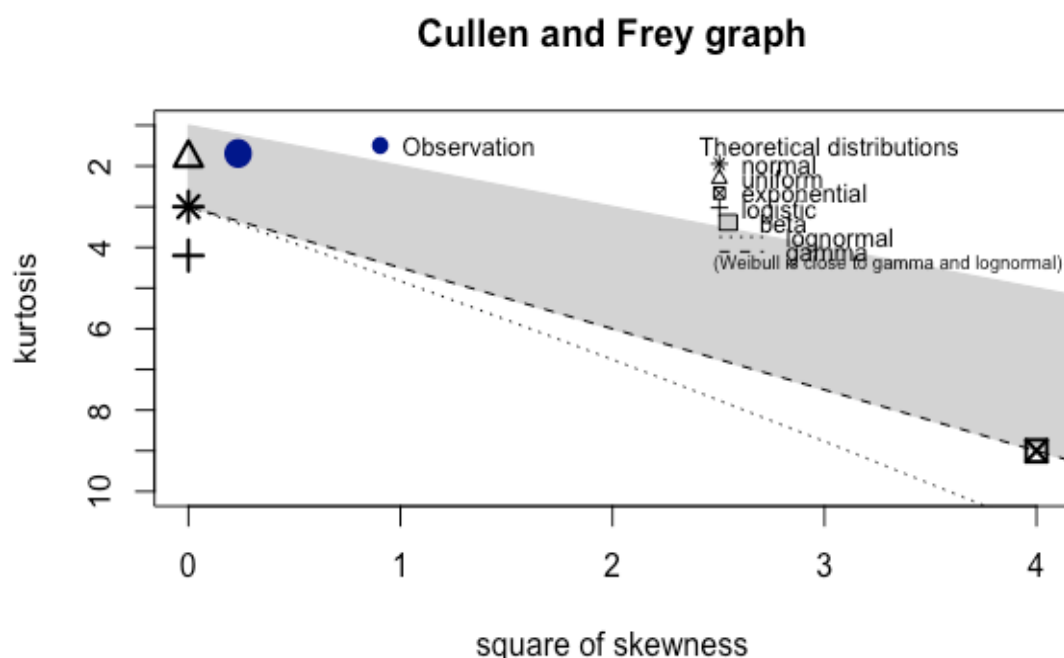
Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PSB 59 Minute Loan Initiative	5.0700	.914	.489	.441
Technology Grade up by Sidbi	5.0200	.929	.496	.437
Training Status of Worker	4.9500	1.301	.110	.711
USage of IT	4.9700	.979	.468	.464

Panel B: Change in value of Cronbach's alpha with a drop of each Variable

We further develop an Awareness scale as a simple average of the three subscales that pass the reliability test viz. “PSB 59 Min Loan Initiative”, “Technology Gradeup Sidbi,” “Use of IT,” defined as

$$\text{Awareness_Level} = (\text{PSB 59 Min Loan Initiative} + \text{Technology Gradeup Sidbi} + \text{Use of IT}) / 3$$

Noteworthy, the value of “Awareness Level” ranges between [1,2], with the two bounded extremes representing the least awareness level and highest awareness level, respectively. However, based on the sub-segment values, the index “Awareness Level” can take a certain set of possible values within the range. The computed Awareness level is then plotted using Cullen and Frey graph (Figure 10) to identify the kind of distribution that fits the dataset. As we can observe, the dataset for Awareness Level falls close to normal, but still, it is ambiguous.



Note: min: 1 max: 2 median: 1.333 mean: 1.35 estimated sd: 0.380 estimated skewness: 0.484 estimated kurtosis: 1.690

Figure 10: Cullen and Frey graph for Awareness Level

To remove ambiguity, we perform Shapiro - Wilk and Kolmogorov-Smirnov test to check for the normality assumption of the dataset “Awareness Level.” Table 9 exhibits the same.

Since the significance level is quite low than the tolerance (5%), we reject the null hypothesis, thus stating that the dataset “Awareness Level” is not normally distributed.

Table 9: Test Statistics of Kolmogorov-Smirnov and Shapiro-Wilk Test

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Awareness_Level	.301	100	.000	.784	100	.000
a. Lilliefors Significance Correction						

Figure 11 displays the histogram of Awareness Level, where we can see that the newly created index takes certain discrete values only.

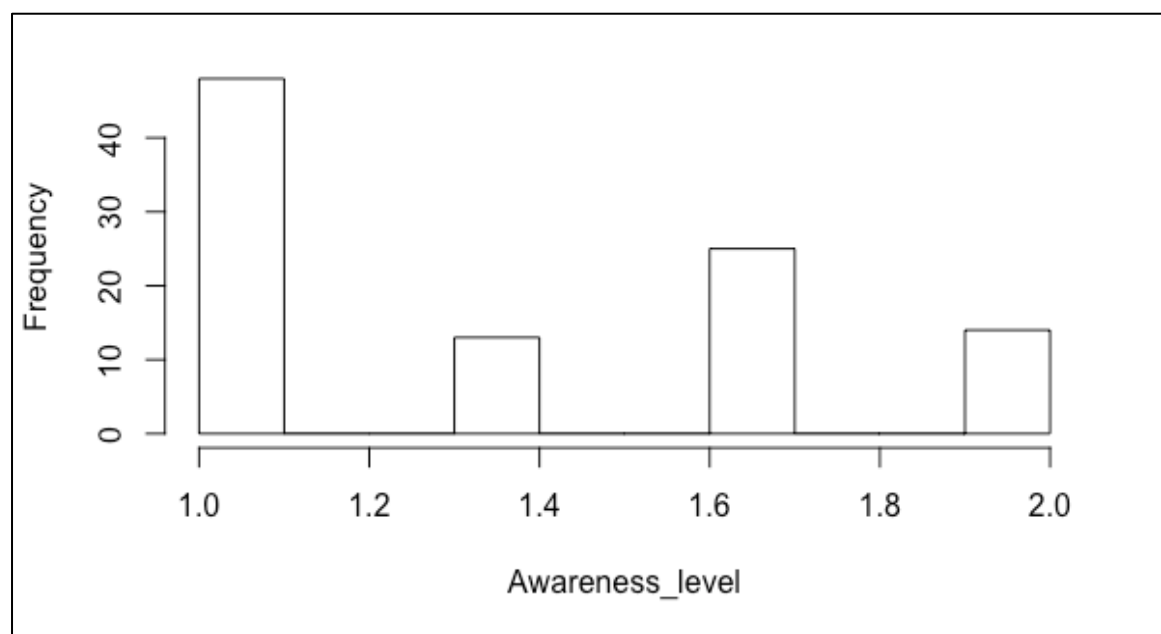


Figure 11: Histogram of Awareness Level

In the next step, we try to investigate the relationship between the awareness level of the owner with the possibility of getting loan sanctioned. As the datatype for Awareness Level is discrete values (Figure 11), whereas Loan status, Difficulty of getting Loan, Time for

Loan sanctioning being categorical, we opt for chi-square test statistic to test the following three hypotheses.

- **Hypothesis test 3a:** To investigate the relationship between the Awareness Level & Loan Status
- **Hypothesis test 3b:** To investigate the relationship between the Awareness Level & Difficulty of getting Loan
- **Hypothesis test 3c:** To investigate the relationship between the Awareness_Level & Time Taken for Loan sanctioning

Figure 12 - Panel A, B, C displays the frequency count of the Loan process factors across various levels of awareness. As we can observe that at Awareness Level 1 (lowest level of awareness), the frequency count is highest for all the factors of the Loan process. Noteworthy, the three factors of the loan process worked out here are i) Loan Status, ii) Difficulty of getting Loan, iii) Time Taken for Loan Sanctioning.

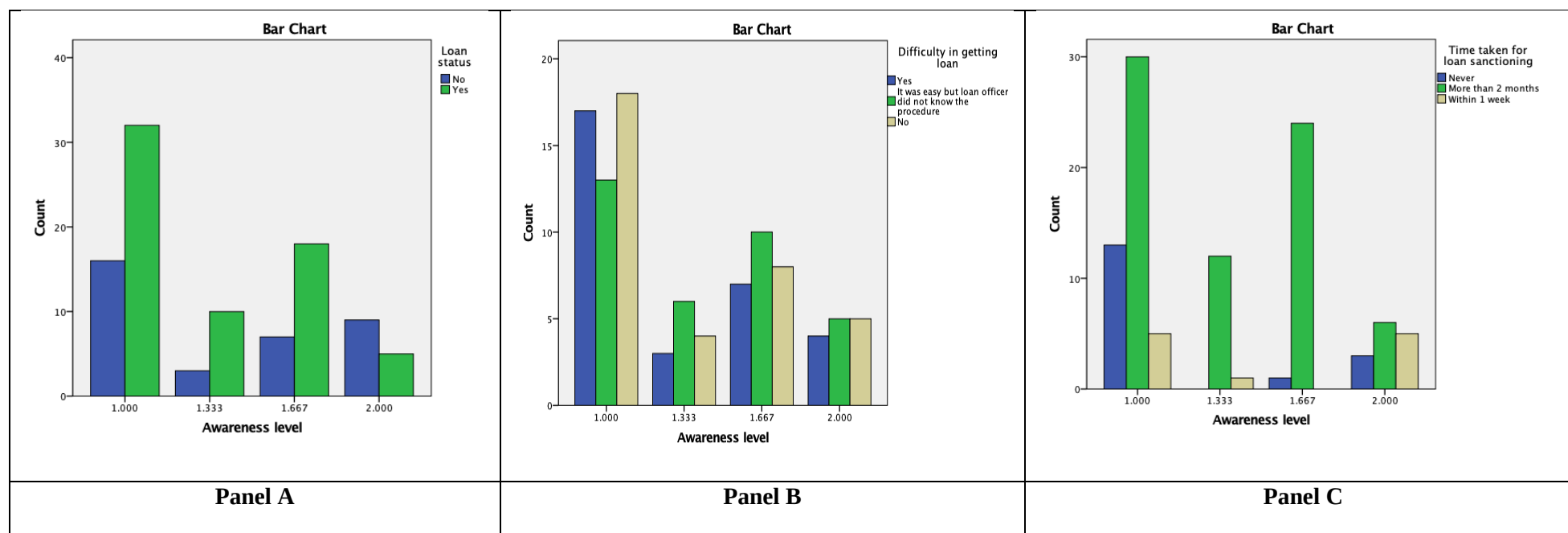


Figure 12: Count of the Loan process Factors across various Levels of Awareness

Though it is tough to comment on whether any trend or association exists with the Awareness Level, we observe not a very statistically significant degree of association exists between the Awareness Level and Loan Status. As the p-value for the chi-square statistic is higher than tolerance (5%), the null hypothesis cannot be rejected. Table 10 – Panel A displays the same. It implies that despite having a high awareness level, it will not make the loan approval easier or difficult for an MSME loan applicant. Yet another relationship to be explored is the Difficulty of getting Loan with Awareness Level. Figure 12 – Panel B displays the bar chart for the difficulty of getting loan responses grouped by awareness level. As we can observe from the bar chart that more 20% of the frequency falls below value 5, thus negating the usage of the chi-square test statistic. Thereafter, we deploy an extended version of the Fisher-exact test, i.e., Freeman – Halton. Table 10 -Panel B displays the test statistics, where we cannot reject the null hypothesis as the p-value is much higher than tolerance (5%). Thus, paper procedures follow a routine process for all the MSME loan applicants despite having a higher awareness level. Noteworthy, we have three categories for the Difficulty of getting the loan (Yes, No, and it was easy, but the loan officer did not know the procedure). Importantly, the questionnaire option is not based on a Likert scale, keeping in mind the level of educational status of MSME owners. To do so we have kept the option pretty simple for questions. The third nominal Loan process factor, i.e., Time taken for loan sanctioning has to be tested with the Awareness Level. Figure 12- Panel C displays the bar chart of Time taken for Loan sanctioning grouped by Awareness Level, where we observe that approximately half of the bars have frequency count less than 5, implying dataset not following a chi-square distribution. Thus we opted for a non-parametric alternative for a $k \times k$ contingency table, Freeman-Halton test (Table 10 – Panel C). Interestingly, we find the p-value to be much lower than the tolerance, thus rejecting the null hypothesis, implying that Awareness Level and Time Taken for Loan Sanctioning are associated.

Table 10: Relationship between the Awareness Level and Loan Status, Difficulty in Getting Loan, Time for Loan Sanctioning

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.687 ^a	3	.083
Likelihood Ratio	6.442	3	.092
Linear-by-Linear Association	1.777	1	.183
N of Valid Cases	100		

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 4.55.

Panel A: Awareness Level * Loan Status

p-value	0.8889
alternative hypothesis: two sided	

Panel B: Awareness Level * Difficulty of getting Loan

p-value	0.0005316
alternative hypothesis: two sided	

Panel C: Awareness Level * Time Taken for Loan Sanctioning

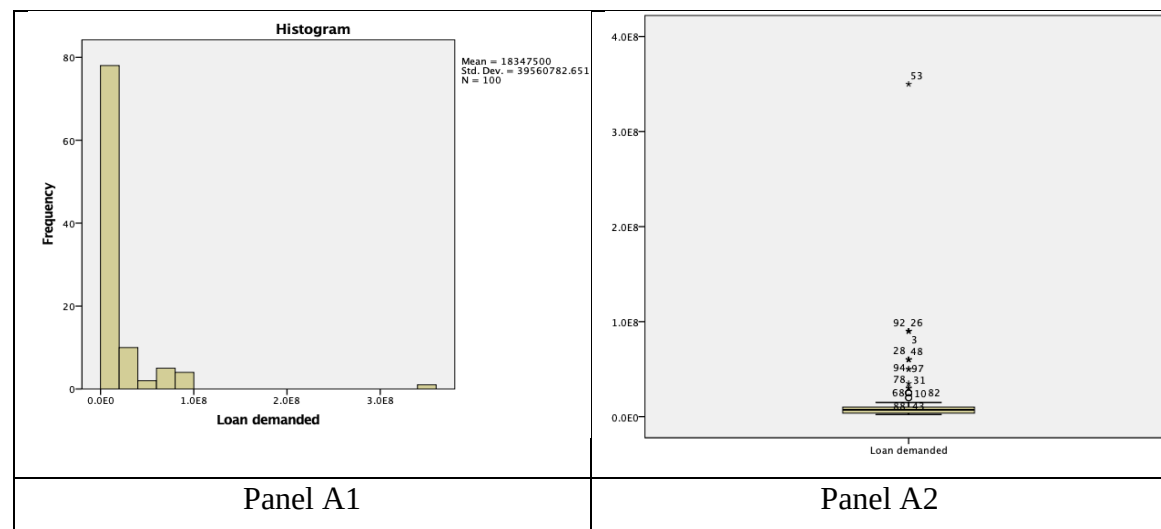
Chapter 7

Analysis of Hypothesis Testing for Loan Financing

7. Analysis of Hypothesis Testing for Loan Financing

This section deals with the Finance related details of the respondents viz. Loan demanded by MSME, Loan sanctioned to an MSME, own money proportion, Short-term loan share from the bank, Long-term loan share from the bank. Initially, we try to investigate whether any relationship exists between the Loan demanded by MSME and Loan sanctioned.

Further, we test the hypotheses to be tested for the three sub-segments viz. Industry categorization, Education level of MSME applicant, and the Awareness Level. Figure 13 displays the frequency histogram (Panel A1, B1) and the boxplot (Panel A2, B2) of the sub-segments of the Financing segment viz. Loan Demanded and Loan sanctioned. As we can observe, a huge variation is observed in the “Loan sanctioned” and “Loan Demanded” segment, exhibited by Figure 13 - Panel A2 and Panel B2. Interestingly, “Loan Demanded” is quite concentrated below the one crore line, whereas the Loan Sanctioned component is spread out, Panel A1 and Panel B1 displays the same.



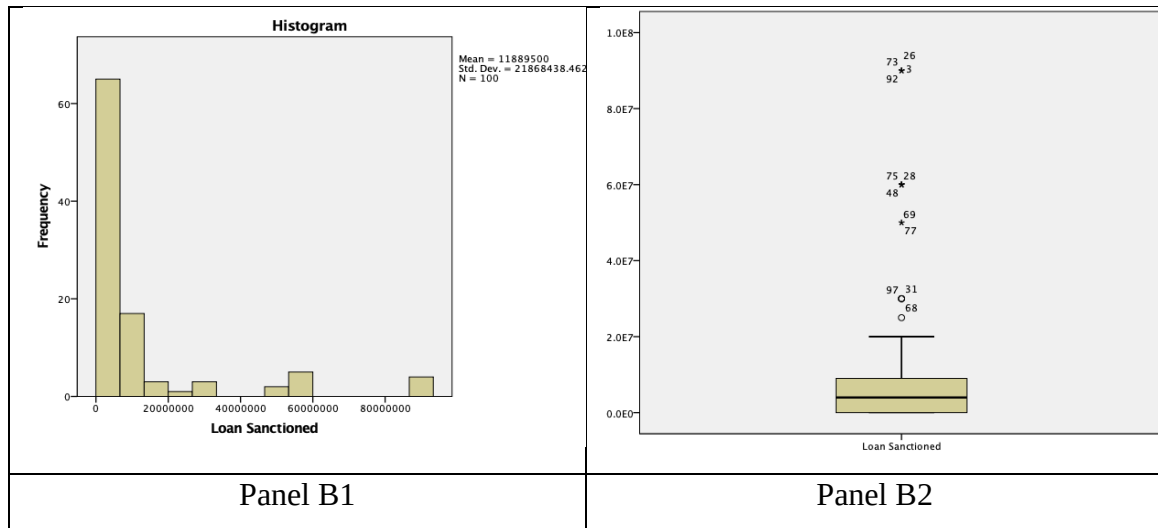


Figure 13: Frequency Histogram and the Boxplot of the sub-segments of the Financing Segment

Importantly, as the observed dataset for Loan Demanded and Loan Sanctioned have many outliers, the distribution for “Loan demanded” and “Loan sanctioned” deviates from the normality. As a result, we cannot apply the Pearson correlation to study the linear relationship between Loan Demanded, and Loan Sanctioned. Even the logarithmic transformation does not bring in normality to the two datasets; hence, we apply a non-parametric test Spearman correlation. The hypothesis to be tested is that Loan demanded is correlated to the Loan sanctioned. Table 11 displays the correlation statistics. As we can observe, that correlation is found to be significant with a positive correlation existing between Loan demanded and Loan sanctioned. Importantly, the correlation here does not imply causation. Thus, we can only safely say that a high loan sanctioned is observed whenever there is high loan demanded and vice versa. However, we can infer that in case the Loan Demanded is high, and if the loan gets approved, there exists a high possibility that Loan Sanctioned lies close to Loan Demanded to suffice the need of MSME. However, we do not observe the Loan Sanctioned always equating to Loan Demanded.

Table 11: Correlation Statistics of Loan Demanded and Loan Sanctioned

Correlations				
			Loan demanded	Loan Sanctioned
Spearman's rho	Loan demanded	Correlation Coefficient	1.000	.575**
		Sig. (2-tailed)	.	.000
		N	100	100
	Loan Sanctioned	Correlation Coefficient	.575**	1.000
		Sig. (2-tailed)	.000	.
		N	100	100
**. Correlation is significant at the 0.01 level (2-tailed).				

Figure 14 displays the histogram of the difference between the Loan demanded and Loan sanctioned. Though the highest frequency is observed with no difference between Loan Demanded and Loan Sanctioned; however, we perform statistical tests to determine whether a significant difference in the mean exists between the Loan demanded and Loan sanctioned.

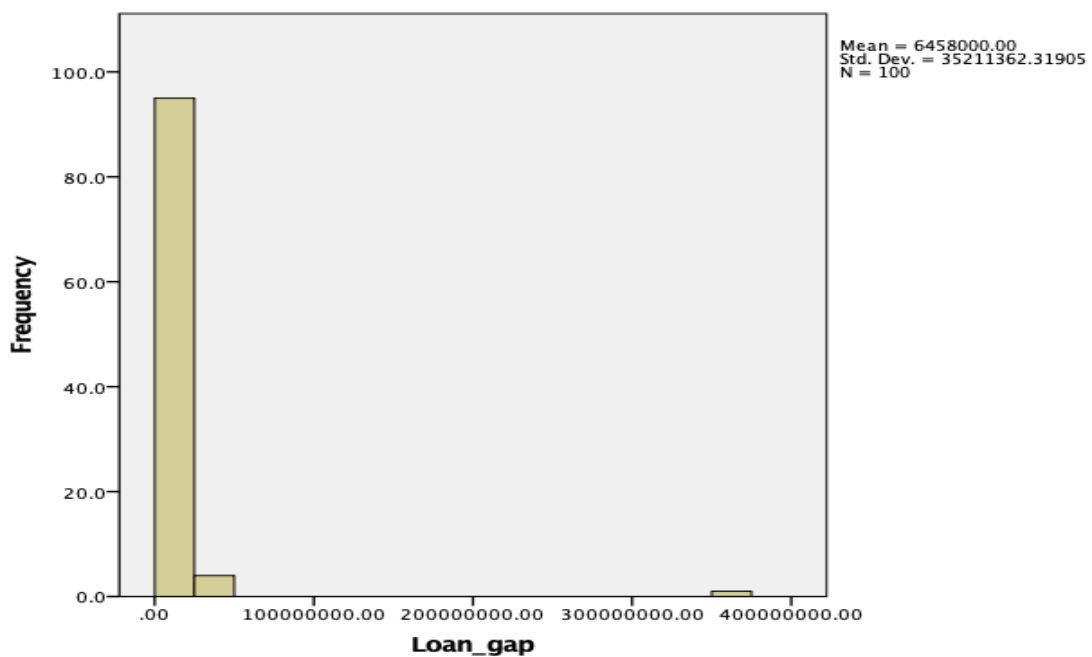


Figure 14: Difference in the Loan Demanded and Loan Sanctioned

As we have already seen the data distribution for both the dataset deviates from normality, even the logarithmic transformation for the difference, Figure 14 is skewed to the left. Thus, we opt for a non-parametric test, the “Wilcoxon rank-sum test.” Noteworthy, due to the presence of outliers, Panel A1, and Panel C1 – Figure 13, the mean is not the right reflection of central tendency. Hence Wilcoxon rank-sum test will focus on the comparison of the median for the two data distribution, i.e., Loan Demanded and Loan Sanctioned.

- Hypothesis: To compare the median of Loan Demanded and Loan Sanctioned from the bank

Noteworthy, we can observe from Figure 14 that as the difference between the loan demanded and sanctioned increase the frequency count of those occurrences decrease. Importantly, the highest frequency count is observed when the loan sanctioned exactly matches the loan demanded, giving the impression that the majority of the time, banks have disbursed required funds to the MSMEs. However, when we run the Wilcoxon rank-sum test, we find a significant difference between the median of Loan Demanded and Loan sanctioned. Table 12 presents the test statistics, rejecting the null hypothesis at the tolerance level 5 percent. Thus, in reality, loan disbursed is short of the limit than required or demanded. It may further infuse operating hurdles among MSMEs. Importantly, fund shortage is one of the primary reasons that bring the sustainable operations of the MSMEs into question. From section 1, Appendix 8, where Bihar ranks pretty low in credit deposit (CD) ratio, despite having a reasonable proportionate contribution to the population of the country. Thus, combinedly, we observe that dual issues exist with MSMEs. One is a large proportion of Loan rejection coupled with the Loan Sanctioned not meeting the requirements to operate the MSMEs. The next issue of concern is Fund Management of the Loan Sanctioned, which deals with the mix of short-term and long-term loans.

Table 12: Wilcoxon Rank-sum Test Statistics

Wilcoxon rank-sum test with continuity correction

W = 6629.5, p-value = 6.35e-05
alternative hypothesis: true location shift is not equal to 0

Figure 15 (Panel A to F) displays the histogram of the proportional contribution by the owner, borrowed from a friend, relatives, short-term share, and long-term share. The short-term loan proportion from the bank is highly skewed towards the left, whereas the long-term loan proportion from the bank is highly skewed towards the left, whereas the long-term proportion concentrates in the middle. Panel E and F displays the same. Though the majority of the MSMEs in our study are self-sponsored; however, the firms are leveraged by loans, mostly attributed to loans from banks. Clearly, on an average long-term loan share supersedes the short-term loan share. On the other hand, the share of money borrowed from friends or internal sources of funds (fund sourced from relatives) remains quite low. Panel B and C exhibit the same.

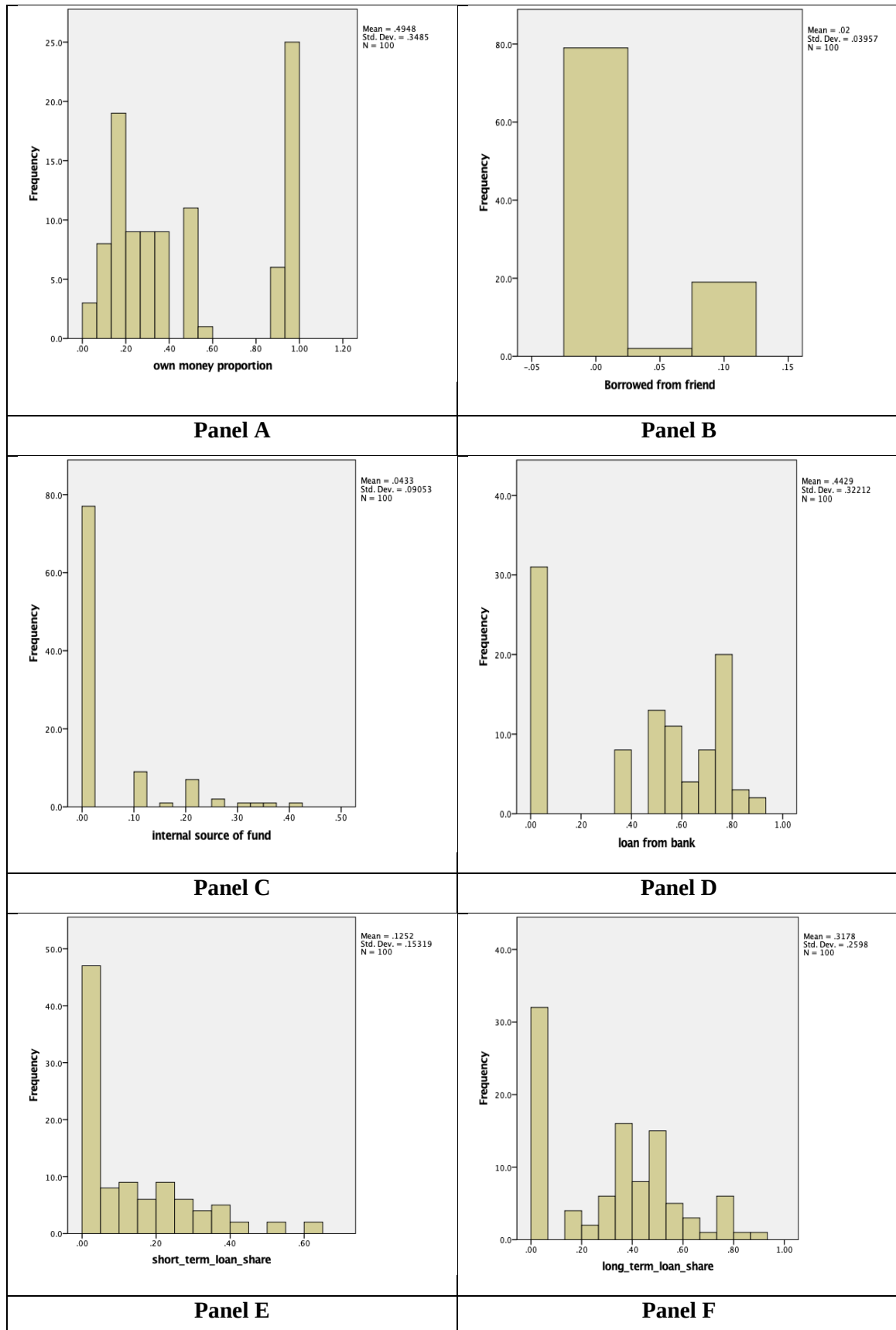


Figure 15: Histogram of the Proportional Contribution by Owner, Borrowed from Friend, Relatives, Short-Term Share, and Long-Term Share

We further investigate the relationship between four variables related to “Financing” viz. Loan Demanded, Loan Sanctioned, Short Term Loan Share, Long Term Loan Share across groups characterized by “Industry Classification,” “Unit Type,” “Nature of Business,” “Owner Education,” and “Awareness Level.” The purpose is to investigate whether the distribution remains the same across all the categories or not. For the same, we frame four separate hypotheses and run the Kruskal Wallis test. The reason for opting out for a non-parametric test is the deviation of normality of the datasets Loan demanded, Loan Sanctioned, Short Term Loan share, Long Term Loan share, Table 13. Importantly, out of the four continuous variables to be tested, Loan sanctioned, short term loan proportion, and Long-term loan proportion are important factors of the “Loan Process.”

Table 13: Table representing Distribution Test

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Loan demanded is normal with mean 18,347,500 and standard deviation 39,560,782.651.	One-Sample Kolmogorov-Smirnov Test	.000 ¹	Reject the null hypothesis.
2	The distribution of Loan Sanctioned is normal with mean 11,889,500 and standard deviation 21,868,438.462.	One-Sample Kolmogorov-Smirnov Test	.000 ¹	Reject the null hypothesis.
3	The distribution of Short term Loan share is normal with mean 0.1251500000000000 and standard deviation 0.153.	One-Sample Kolmogorov-Smirnov Test	.000 ¹	Reject the null hypothesis.
4	The distribution of Long term loan share is normal with mean 0.3177500000000000 and standard deviation 0.260.	One-Sample Kolmogorov-Smirnov Test	.000 ¹	Reject the null hypothesis.
Asymptotic significances are displayed. The significance level is .05.				
¹ Lilliefors Corrected				

7.1 Hypothesis Test under the group “Industry Classification”

- **Hypothesis 1.1d:** To compare the distribution of Short-Term Loan share across Industry Classification
- **Hypothesis 1.1e:** To compare the distribution of Long-Term Loan share across the group classified by Industry Classification
- **Hypothesis 1.1f:** To compare the distribution of Loan Demanded across the group classified by Industry Classification
- **Hypothesis 1.1g:** To compare the distribution of Loan Sanctioned share across the group classified by Industry Classification

As we can observe from Table 14, apart from financing subcategory, “Loan Demanded,” the rest of the subcategory’s distribution across the two groups “Manufacturing” and “Service” remains the same. It implies that, on average, Loan Demanded by the MSMEs operating in the manufacturing sector differs significantly from the MSMEs operating in the service sector. A plausible reason could be the Manufacturing sector being highly capital intensive. However, when it comes to loan disbursement, which is under the hands of bank managers, we hardly find any significant difference in the average value across the two industry types. In addition to this, the mix of short-term and long-term follow the same distribution across the group, signifying that irrespective of what the loan has been demanded, the loan amount sanctioned, and the loan mix is not affected by the industry the MSME belongs too. Thus, banks on their side consider both the MSMEs Manufacturing and Service as equally likely, and the industry is not the criteria to decide the loan disbursement and the loan mix. As we have already tested the three important components of “Loan process,” i.e., Loan approval, difficulty to process the loan and Time duration to get loan disbursed related to industry classification in Section 1.7.1 (Hypothesis test 1.1a,

1.1b, 1.1c), where we find no significant association of industry with all the three components. . Hence, we can conclude that the classification of industry type has no role to play in the approval of a loan, the difficulty of getting the loan sanctioned, time duration to get the loan disbursed, setting the amount to be sanctioned, and the loan mix. Thus, no matter which industry an MSME, the process of loan disbursement, which includes all the five major components (Time, Ease, Approval, Amount, Mix) will remain the same. No added benefits to an MSME which operates in manufacturing and neither to service.

Table 14: Comparison of Mean across the Group Industry Classification

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Short term Loan share is the same across categories of Classification.	Independent-Samples Mann-Whitney U Test	.796	Retain the null hypothesis.
2	The distribution of Long term loan share is the same across categories of Classification.	Independent-Samples Mann-Whitney U Test	.509	Retain the null hypothesis.
3	The distribution of Loan demanded is the same across categories of Classification.	Independent-Samples Mann-Whitney U Test	.006	Reject the null hypothesis.
4	The distribution of Loan Sanctioned is the same across categories of Classification.	Independent-Samples Mann-Whitney U Test	.117	Retain the null hypothesis.
Asymptotic significances are displayed. The significance level is .05.				

7.2 Hypothesis Test under the group “Unit Type”

- **Hypothesis 1.2d:** To compare the distribution of Short-Term Loan share across the group Unit Type
- **Hypothesis 1.2e:** To compare the distribution of Long-Term Loan share across the group Unit Type

- **Hypothesis 1.2f:** To compare the distribution of Loan Demanded across the group Unit Type
- **Hypothesis 1.2g:** To compare the distribution of Loan Sanctioned share across the group Unit Type

As we can observe from Table 15 that none of the null hypotheses can be rejected. It implies that irrespective of the kind of ownership the distribution of Loan demanded, Loan sanctioned, Short term loan proportion and long-term loan proportion remains the same across the group Unit Type comprising (proprietorship, company, partnership). Importantly, apart from the Loan demanded, which rests with the discretion of MSME applicant, bank manager decision impacts the amount to be sanctioned and the loan mix.

Interestingly, irrespective of the ownership the Loan demanded remains the same throughout. Moreover, the distribution of loan remaining same across the group signify that irrespective of the kind of ownership, the possibility of loan sanctioned remains equally likely. Thus, the type of ownership has no role to play, deciding the amount of loan to be sanctioned. Combining the findings of the hypothesis testing section 1.7.1 (Hypothesis 1.2a,1.2b,1.2c) we can conclude that the Business Unit type has no role to play with approval of a loan, the difficulty of getting the loan sanctioned, setting the amount to be sanctioned and the loan mix. As we find, the Unit Type “Partnership” has relatively a smaller number of occurrences for Time Taken for loan sanctioning to exceed more than two months. It may be due to the loan demanded from this kind of ownership to be lower. However, as we can find that the distribution of Loan demanded to stay the same across the group, this possibility can be negated too. Hence, it can be concluded that the Business Unit type too does not affect the Loan process.

Table 15: Comparison of Mean across the Group Unit Type

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Short term Loan share is the same across categories of Unit Type.	Independent-Samples Kruskal-Wallis Test	.547	Retain the null hypothesis.
2	The distribution of Long term loan share is the same across categories of Unit Type.	Independent-Samples Kruskal-Wallis Test	.213	Retain the null hypothesis.
3	The distribution of Loan demanded is the same across categories of Unit Type.	Independent-Samples Kruskal-Wallis Test	.361	Retain the null hypothesis.
4	The distribution of Loan Sanctioned is the same across categories of Unit Type.	Independent-Samples Kruskal-Wallis Test	.737	Retain the null hypothesis.
Asymptotic significances are displayed. The significance level is .05.				

7.3 Hypothesis Test under the group “Nature of Business”

- **Hypothesis 1.3d:** To compare the distribution of Short-Term Loan share across the group Nature of Business
- **Hypothesis 1.3e:** To compare the distribution of Long-Term Loan share across the group Nature of Business
- **Hypothesis 1.3f:** To compare the distribution of Loan Demanded across the group Nature of Business
- **Hypothesis 1.3g:** To compare the distribution of Loan Sanctioned share across the group Nature of Business

As we can observe from Table 16 that none of the null hypotheses can be rejected, irrespective of the sector in which an MSME operates. Quite surprisingly, the various industries that we have come across during our surveying vary widely in terms of their capital-intensive nature. Ranging from basic agricultural goods & jute manufacturing to

textile, engineering, and electricals. Despite that, loan demanded distribution remains the same across the group.

Moreover, most of the MSMEs respondents operate in agriculture and allied services; however, the disbursement of the loan remains the same across the group with no particular emphasis on MSME operating in particular sectors such as agriculture. Combining the hypothesis testing of section 1.7.1 (Hypothesis, 1.3a, 1.3b, and 1.3c) it can be concluded that the sector in which an MSME operates has no influence on the Loan process as a whole. Thus, we can observe that Industry Categorization, including the sub-segments (Industry Classification, Unit Type, and Nature of Business) do not influence the Loan process.

Table 16: Comparison of Mean across the Group – Nature of Business

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Short term Loan share is the same across categories of Nature of Business.	Independent-Samples Kruskal-Wallis Test	.464	Retain the null hypothesis.
2	The distribution of Long term loan share is the same across categories of Nature of Business.	Independent-Samples Kruskal-Wallis Test	.872	Retain the null hypothesis.
3	The distribution of Loan demanded is the same across categories of Nature of Business.	Independent-Samples Kruskal-Wallis Test	.683	Retain the null hypothesis.
4	The distribution of Loan Sanctioned is the same across categories of Nature of Business.	Independent-Samples Kruskal-Wallis Test	.207	Retain the null hypothesis.
Asymptotic significances are displayed. The significance level is .05.				

7.4 Hypothesis Test under the group “Owner Education”

- **Hypothesis 2d:** To compare the distribution of Short-Term Loan share across the group Owner Education
- **Hypothesis 2e:** To compare the distribution of Long-Term Loan share across the group Nature of Owner Education
- **Hypothesis 2f:** To compare the distribution of Loan Demanded across the group Owner Education
- **Hypothesis 2g:** To compare the distribution of Loan Sanctioned share across the group Owner Education

As we have already observed a statistically significant relationship between the owner’s education level and the time taken for loan disbursal (section 1.7.2, Hypothesis 2c), implies that more the education level of the MSME applicant higher is the possibility of getting timely disbursal of loan. Quite obviously, education level aids in presenting the business idea with all the paperwork in place to the loan manager, which lies within the scope of technical and economic feasibility. Hence, the time taken for loan sanctioning reduces. However, as we can see from section 1.7.2 (hypothesis 2b) that the difficulty level remains the same for the paper process, implying that the loan officer follows all the schedule tasks before sanctioning loan. An educated person has an edge as he presents all the required documents at the very first meeting, thus expediting the loan disbursal time. In this section, we test the other factors of the loan process viz. the variables which are continuous in nature. As we can observe from Table 17 that though the distribution of Loan demanded and Loan sanctioned remains the same across the group, however, the distribution varies when we consider the mix, i.e., short-term and long-term loan proportion under grouping Owner Education. Thus, we investigate further to figure out the group whose distribution

deviates significantly from the rest. As we can observe from Figure 17 – Panel 2C, 2D that applicants with higher education levels such as with a technical course or are postgraduate have more proportion of long-term loans in the total loan proportion. Quite importantly, debt that matures in time gives enough slack periods for the MSMEs to generate positive cash flows in the long run and run profitably with the repayment of the debt. We do observe that the education level of the MSME applicants plays a crucial role in managing the finances, especially related to debt management. The finding is quite important in a way that proper management of debt paves the way for sustainable business operations. In the case of short-term debt proportion on the higher side, it reduces the repayment period of the MSMEs, thus putting an enormous financial burden on the business operations, especially during the initial year of business operations. Notably, during the initial years of a start-up, characterized by the launch phase Figure 18, the profit is, in general, negative or abysmally low. Hence, early repayment of short-term debt is not a viable alternative as it will drag the cash flow furthermore on the downside. It further brings into question the survivability of the MSMEs, with the cascading effect felt with the Bank NPAs to rise. Thus we can observe that the education level of an MSME applicant is very crucial for fund management and carry out the business operations smoothly, which can sustain the business for long. Ironically, it can be observed that MSME applicants with low education levels have opted for a higher proportion of short-term loans, which challenges their operability in the long run.

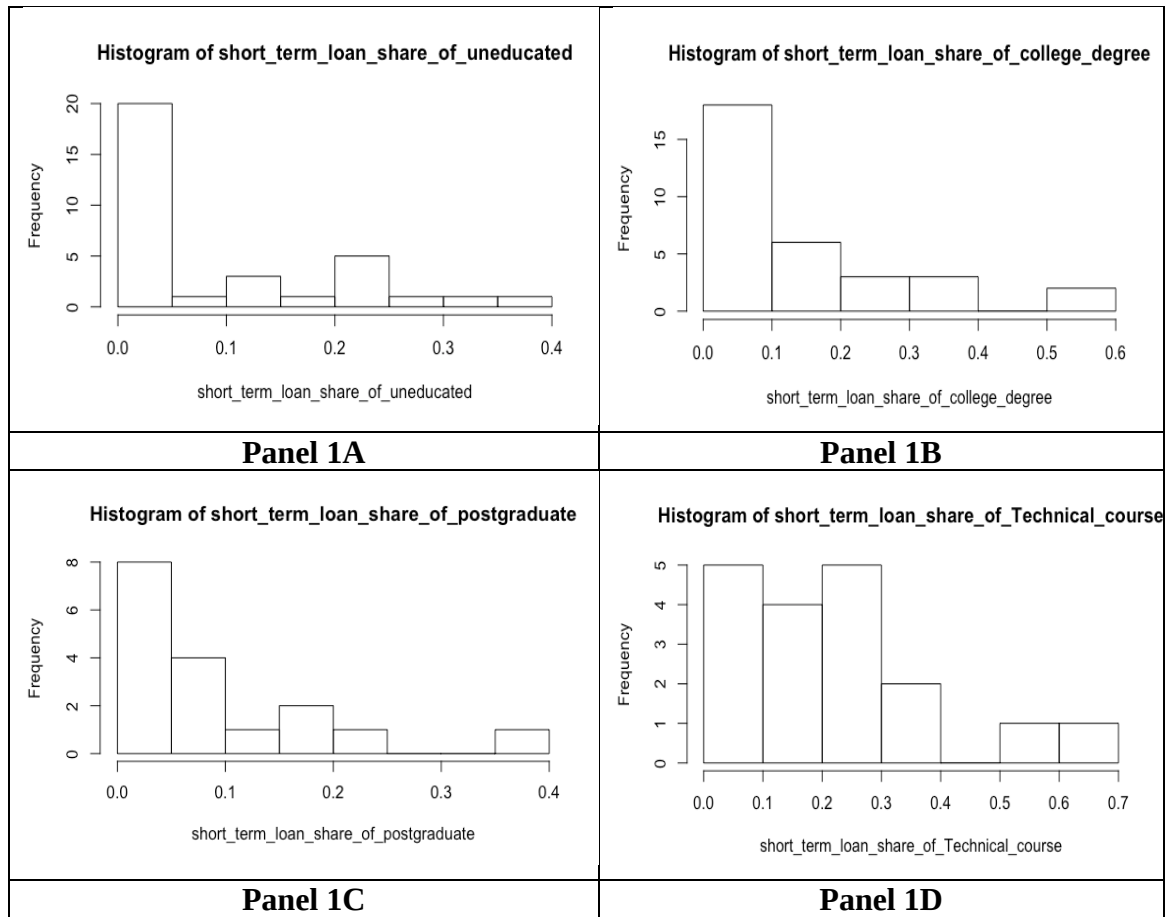
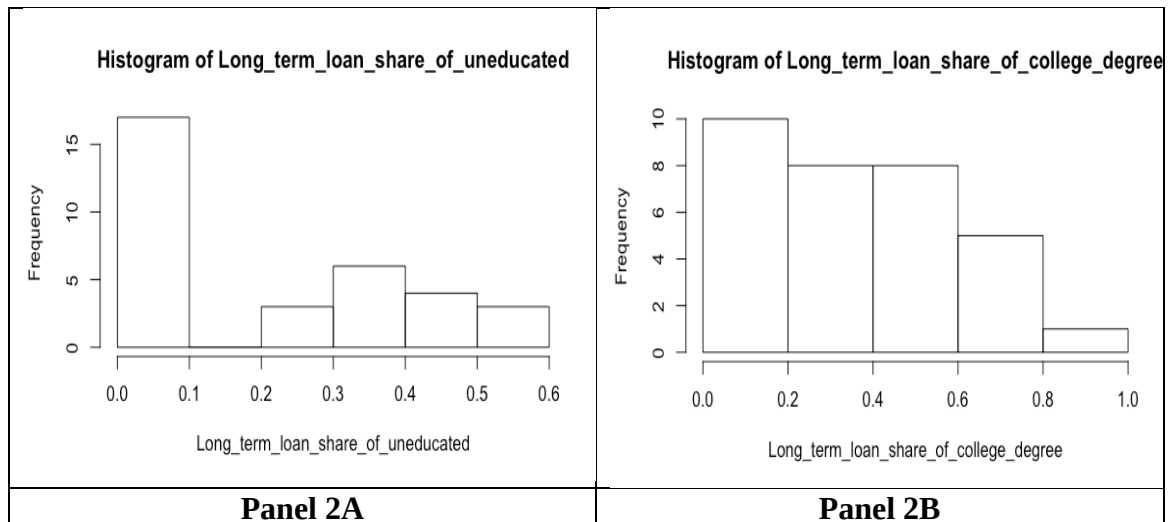


Figure 16: Frequency Count of Short-term Loan Share across the Group Education Level



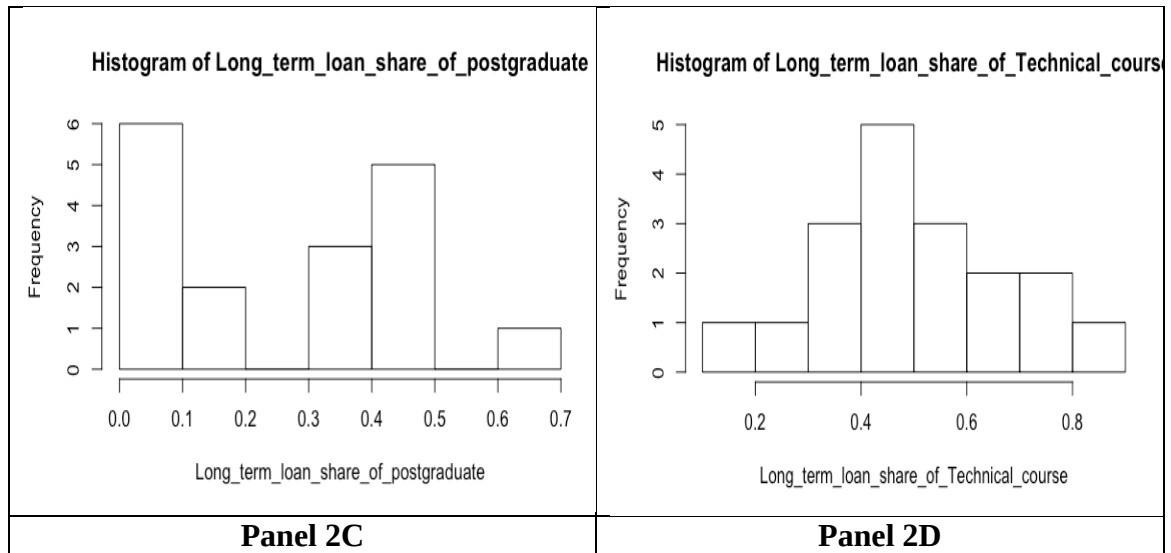


Figure 17: Frequency Count of Long-term Loan Share Across the Group Education Level

Table 17: Comparison of Mean across the Group Education Level

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Short term Loan share is the same across categories of Owner Education.	Independent-Samples Kruskal-Wallis Test	.022	Reject the null hypothesis.
2	The distribution of Long term loan share is the same across categories of Owner Education.	Independent-Samples Kruskal-Wallis Test	.001	Reject the null hypothesis.
3	The distribution of Loan demanded is the same across categories of Owner Education.	Independent-Samples Kruskal-Wallis Test	.911	Retain the null hypothesis.
4	The distribution of Loan Sanctioned is the same across categories of Owner Education.	Independent-Samples Kruskal-Wallis Test	.401	Retain the null hypothesis.
Asymptotic significances are displayed. The significance level is .05.				

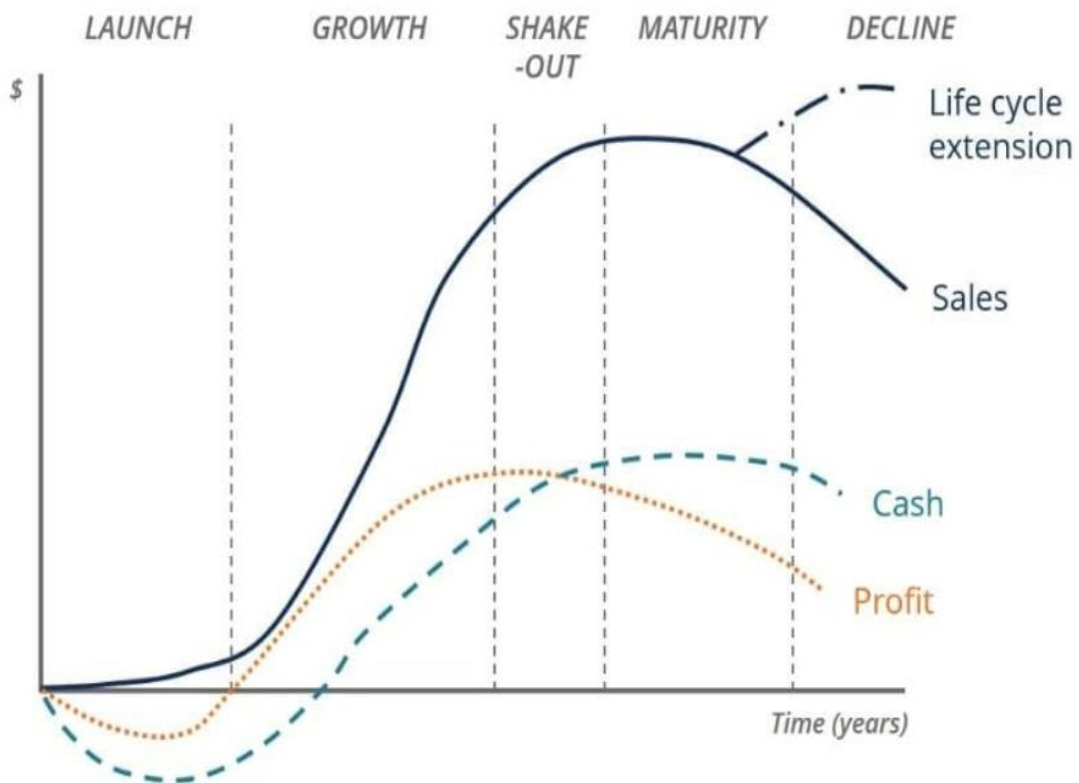


Figure 18: Business Life Cycle

7.5 Hypothesis Test under the group “Awareness Level”

The next hypothesis to be tested is with the group Awareness Level. As we can observe from Figure 19 that Long term loan share varies across the awareness level. Quite importantly, educational level and awareness level are two important factors that determine the long-term loan mix.

- **Hypothesis 3d:** To compare the distribution of Short-Term Loan share across the group Awareness Level
- **Hypothesis 3e:** To compare the distribution of Long-Term Loan share across the group Awareness Level
- **Hypothesis 3f:** To compare the distribution of Loan Demanded across the group Awareness Level
- **Hypothesis 3g:** To compare the distribution of Loan Sanctioned share across the group Awareness Level

From Table 18, we observe that the long-term loan share varies across the awareness_level. From fig. 19, we observe a staggering high null long term loan share at the lowest level of awareness, i.e., one. However, the bar chart does not statistically signify that a higher proportion of long term loan share will be observed at a higher level of awareness. Thus, we need to test the response variable “Awareness Level” with the predictor variable “Long Term Loan Share.” It would help to figure out whether Long term loan share is a significant predictor as well what is the likelihood of observing higher awareness levels at a higher proportion of Long term loan share. Since awareness level is on the ordinal scale, we perform ordinal logistic regression, with Long term loan share as a predictor variable and awareness level as the response variable. Panel A – Table 19 displays the goodness of fit

of the ordinal logit model, where we observe that the model is a good fit as the significance level is less than the tolerance.

Furthermore, Panel B represents the coefficient of the predictor variable “Long term loan share” being 1.858, implying that with every 1 percent rise in Long term loan share proportion, we observe a 1.858 percent rise in the awareness level of the MSME applicant.

Most importantly, the relationship is on the positive side between the awareness level and the Long term loan share. It statistically signifies that a higher proportion of Long term loan share is related to a higher level of awareness.

Additionally, Panel B, column Exp (B) reflects odd ratio, with the ratio being more than 1 for Long term loan share reflects the increasing likelihood of the response variable “Awareness Level” for every one unit increment in the predictor variable “Long Term Loan Share.” This further validates the strength of the relationship observed amid Awareness Level and Long term loan share. Thus we observe that “Education Level” and “Awareness Level” are related to the “Long term loan share of the loan disbursed to the MSME. As we have already discussed, how important the Long term loan share component is for future sustainable operations of the MSME.

Noteworthy, we have already dealt with the percentage share of long term and short term loan share in the total loan component, yet at the same instance, based on initial paid-up capital arranged by MSME owners on their own, some firms are more leveraged than the other. In that case, there is a possibility of credit supply being impacted due to a firm standing at a high leveraged position. For the same, we empirically investigate further, whether does the financial leverage bears any relationship with the glitch in the credit supply or not. The glitch in credit supply can be computed from the difference in the Loan demanded and Loan sanctioned. The dataset thus observed is continuous in nature; at the same instant financial leverage (ratio of the proportion of money from bank to own money proportion) is continuous too. As we can observe from Table 20- Panel A the two datasets

deviate from the normality, reducing the test to non-parametric Spearman correlation test. From Table 20-Panel B, we find an insignificant correlation between the glitch in money supply and leverage.

Quite importantly, we observe that the banks do not discriminate any MSME on the grounds of the industry, sector, kind of ownership it belongs to. Neither do they discriminate based on the education level of the employees or the awareness level they have? Noteworthy, the loan disbursement process has been tested across all the factors viz. Loan sanctioned, Difficulty of Getting Loan, Loan Approval, Time Taken for Loan sanctioning, and the Loan mix. For all these factors, the behavior of the Loan officer has to remain unbiased. However, when it comes to the discretion of MSME owners to decide the loan mix, i.e., Long term and short term loan share, we observe that MSME applicants with higher education and awareness level manage the fund more smartly by allocating a higher proportion of long term loan, thus delaying the loan repayment period. The difference is not noticeable at the current instance, but in the long run, many MSME with a higher proportion of short term loans will phase out due to non-repayment of debt. Thus, the educational level and awareness level plays a vital role in better fund management for business operation. Though a number of government initiatives for vocational training and awareness campaigns have been rolled out, yet we find the penetration of these activities is still less, with a large number of MSME owners being completely aloof. In the future to come, the fall of these MSME will do double damage, not only challenging the livelihood earning of the applicant but also adding to the NPAs of the bank due to non-repayment of loans. We further validated the findings of the unbiased nature of loan officers during loan sanctioning from bank personnel via questionnaire.

Table 18: Comparison of Mean across the Group – Awareness Level

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Short term Loan share is the same across categories of Awareness level.	Independent-Samples Kruskal-Wallis Test	.251	Retain the null hypothesis.
2	The distribution of Long term loan share is the same across categories of Awareness level.	Independent-Samples Kruskal-Wallis Test	.001	Reject the null hypothesis.
3	The distribution of Loan demanded is the same across categories of Awareness level.	Independent-Samples Kruskal-Wallis Test	.176	Retain the null hypothesis.
4	The distribution of Loan Sanctioned is the same across categories of Awareness level.	Independent-Samples Kruskal-Wallis Test	.389	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

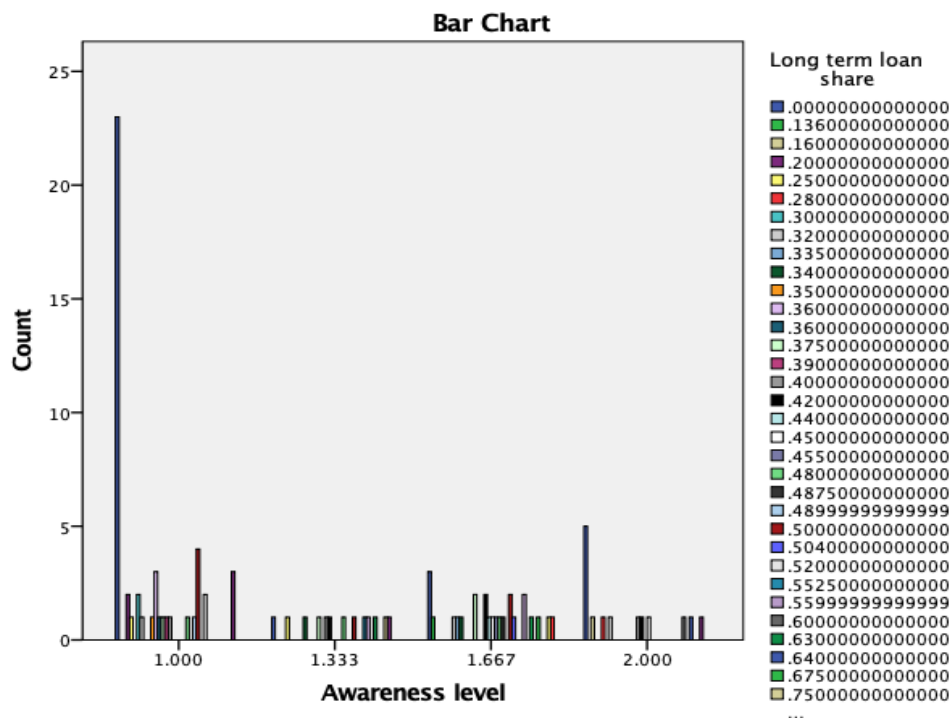


Figure 19: Frequency Count of Long-term Loan Share Across Awareness Level

Table 19: Ordinal Regression Output

Tests of Model Effects			
Source	Type III		
	Likelihood Ratio Chi-Square	df	Sig.
Longtermloanshare	6.235	1	.013
Dependent Variable: Awareness level Model: (Threshold), Longtermloanshare			

Panel A

Parameter Estimates											
Parameter		B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
				Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold	[Awareness_Level=1.00]	.553	.3334	-.100	1.207	2.755	1	.097	1.739	.905	3.343
	[Awareness_Level=1.33]	1.123	.3516	.434	1.812	10.200	1	.001	3.074	1.543	6.122
	[Awareness_Level=1.67]	2.521	.4192	1.700	3.343	36.177	1	.000	12.442	5.472	28.293
Longtermloanshare		1.858	.7584	.371	3.344	6.001	1	.014	6.410	1.450	28.342
(Scale)		1 ^a									
Dependent Variable: Awareness level Model: (Threshold), Longtermloanshare											
a. Fixed at the displayed value.											

Panel B

Table 20: Relationship between Financial Leverage and Credit Supply

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Glitch_in_credit_supply	.427	100	.000	.149	100	.000
Leverage	.206	100	.000	.778	100	.000
a. Lilliefors Significance Correction						

Panel A

Correlations				
			Glitch_in_credit_supply	Leverage
Spearman's rho	Glitch_in_credit_supply	Correlation Coefficient	1.000	-.053
		Sig. (2-tailed)	.	.603
		N	100	100
	Leverage	Correlation Coefficient	-.053	1.000
		Sig. (2-tailed)	.603	.
		N	100	100

Panel B

On the side of the banks, 50 respondents cited the reason for rejecting a loan proposal. The single most reason cited for rejection is the credit rating of MSMEs followed by technical and economic feasibility. Figure 20 provides a pictorial representation of the same.

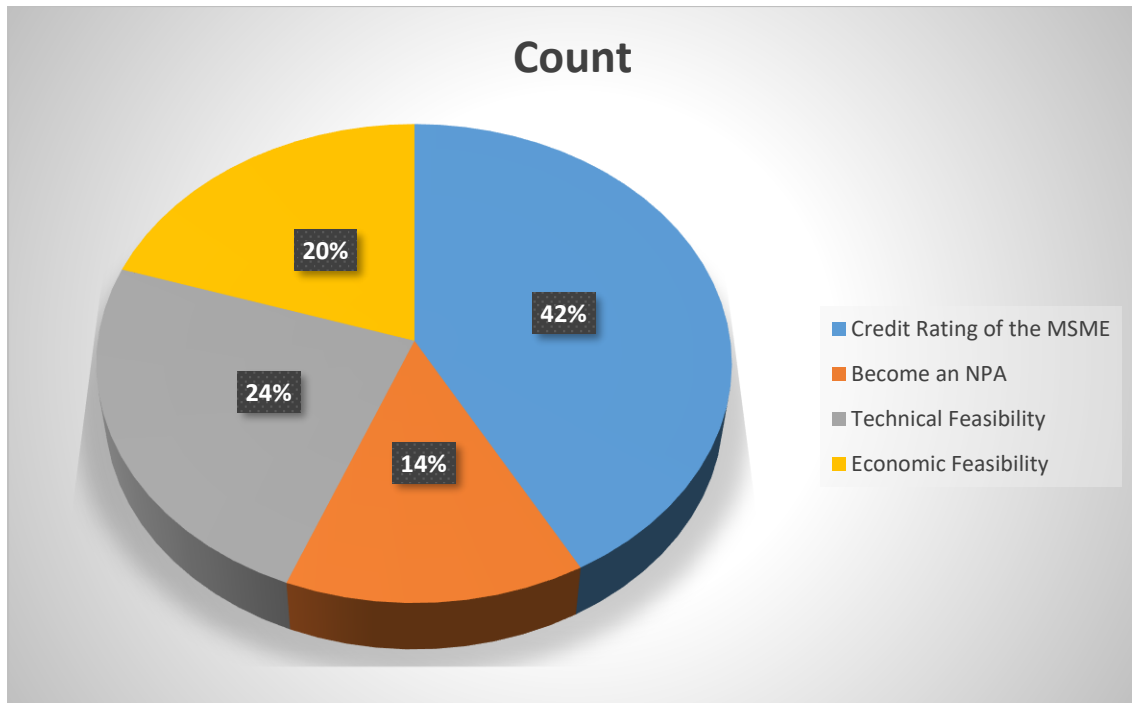


Figure 20: Frequency Count of Loan Rejection due to Credit Rating of MSME, NPA, Technical Feasibility and Economic Feasibility

Noticeably, very few of the respondents cited the reason that the loaned-out asset to become an NPA in the future. Thus, combining the hypothesis test done previously and the response from bank officials we deduce that the barring few factors such as Time taken for loan sanctioning and the loan mix (short-term and long-term) loan proportion rest of the factors of Loan process are not impacted by the Industry classification, Type of Business Unit, Sector to which an MSME belongs, Awareness level of loan Applicant and his education status. The same is validated by the response given by bank officers where the rejection of loan is primarily done based on the credit rating of MSMEs and their technical and economic feasibility.

Chapter 8

Multivariate Analysis of the Loan Process

8. Multivariate Analysis of the Loan Process

In the previous sections, we performed a univariate analysis with the variables of the loan process to understand the nature of the relationship existing amongst the variables that may impact the Loan process. However, a multivariate analysis is plausibly required to supplement the analysis and make it more holistic. For the same, we aim to fit the linear model based on the type of the response variables falling under the segment “Loan Process”. Hence, the section aims to fit a linear model with the response variables as Loan Process (Loan status, Difficulty in getting Loan, Time taken for Loan Sanctioning, and Loan Sanctioned Amount). Noteworthy, in each case, four different linear models are fitted with predictor variables constituting of Industry Categorization (Industry Classification, Business Unit Type, Nature of Business), Owner Education Level, Awareness Level, and Different Sources of Funding apart from Loan from Banks, and Loan Demanded. To begin with, we fit a model for Loan Status as the response variable. Noteworthy, Loan Status being dichotomous in nature, we fit a logit model with dummy variable “0” signifying as Loan Not Sanctioned, whereas “1” signifying as Loan Sanctioned. The null hypothesis for the same is given below:

H₀: The No model and the logit model are no different

H_a: The logit model significantly differs in terms of curve fitting from the No model

Note: “No” model signifies that no linear relationship can be established between predictor and response variables.

Table 21 - Panel A displays the Hosmer-Lemeshow test result to test the null hypothesis. Noteworthy, in the Hosmer-Lemeshow test, the non-significance of the p-value is indicative of the goodness of fit of a model. With the p-value being more significant than the tolerance, the test is non-significant signifying that the null hypothesis can be rejected.

It implies that the logit model fit differs significantly from the No model. However, the model fit variation explained by the R-square value computed through Nagelkerke is pretty low (Table 21 - Panel B). Noteworthy, the value varies from [0,1], with the two limits implying the proportional explanation by the model. Moreover, we can observe from Panel C of Table 21 that none of the predictor variables is significant enough to explain the response variable, i.e., Loan Status. As a result, the logit model does not fit well to explain Loan status in terms of the predictor variables.

Table 2121: Hosmer-Lemeshow test Result for Loan Status

Step	Chi-square	df	Sig.
1	8.614	8	.376

Panel A

Step	Nagelkerke R square
1	0.104

Panel B

Variables Used in the Equation		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	Industry_Classification	.390	.580	.451	1	.502	1.476
	Unit_Type	-.122	.289	.178	1	.674	.885
	Nature_of_Business	.062	.140	.196	1	.658	1.064
	Owner_Education	-.323	.261	1.533	1	.216	.724
	Awareness_Level	-.636	.670	.899	1	.343	.530
	Own_Money_Proportion	.909	2.196	.171	1	.679	2.482
	Borrowed_from_friend	-5.604	6.181	.822	1	.365	.004
	Internal_Source_of_fund	-.462	2.943	.025	1	.875	.630
	Short_term_loan_proportion	2.017	1.916	1.107	1	.293	7.512
	Long_Term_Loan_proportin	1.299	1.557	.696	1	.404	3.667
	Loan_demanded	.000	.000	.029	1	.864	1.000
	Constant	-.169	2.281	.005	1	.941	.844

Panel C

The next response variable to be considered is “Time taken for Loan Sanctioning.” The response variable is dichotomous with two responses as “sanctioned within a week” and “took more than 2 months”. The former has been a dummy variable coded as 1, while the latter coded as 0. Thus, before applying the logit model, we frame the hypothesis to be tested against a “No model” option. The hypothesis for the same is listed below

H0: The No model and the logit model are no different

Ha: The logit model differs significantly from the No model

As we can observe from Table 22 - Panel A that the Hosmer-Lemeshow test value signifies non-significance, implying that we can reject the null hypothesis and the logit model is a good fit. In addition to this, if we go through the Nagelkerke R square value, it comes out to be pretty decent (Table 22 - Panel B). We proceed further to have a glimpse of the classification table (Table 22 - Panel C). As we can observe that prediction percentage correctness is highly skewed. Further, we plug in the predictor variables that are significant to build the logit model. As we can observe that “Unit type”, “Owner Education”, “Awareness Level”, and “Loan Demanded” are significant within the tolerance level of (5%). Thus, the logit model with the response as “Time taken for Loan Sanctioning” is listed below:

$$\text{Time taken for loan sanctioning (Y)} = \exp (0.320 * \text{Unit Type} - 0.268 * \text{Owner education} + 1.011 * \text{Awareness level} - 9 * 10e-9 * \text{Loan demanded} - 1.127)$$

Moving with the inference, a positive value of Unit type signifies an observation allotted higher value on the nominal scale has a higher likelihood of loan sanctioning time to take more than 2 months, indicative of log odds of occurrence of loan sanctioning amount to exceeds two months against within one week by 0.320 units. In our case, the dummy code for “Proprietorship”, “Company,” and Partnership is {0,1,2} respectively. Noteworthy, loan sanctioning amount dummy coded as “0” is odd to be looked out. With the predictor variable “Owner Education”, being negative in the equation is an indication of an owner with higher education has a low likelihood of getting the loan sanctioned after 2 months, which indirectly implies that if the loan gets sanctioned, it would be within 2 months. A plausible reason for this is an owner with a higher education level would pass on hassle-free as he has an edge to know the financial and legal procedures to be well documented before loan submission. Noteworthy, a higher level of educational qualification has been allotted a higher numeric dummy code. As an example, in comparison to the uneducated MSME applicant, the college-educated owner has been allotted dummy code as 1. The next predictor to be part of the logit model is the “Awareness Level” index. A positive value here implies that awareness level provides no edge to get the loan sanctioned within 2 months, rather it increases the duration for loan sanctioning. The observation seems random, rather than aligning to some sound macroeconomic fundamentals backing up. It can be interpreted in a way as if the awareness level has little role to play in deciding the duration of loan sanctioning. In a way, it portrays the loan manager as unbiased in sanctioning loans. The last predictor to be significant enough is the Loan Demanded, with again a very low negative value. Quite obviously, the predictor Loan Demanded being an interval scale, here signifies that a higher loan amount demanded would require more time duration to be sanctioned. Importantly, a massive investment in an MSME would demand enough scrutiny from the loaning officer, which very well empirically gets verified by the statistical results. Though the variation explained is not high enough (evident from

Nagelkerke R-square value), the Time taken for Loan Sanctioning can be predicted via predictors.

Table 22: Hosmer-Lemeshow test Result for Time taken for Loan Sanctioning

Step	Chi-square	df	Sig.
1	10.581	8	.227

Panel A

Step	Nagelkerke R square
1	0.219

Panel B

Classification Table ^a					
	Observed		Predicted		
			Time taken for loan sanctioning		Percentage Correct
			more than 2 months	within 1 week	
Step 1	Time taken for loan sanctioning	more than 2 months	89	0	100.0
		within 1 week	10	1	9.1
		Overall Percentage			
a. The cut value is .500					

Panel C

Variables in the Equation		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	Industry_Classification	.432	.847	.260	1	.610	1.541
	Unit_Type	.320	.458	.489	1	0.043*	1.377

Nature_of_Business	-.118	.221	.284	1	.594	.889
Owner_Education	-.268	.431	.386	1	0.023*	.765
Awareness_Level	1.011	1.164	.754	1	0.034*	2.748
Own_Money_Proportion	-1.528	3.263	.219	1	.640	.217
Borrowed_from_friend	-326.907	101767.598	.000	1	.997	.000
Internal_Source_of_fund	1.667	4.115	.164	1	.685	5.298
Short_term_loan_proportion	1.911	2.932	.425	1	.514	6.761
Long_Term_Loan_proportion	-.993	2.414	.169	1	.681	.371
Loan_demanded	-.9* 10e -9-	.000	.733	1	0.045*	1.000
Constant	-1.127	3.354	.113	1	.737	.324

Panel D

The next response to be tested is “Difficulty in Loan Sanctioning”, again on a nominal scale. The dummy code allotted is {0,1,2} for “yes”, “no”, “easy but loan officer did not know the procedure”. The model opted for curve fitting is Multinomial Logistic Regression, as the response variable is on a nominal scale. Importantly, the reference category for comparison has been chosen as “yes” dummy coded as 0. The null hypothesis to be tested against the significance of the fitted multinomial logit model against no model.

H₀: The No model and the multinomial logit model are no different

H_a: The multinomial model differs significantly from the No model

As we can observe from Table 23 – Panel A that the significance level is well below the tolerance, indicating the model to be a good fit. Thus, we can reject the null hypothesis and

infer that the multinomial logit differs significantly from the No model. Next, we look at the Nagelkerke pseudo-R-square and McFadden values as an indicator of a good fit (Table 23 – Panel B). A higher value in the range of 0.2 – 0.4 for McFadden is indicative of the model to be a good fit. With Nagelkerke R-square value ranging in between [0,1], a value closer to 1 is indicative of a good fit model. The next is the reduced model fitting variable estimates with the likelihood ratio with significance (Table 23 - Panel C). As we can observe that only two predictors, i.e., own money proportion and internal source of the fund are statistically significant in determining the ease of loan. Thus, the linear predictor function for the difficulty of getting a loan can be written as:

$$\text{Difficulty in getting loan (i, k)} = \beta_0 * \text{Own Money proportion} + \beta_1 * \text{Internal source of fund} + \alpha$$

Where observation i (dummy code) has outcome k.

Noteworthy, the reference or the pivot response variable has been taken as the response (yes) with dummy code “0”. Thus, the two regressed equation with log odds can be summarized as below:

$$\text{Ln } \{P(Y = 1)/P(Y=0)\} = -8.782 * \text{Own Money Proportion}$$

$$\text{Ln } \{P(Y = 2)/P(Y=0)\} = 13.363 * \text{Internal Source of Fund}$$

Note, the negative coefficient in equation 1 is an indication that every unit change in Own Money Proportion decreases the log odds of Difficulty of Getting Loan (No) with reference to “yes” by -8.782 units. Similarly, the positive coefficient of an internal source of fund is an indication of that every unit change in the internal source of fund increases the log odds by 13.363 units as against the reference, i.e., the tendency of the loan officer to know the

loan procedure is linked to the quantum of internal source of fund. Quite surprisingly, more the internal source of the fund or own money proportion, more difficult is to get loan sanctioned.

Table 23: Hosmer-Lemeshow test Result for Difficulty in Loan Sanctioning

Model Fitting Information				
Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	218.074			
Final	151.471	66.602	22	.000

Panel A

Pseudo R-Square	
Cox and Snell	.486
Nagelkerke	.547
McFadden	.303

Panel B

Likelihood Ratio Tests				
Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	155.510	4.039	2	.133
Industry_Classification	154.588	3.116	2	.211
Unit_Type	153.274	1.802	2	.406
Nature_of_Business	154.566	3.094	2	.213
Owner_Education	152.604	1.132	2	.568
Awareness_Level	152.601	1.129	2	.569
Own_Money_Proportion	159.697	8.226	2	.016
Borrowed_from_friend	152.875	1.404	2	.496
Internal_Source_of_fund	162.901	11.429	2	.003
Short_term_loan_proportion	151.533	.062	2	.970

Long_Term_Loan_proportin	155.280	3.809	2	.149
Loan_demanded	152.173	.701	2	.704

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

Panel C

Parameter Estimates									
Difficulty in getting loan ^a			B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)
									Lower Bound Upper Bound
no	Intercept		6.786	3.633	3.489	1	.062		
	Industry_Classification		-.658	.817	.648	1	.421	.518	.104 2.571
	Unit_Type		-.537	.450	1.424	1	.233	.584	.242 1.412
	Nature_of_Business		-.280	.201	1.946	1	.163	.755	.509 1.120
	Owner_Education		-.433	.411	1.112	1	.292	.648	.290 1.451
	Awareness_Level		.939	1.074	.765	1	.382	2.558	.312 20.971
	Own_Money_Proportion		-8.782	3.351	6.868	1	.009	.000	2.155E-007 .109
	Borrowed_from_friend		1.575	10.743	.021	1	.883	4.830	3.463E-009 6735352911.046
	Internal_Source_of_fund		3.379	7.635	.196	1	.658	29.350	9.309E-006 92536209.488
	Short_term_loan_proportion		-.029	3.012	.000	1	.992	.971	.003 355.695
	Long_Term_Loan_proportion		-2.187	2.345	.870	1	.351	.112	.001 11.119
	Loan_demanded		.000	.000	.816	1	.366	1.000	1.000 1.000
	Intercept		5.693	3.787	2.260	1	.133		
Easy but loan officer did not know the procedure	Industry_Classification		.635	.729	.757	1	.384	1.886	.452 7.878
	Unit_Type		-.416	.377	1.218	1	.270	.660	.315 1.381
	Nature_of_Business		-.300	.186	2.597	1	.107	.741	.515 1.067
	Owner_Education		-.243	.382	.406	1	.524	.784	.371 1.657
	Awareness_Level		.812	.867	.878	1	.349	2.253	.412 12.329

Own_Money_Proportion	-5.503	3.626	2.303	1	.129	.004	3.337E-006	4.975
Borrowed_from_friend	8.500	9.131	.867	1	.352	4916.736	8.307E-005	290998339775.114
Internal_Source_of_fund	13.363	7.329	3.324	1	.068	635786.515	.367	1101265731864.668
Short_term_loan_proportion	-.622	3.193	.038	1	.845	.537	.001	280.169
Long_Term_Loan_proportion	-4.442	2.396	3.437	1	.064	.012	.000	1.289
Loan_demanded	.000	.000	.442	1	.506	1.000	1.000	1.000

a. The reference category is: yes.

Panel D

The last response variable of the Loan process to be tested is “Loan Sanctioned Amount.” As the variable is continuous in nature, we fit an ordinary least square regression model. As we can observe from the Coefficient table (Table 24 - Panel A) that apart from the predictors “Loan Demanded,” the rest of them are insignificant, with tolerance range being 5%. Thus, we rerun the regression model with just one predictor, “Loan Demanded.” As we can observe from Table 24, Panel B that the R-square value is pretty low (close to 0.216), indicative of low explanation in variation by Loan Demanded via a linear model. Additionally, the residual plot shows the dependent variable to be highly skewed, thus deviating from normality. It violates one of the assumptions to fit an OLS. Hence, we undergo curve estimation to identify the kind of model that can be fitted with predictor variable as Loan demanded and response as Loan sanctioned.

As we can observe from Panel D and Panel E of Table 24 that the cubic or quadratic model fitting shows the highest variance explanation with R-square values ranging (90%). Thus, we opt to fit the cubic model, which can be summarized as below:

$$\text{Loan sanctioned} = -2.707\text{E-}17 * (\text{Loan demanded})^3 + 7.932\text{E-}9 * (\text{Loan demanded})^2 + 0.539 * (\text{Loan demanded}) - 151585.405$$

Table 24: Hosmer-Lemeshow test Result for Loan Sanctioned

Coefficients ^a							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-5955292.387	20492677.684		-.291	.772		
Industry Classification	663341.742	5154045.978	.013	.129	.898	.899	1.113
Unit Type	-1963647.643	2707891.298	-.072	-.725	.470	.887	1.128
Nature of Business	-436785.631	1278905.113	-.035	-.342	.734	.818	1.222
Owner Education Level	2249083.969	2393506.257	.112	.940	.350	.606	1.650
Awareness level	-3173894.601	6375275.573	-.055	-.498	.620	.705	1.419
1 Own Money Proportion	13899149.377	19793371.520	.221	.702	.484	.087	11.498
Borrowed from Friend	-27728914.103	57524427.054	-.050	-.482	.631	.799	1.252
Internal Source of Fund	14512424.815	26644656.041	.060	.545	.587	.711	1.406
Short Term Loan Proportion	10810270.329	17335884.694	.110	.624	.535	.278	3.599
Long Term Loan Proportion	9228440.773	13872926.501	.160	.665	.508	.149	6.717
Loan Demanded Amount	.256	.056	.463	4.529	.000	.828	1.207

a. Dependent Variable: Loan Sanctioned Amount

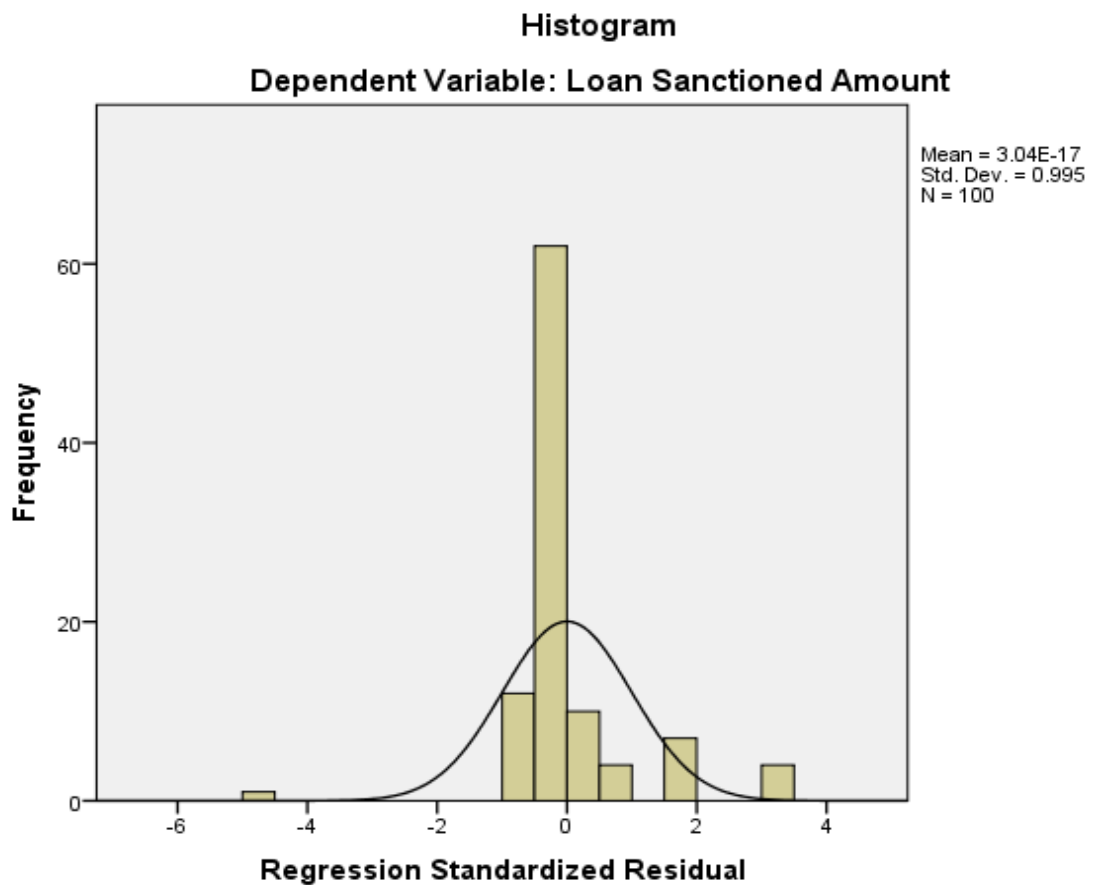
Panel A

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.464 ^a	.216	.208	19466416.076	2.020

a. Predictors: (Constant), Loan Demanded Amount

b. Dependent Variable: Loan Sanctioned Amount

Panel B



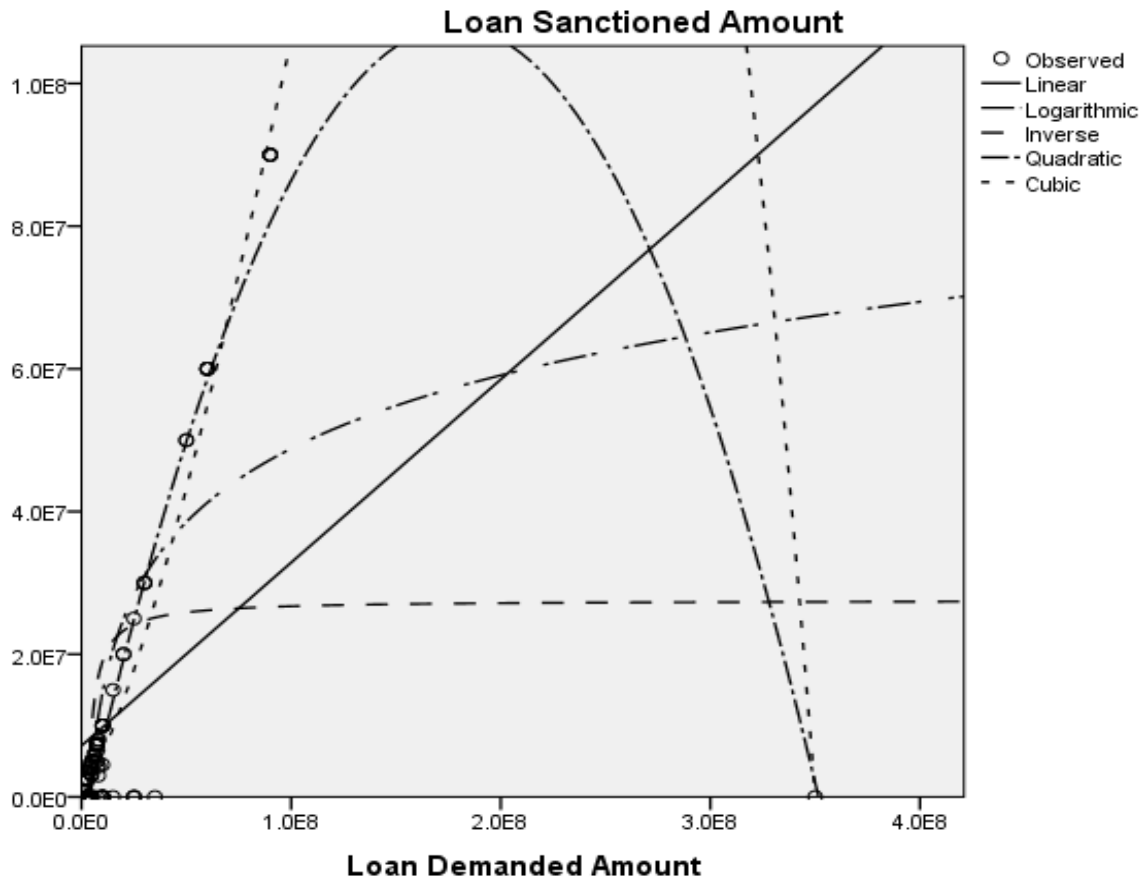
Panel C

Model Summary and Parameter Estimates									
Dependent Variable: Loan Sanctioned Amount									
Equation	Model Summary					Parameter Estimates			
	R Square	F	df1	df2	Sig.	Constant	b1	b2	b3
Linear	.216	26.939	1	98	.000	7180021.587	.257		
Logarithmic	.551	120.092	1	98	.000	-224600732.243	14842944.700		
Inverse	.282	38.583	1	98	.000	27583764.029	-85830152135305.800		
Quadratic	.903	453.741	2	97	.000	-4628622.200	1.267	-3.566E-009	
Cubic	.936	471.435	3	96	.000	-151585.405	.539	7.932E-009	-2.707E-017
Compound ^a	.	.	.	.	.	.	.		
Power ^a	.	.	.	.	.	.	.		
S ^a	.	.	.	.	.	.	.		
Growth ^a	.	.	.	.	.	.	.		
Exponential ^a	.	.	.	.	.	.	.		
Logistic ^a	.	.	.	.	.	.	.		

The independent variable is Loan Demanded Amount.

a. The dependent variable (Loan Sanctioned Amount) contains non-positive values. The minimum value is 0. Log transform cannot be applied. The Compound, Power, S, Growth, Exponential, and Logistic models cannot be calculated for this variable.

Panel D



Panel E

Noteworthy, the multivariate statistical exercise on the respondents resonates with the output inferred from the univariate. However, we were able to precisely quantify the amount with which the constituent of Loan process viz. Loan status, Time Taken for Loan Sanctioning, Difficulty of getting Loan, and Loan Sanctioned. As we can observe that among the two dichotomous variable Loan Status and Time Taken for Loan Sanctioning, only the later is impacted by the predictor Unit type, owner education, awareness level, and loan demanded amount. Whereas, the difficulty of getting a loan is impacted by merely two variables, i.e., own money proportion and internal source of fund. Lastly, the loan sanctioned amount bears a cubic relationship with the amount of loan demanded. Though the multivariate analysis has provided more in-depth insights and improved the prediction ability of the variables that define the loan process with the rest of the captured variables, however the univariate analysis findings can never be underestimated. The core reason for failure that can never be shrugged off remains poor fund management in terms of leverage

amount. However, at the same time, the amount sourced internally, and own money proportion impacts the timely schedule of the loan process in terms of ease of getting loan and duration lapsed in loan sanctioning.

Chapter 9

Conclusion

9. Conclusion

The study explores the issues related to the financing of MSMEs of the State of Bihar and investigates which factors influence the credit supply by decomposing the Loan process into factors that expedite or slow down the disbursement of Loan for the MSMEs of the state. For the same random sampling of 100 MSME owners was done, and the questionnaire was framed to capture the attributes that may influence the factors of the Loan process. The attributes had three segments viz. Categorization, Awareness, Education. The factors of the loan process were dealt with the attribute Financing, where details related to sources of money, loan demanded, and the loan sanctioned were dealt with. Each factor was then empirically tested across the attributes, and their sub-segments to precisely identify which factor is most responsible for a glitch in the Loan process and does any group attribute has significant influence or role to play in loan disbursal. The study finds that barring, “time Taken for Loan Sanctioning,” and the “loan mix” rest of the factor of the Loan process holds no significant association with the attributes or its sub-segments. To discuss it further, the sub-segment “Industry classification” under the categorization attribute has no impact on the Loan process, though it has been observed that MSMEs operating in the manufacturing sector demand more loans on an average to the MSMEs operating in the service sector. The other sub-segment of categorization attribute, i.e., Unit type dealing with the ownership type of the MSMEs, finds more wait time in loan disbursal for MSMEs with “Proprietorship” or “Company” type of ownership. For the rest of the factors of the Loan process, the type of ownership has no significant role to play. The last sub-segment, i.e., the nature of the business, dealing with the sector in which MSMEs operate, also has no significant impact on the loan process. Quite importantly, the education level influences two factors of the loan process viz. Time to get loan sanctioned and the loan mix. It has been observed that the applicants with higher educational levels, i.e., postgraduate or with

a technical course have a higher mix of long-term loans than the short-term. Reasonably, with debt that matures in a long span of time provides enough slack period for the MSMEs to generate positive cash flow along with timely repayment of debt. Importantly, in the short run, it is highly unlikely for a new MSME firm to generate enough cash flows to sustain business along with loan repayment. It has often been observed that the short-run cost takes a mega share of the total revenue leaving behind marginal profit. Though, the bank officers do not discriminate in loan sanctioning based on the education level as the same distribution for the amount of Loan sanctioned is observed across the group, channelizing the allocated fund in an appropriate manner will be effective in case of a right mix of short-term and long-term loans. For that, the education level has a role to play. Though government initiatives are on the run for vocational training and skill development, still a large number of respondents with low levels of education are operative in micro to small levels of industries. However, short-term hiccups combined with the pressure of loan repayment in case of the short-term loan proportion being high, questions the sustainability of the firm to operate. Yet another attribute Awareness level is associated with the Time taken for loan sanctioning, and the distribution of Long-term loan share varies across the group with the applicants with higher awareness level have a more proportionate allocation in the long-term loan share. The trend observed in the education level along with awareness level indicates that two of these attributes add to the business acumen to strategize and manage the finances of the MSME accordingly. Importantly, a glitch in credit supply can stop operations in small industries, thus hampering their long-term fortune. Instead of this, more concentrated efforts from banks and the government must be taken to sensitize the people interested in running MSMEs about the benefits of training programs, schemes, etc. Lastly, we tested the correlation statistics of the financial leverage of an MSMEs with the shortage of money supply. The study finds no significant correlation amongst the two indicating no further study to be constituted to investigate whether a highly leveraged firm

is more likely to get less money sanctioned than demanded. However, the findings negate any such relationship to exist between the two, indicating that the loan officer is less concerned about the leveraged position a firm is having. Noticeably, many factors influence loan rejection and approval; however, respondents of the banks focussed more on the crediting rating of the MSMEs as the deciding factor for loan rejection followed by technical and economic feasibility. Thus, from banks' perspective, irrespective of the firm industry classification, sector, and type of ownership, the loan disbursement will depend finally on the project plan with proper feasibility analysis along with a decent credit rating to get the loan disbursed. However, the time duration and loan mix will certainly be influenced by the applicant's awareness level and education status. Furthermore, a multivariate analysis is performed to establish the linkage amongst the variables of the loan process with other variables and thereby quantify the amount by which the predictors are affecting the response. The findings eventually converge with the univariate analysis, with the dichotomous response Time taking for loan sanctioning impacted by Unit type, owner education, awareness level and the amount of loan demanded. While Business unit type and awareness level increases the log-likelihood of occurrence of time duration to exceed more than one month, the education level of employees and the amount of loan demanded decreases the same. The observation is indicative of education level, preferably the skilled one with professional courses to have an edge in the loan process. The other nominal variable i.e. Difficulty of getting a loan with reference to pivot response of "yes" includes only two predictors to be significant enough viz. Own money proportion and internal source of funds to predict the ease of getting a loan. While higher own money proportion complicates the loan to be funded, possibly due to higher expected loan demanded, a higher internal source of fund smoothens the ease of getting a loan. Lastly, the amount of loan sanctioned deviates from linearity with just one predictor to be significant enough to be incorporated in the model i.e. Loan demanded. As per our study, a cubic relationship

explains more than 90% of the variance, thus fits suitably to predict the amount of loan to be sanctioned vis-à-vis loan demanded. Though the multivariate statistics set the predictors for the response variables contributing to the loan process the core reason challenging MSMEs sustainability remains the same, i.e., poor fund management especially in terms of capital leverage.

An important observation is a large number of MSMEs have been registered under Agriculture & Allied segment. MSMEs of this sector requires low capital to start the business but has the capacity to create huge employment opportunities. Ironically, the MSME sector of this sector is at a very nascent stage and needs much more aid than just finance. Difficulty in obtaining capital, inadequate and unreliable power supply, zero access to modern technology, dearth of latest technology and agriculture supply chain information, and lack of market and infrastructure are the major reasons for the dismal growth of MSMEs in the state. The study suggests proactive and time-bound support from the government of Bihar and banks to boost the pace of MSMEs' development in the state. Although compared to the past, the availability of electricity situation in Bihar has improved, but still, to promote the MSMEs sector in the state, the government should revive the sick and closed industries to boost the demand. Unlike other industrial states, the government of Bihar requires to set many special economic zone or Industrial belts to provide an energetic industrialized shape to Bihar. Quite importantly, agriculture has been a major source of livelihood for people coming from the lower strata of society. Noteworthy, in the case of the Indian society's hierarchical structure, the categorization is more aligned with the caste system. Some academicians such as Raj et al. (2018) have emphasized on the caste system that plays a role in gaining access to finance. Our study opens gates for the future discourse of research with special impetus on the agrarian sector clubbed with the social hierarchy and their relationship with access to finance.

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Appendix 1: MSMED Act Definition of MSMEs

As per the MSME Development Act, 2006, the current definition of Micro, Small and Medium Enterprises in the manufacturing and service sector are as follows:

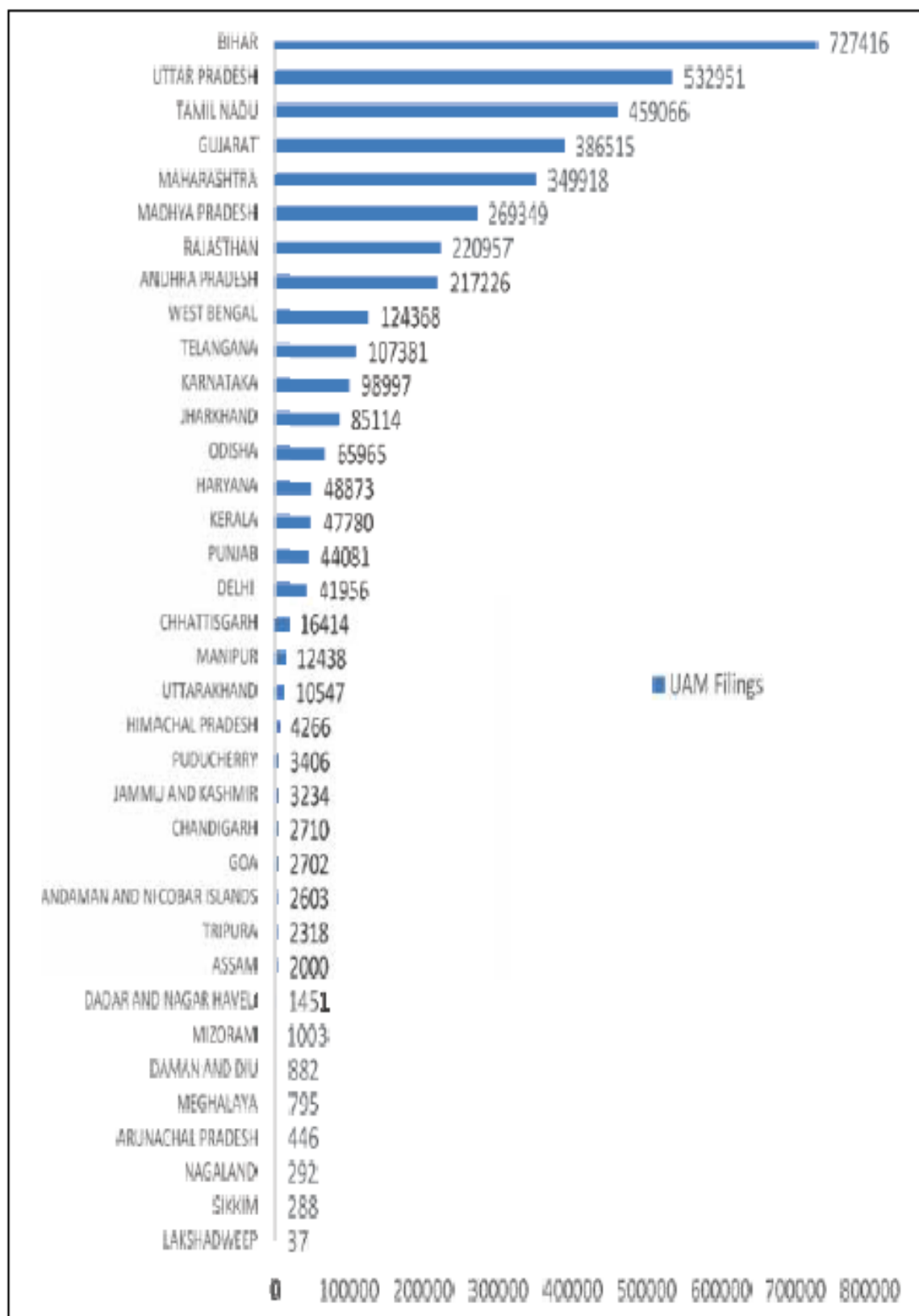
Category	Manufacturing Sector	Service Sector
	Investment in plant & machinery (excluding land & building)	Investment in equipment (excluding land & building)
Micro	Upto Rs 25 lakhs	Upto Rs 10 lakhs
Small	Above Rs 25 lakhs up to Rs 5 crores	Above Rs 10 lakhs up to Rs 2 crores
Medium	Above Rs 5 crores up to Rs 10 crores	Above Rs 2 crores up to Rs 5 crores

Note: MSME covers manufacturing as well as service sectors, including small road transport operators (SRTTO). Under the revised Priority sector loans (PSL) guidelines, medium enterprises (with investment limit of more than Rs 5 crore to Rs 10 crore for manufacturing units and more than Rs 2 crore to Rs 5 crore for service sector units) has also been brought under the priority sector ; and a separate sub-limit of 7.5% of Adjusted Net Bank Credit (ANBC) has been fixed for lending to micro-enterprises.

Appendix 2: State-wise Distribution of MSMEs

Sl. No.	State/UT	Estimated Number of MSMEs	
		Number (in lakh)	Share (in %)
1	Uttar Pradesh	89.99	14
2	West Bengal	88.67	14
3	Tamil Nadu	49.48	8
4	Maharashtra	47.78	8
5	Karnataka	38.34	6
6	Bihar	34.46	5
7	Andhra Pradesh	33.87	5
8	Gujarat	33.16	5
9	Rajasthan	26.87	4
10	Madhya Pradesh	26.74	4
11	Total of above ten States	469.36	74
12	Other State/UTs	164.52	26
13	All	633.88	100

Appendix 3: State-wise distribution of Udyog Aadhar Memorandum (UAM) filings



Appendix 4: Contribution of Industrial sector in GSVA in different Indian states

State	2014-15	2015-16	2016-17	State	2014-15	2015-16	2016-17
Andhra Pradesh	27.5	27.5	26.7	Maharashtra	34.8	35.1	34.1
Assam	31.0	38.0	38.0	Odisha	40.2	43.6	42.1
Bihar	21.1	20.4	19.2	Punjab	25.0	25.2	25.0
Chhattisgarh	47.6	48.3	48.0	Rajasthan	30.5	31.5	31.0
Gujarat	47.2	49.8	49.8	Tamil Nadu	33.6	36.2	36.9
Haryana	31.2	31.1	30.5	Telangana	23.7	25.7	25.5
Jharkhand	43.5	41.3	37.1	Uttar Pradesh	26.5	28.2	29.1
Karnataka	26.5	27.6	27.4	West Bengal	24.4	25.0	26.9
Kerala	27.3	27.4	27.0	India	31.1	31.6	31.5
Madhya Pradesh	27.3	29.3	27.0				

Source : Central Statistical Organisation (CSO)

Appendix 5: Annual Growth Rate of Secondary Sector in Bihar at constant prices

Annual Growth Rate of Secondary Sector in Bihar at constant prices					
Sector	2013-2014	2014-15	2015-16	2016-17	2017-18
Mining and quarrying	540.6	-58.3	210	-0.1	3.5
Manufacturing	94.5	37.4	-10	7.6	2.7
EGWUS	2.8	3.4	0.1	7.3	3.6
Construction	6.5	-4.5	10.2	1	2.2
Secondary	27.8	11.9	0.1	4.2	2.5
Gross State Domestic Product	4.9	3.6	5.8	9.9	11.3

Note: * EGWUS = Electricity, gas, water supply & other utility services. Source: Directorate of Economics and Statistics, GOB

Appendix 6: Distribution of All Bank Branch Offices (2013 - 2018)

Distribution of All Bank Branch Offices (2013 - 2018)						
Year	Total	Growth Rate	Rural proportion	Semi-urban proportion	Urban proportion	All
2013	5270	8.4	59.6	21.8	18.6	100
2014	5908	12.1	58.7	23	18.3	100
2015	6297	6.6	57.9	23.1	19	100
2016	6661	5.8	55.4	25.2	19.4	100
2017	6844	2.8	51	28.5	20.5	100
2018	6906	0.9	50.8	28.6	20.5	100

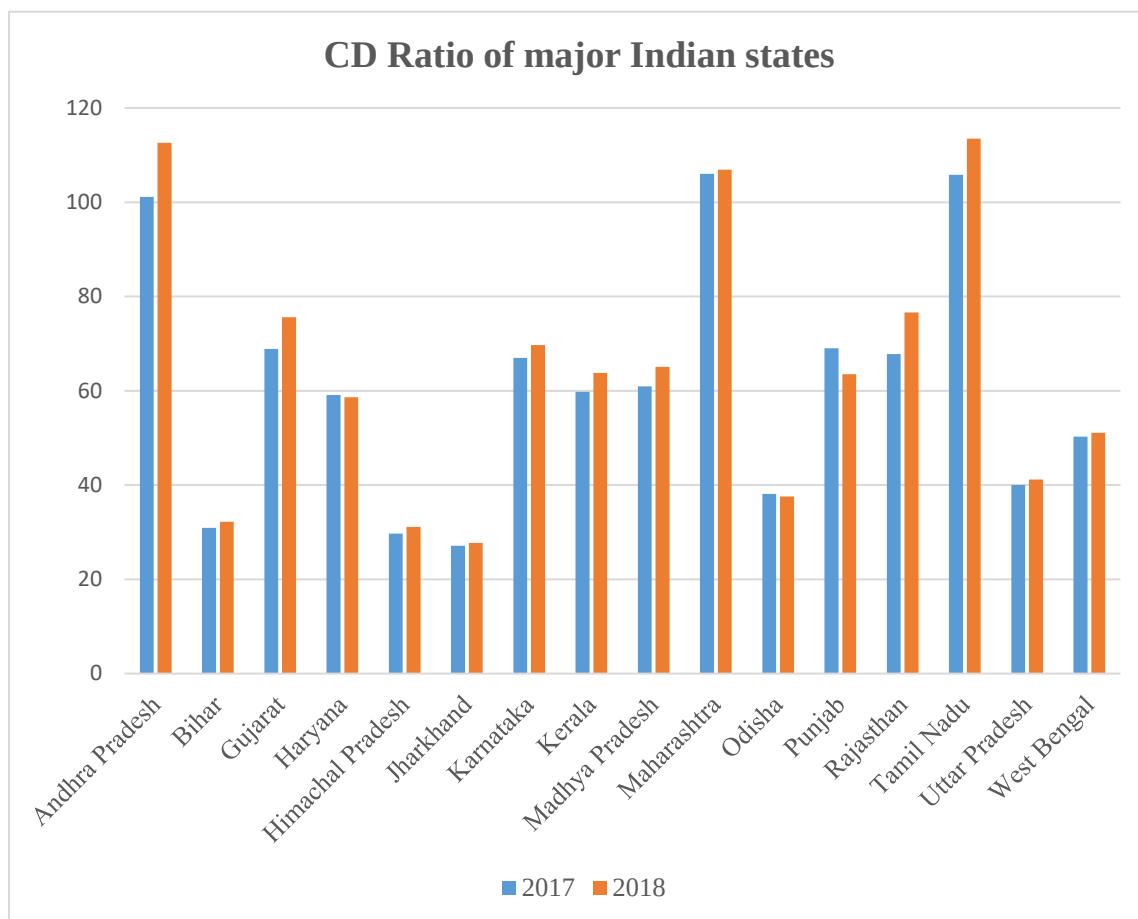
Source: State Level Bankers' Committee

Appendix 7: Distribution of Branches of Commercial Banks among States

Distribution of Branches of Commercial Banks among States (as on March 2018)							
States	No. of Branches	Percentage share in all India branches	Percentage share in all India population	States	No. of Branches	Percentage share in all India branches	Percentage share in all India population
Andhra Pradesh	6892	4.9	7	Maharashtra	12317	8.8	9.3
Bihar	6681	4.8	8.6	Odisha	4801	3.4	6
Chhattisgarh	2492	1.8	2.1	Punjab	6436	4.6	2.3
Gujarat	7835	5.6	5	Rajasthan	7198	5.1	4.4
Haryana	4808	3.4	2.1	Tamil Nadu	10710	7.6	6
Himachal Pradesh	1532	1.1	0.5	Uttar Pradesh	16913	12.1	16.5
Jharkhand	2947	2.1	2.7	Uttarakhand	2041	1.5	0.8
Karnataka	9933	7.1	5	West Bengal	7932	5.7	3.5
Kerala	6281	4.5	2.8				
Madhya Pradesh	6511	4.6	6				

Note: The information on the number of branches of commercial banks is slightly different in Tables 10.1 and 10.2. This is due to non-reporting by some banks about their operations to the Reserve Bank of India (RBI) and the non-reconciliation of State Level Bankers' Committee (SLBC) data with the RBI data. Source: Quarterly Statistics on Deposits and Credit of Scheduled Commercial Banks, Reserve Bank of India.

Appendix 8: Credit Deposit Ratio of Major Indian States



Appendix 9: The Political Map of State of Bihar



Appendix 10: Questionnaire for MSMEs in Bihar

To categorize MSME operating in different sectors

1. Classification of MSME?
 - a. Service enterprise
 - b. Manufacturing enterprise
2. Unit type?
 - a. Company
 - b. Partnership
 - c. Proprietorship
3. Nature of Business of this SME?
 - a. Agriculture
 - b. Processed Food Items
 - c. Rubber, Plastics
 - d. Engineering
 - e. Electrical

To access relevant experience in the area of working

4. Owners Education?
 - a. Post-Graduation
 - b. College Degree
 - c. Technical Courses
 - d. Uneducated

To access how the financing is managed

5. What proportion of money you got from the following to finance your business?
 - a. With own money
 - b. Borrowed from some close friend or family
 - c. Internal sources of fund
 - d. Loan from bank
 - e. Loan from NBFCs

- f. Capital Markets
6. Fill the proportion of money borrowed to finance the firm based on maturity levels:
- a. Short term
 - b. Long term

To access the issues related to financing: Perspective of firm owners

7. Was it difficult to get a loan from the bank?
- a. Yes
 - b. No
 - c. It was easy, but the person was not aware of THE proper procedure.
8. Amount of loan demanded from the agency.
9. Amount of loan sanctioned by the agency.
10. Time Taken for Sanctioning the Loan.
- a. Less than 1 week.
 - b. Between 1 week to 1 month
 - c. Between 1 month to 2 months
 - d. More than 2 months
11. How much of your need was supported by the loan?
- a. Less than 50% of the need
 - b. 50% of the need
 - c. 50% - 60% of the need
 - d. 60% - 75% of the need
 - e. 75% - 90% of the need
 - f. More than 90%

Awareness about government initiatives

12. Are you aware of PSB loans in 59 minutes initiative?

- a. Yes
 - b. No
13. Are you aware of the technology grade-up program of SIDBI?
- a. Yes
 - b. No
14. Has the digital India initiative increased or decreased your pain?
- a. Increased our pain
 - b. Decreased our pain
15. Did you train workers under the skill India program?
- a. Yes
 - b. No
16. Do you use IT or computer technologies in your enterprise?
- a. Yes
 - b. No

Questionnaire for the banks

1. What is the single most reason for declining the proposal of loan sanctioning to MSMEs and SMEs
- 1. Credit rating of MSME/SME
 - 2. Pre notion of loan turning into bad debt due to firm operations in Bihar
 - 3. Usage of primitive technology & inexperienced labor force
 - 4. Other