CHAPTER 4

DESCRIPTIVE ANALYSIS

4.1 INTRODUCTION

The previous chapter described the methodology employed by gathering data to address the questions raised. This chapter provides the descriptive statistics of the industries that participated in this study and of their response on questionnaire. This chapter is significant for a number of reasons, firstly it provides background information of the industries and managers surveyed, such as their characteristics, their manufacturing strength, manufacturing performance and extent of AMT adoption. This information is vital in order to know about industries whose results are considered under observation in this chapter.

Finally, a thorough review of the descriptive statistics of the sample and questionnaire answer provides a means of testing the sturdiness of the data and also provides a greater understanding of exactly what type of industries have been surveyed and what answers have been given. This chapter has been organized into four sections: the first section is centered on the respondents profile and their characteristics, the second section outlines the manufacturing priority, strength by industries surveyed, the third section describes the technology employed by the industries and the final section looks at the industries performances.

4.2 RESPONDENT'S PROFILE

Several elements of industry profile have been collected i.e. type of products, main customer groups, number of employees, annual sales, trend in market share etc. A letter associated the questionnaire was addressed to the chairman or managing director of the industries. In the last part of the questionnaire, the respondents were required to fill up their job title and the duration of holding
that particular position in the industry. This information was deemed important in order to find out the credibility of the informant. The majority of the respondents were general managers, assistant managers, human resource managers, chief engineers, directors, and some respondents were responsible directly to manufacturing or operations or production issues of their industries. At a glance it can infer that the information collected from the survey is highly credible and with good understanding of informants, with the average duration in their respective positions as 12 years.

4.2.1 Manufacturing Sector Distribution

As the focus of this study is on diverse sectors, data is presented in a disaggregated form of the manufacturing sectors. This allows better understanding about sectored differences in terms of the structure and composition of the different sectors that constitute in cumulative manufacturing sectors and also provide a basis for understanding the reason of different industries acting differently in terms of adopting diverse technologies, manufacturing strategies and achieving different level of performances. The data have been collected from four sectors of manufacturing industries. The majority of respondents are from automobile sector (22 respondents), followed by process sector (18 respondents), electrical & electronics sector (16 respondents) and industrial machinery and equipment sector (12 respondents). The average numbers of employees in different sectors are 1000-3000. The majority of industries have existed in the manufacturing scenes between 20 to 40 years. In terms of the employment size of firms of different permissible status industries, it has been observed that over fifty percent of private industries are of small size; however, the majority of publicly held industries are medium sized. The difference between public and private limited is the convenience of the equity market: as the shares of the public limited company are publicly traded, there is the opportunity for ownership to be separated from operational control of the industry. By
contrast, private owned having limited scope for raising capital on open markets, have a direct association between ownership and control.

Figure 4.1: Sector wise distribution

4.2.2 Summary of respondent profile

The basic survey data have been presented for four broad manufacturing sectors on selection of firm and industry characteristics. Indian manufacturers enjoy the advantages of cheaper raw materials and accessibility of educated, qualified and skilled labor as well as engineers and designers at much lower costs. Technological advancements made by some of these domestic conglomerates have allowed them to become incorporated associates rather than outsourcing associates. Indian automobiles and components are gaining increasing acceptance in the world markets due to their cost competitiveness. In India, the electrical engineering industry has a diverse industrial base with significant unorganized market. It is estimated that light engineering sector contributes to 8-10% of total exports of the country. The Indian engineering industry uses all types of machine tools for manufacturing goods. Due to India’s rapid modernization, engineering industry is now focusing on green field projects as well as the upgrading of existing facilities. India is the fourth
largest producer of cement in the world. India also produces crude steel, making it one of the ten largest steel producers in the world. Increased demand from China as well as strong domestic demand, particularly by consumer durables, automotive manufacturers and the construction sector is the key drivers of production growth. Overall some important differences have been identified across four sectors which might be important in terms of understanding why firms in different sectors have different levels and different types of AMT adoption, have different strategies in place to deal with AMT and have different levels of performance.

4.3 COMPETITIVE PRIORITY

Some basic differences have been explored in the nature of industries of the manufacturing sector. This section focuses on the competitive priority of industries surveyed. In this context manufacturing industries explore the four competitive priorities, namely: quality, flexibility, delivery and cost. Industries were asked to indicate the competitive priority. For each item, respondents were requested to choose a response on five point likert scale; anchored at one end with ‘least important’ meriting a score 1 and the other by ‘most important’ meriting a score of 5.
As shown in figure 4.2, it is observed that quality is vital competitive priority for any industry. Overall, across the four sectors, the mean rankings are above 4, which suggest that quality is considered as vital priority for any industry. The result shows that there is a strong conformity between the four sectors in providing quality products which are reliable and offer high performance in order to compete effectively in the market. Industries pursuing a flexibility strategy offer a wide range of products, excellent after sales service and introduction of new products lines. Referring to figure CP2, the mean score is approx 4, which is slightly less than the quality mean. The result shows that after the quality, flexibility is the important priority of any industry. Industries competing on delivery strategy can compete on reliability as well, i.e. on time delivery to their customers. Figure CP3 shows that mean score is less than 4, which suggests that after the quality and flexibility, delivery is the third important competitive priority. Under the dimension of cost, this has been measured using two items, i.e. companies to offer prices as low as or lower than their competitors, and continuously looking for cost reductions. Figure
CP4 shows that the cost is considered as the least important competitive priority by all sectors.

Figure 4.2.1: Competitive Priority in Automobile sector

Figure 4.2.2: Competitive Priority in E&E sector
In expressions of the importance pattern on each measure among the sectors, offering high quality products is professed to be most important competitive priority in all four sectors. It is perceptible that the cost is considered as the least competitive priority by all industries. The automobile and machinery sectors emphasize more on quality followed by flexibility and delivery while process industry emphasizes less on quality followed by flexibility and delivery as compared to automobile industries.
4.4 COMPETITIVE STRENGTH

Competitive strength has two basic dimensions: how competent an industry is compared with those that want to beat it and how competent it is to mitigating the impact of those forces out that can cause it to be beaten. Industries were asked to indicate the competitive strength. For each item, respondents were requested to choose a response on five point likert scale; anchored at one end with ‘least important’ meriting a score 1 and the other by ‘most important’ meriting a score of 5.

Figure 4.3: Competitive strength in different sector

It is observed from the figure 4.3 that all the manufacturing industries emphasize on the almost same competitive strengths, all sectors relied on quality, responsiveness, flexibility, advanced manufacturing technologies, product customization, information technology, sales and marketing, manufacturing functions and innovativeness.
Figure 4.3.1: Competitive strength in Automobile sector

Figure 4.3.2: Competitive strength in E&E sector
As it has been presented the emphasize and pattern of competitive strength for all four major industries, So it may be conclude, that industries surveyed do not compete on any particular strength alone, rather a combination of different dimensions of competitive strengths i.e. quality cost, responsiveness, flexibility, advanced manufacturing technologies, product customization, information technology, sales and marketing, manufacturing function and innovativeness.
4.5 AUTOMATION IMPLEMENTATION STEPS

The process required to implement a successful automation in a manufacturing industry can be refined down to eight main steps. Each step moves closer to the ultimate goal and will also help to become more organized and more profitable than before. This improvement in profitability helps to finance the future steps required to reach the desired goals of a particular industry or manufacturing unit. Each step must be taken in order and be fully implemented into the day-to-day work habits for the process to be a success. Like the weak link of a chain, a step not taken will quickly develop into a bottleneck that will drain the productivity gains and profits created by other investments in the process. Even the small industry can afford to make these first steps since they require a relatively small financial investment. The greater investment is in believing in the concept and being willing to follow it through. Industries were asked to indicate the automation implementation steps. For each item, respondents were requested to choose a response on a five-point likert scale; anchored at one end with ‘least important’ meriting a score 1 and the other by ‘most important’ meriting a score of 5.
It is observed from the figure 4.4 that all sectors mean vary between three and four, which suggest that all sectors emphasize to implementation the automation in manufacturing industries. In all sectors development and implementation is important factor. Different automation steps vary according to different sectors.

Figure 4.4: Automation Implementation steps in different sector

Figure 4.4.1: Automation Implementation steps in Automobile sector
Figure 4.4.2: Automation Implementation steps in E&E sector

Figure 4.4.3: Automation Implementation steps in M/C sector
In automobile sector first priority is given to development & implementation followed by planning, technology assessment, cost, concept, training and post evolution. In electronics industries first priority is given to planning followed by concept development, cost, technology assessment, development & implementation, training, post evolution. In machinery industries first priority is given to development & implementation followed by planning, technology assessment, cost, concept, training and post evolution. In process industries first priority is given to cost analysis followed by technology assessment, development & implementation, planning, concept development, training and post evolution.
4.6 ADVANCED MANUFACTURING TECHNOLOGIES (AMTs)

The study investigates different types of advanced manufacturing technology (AMT), which are commonly used by manufacturing industries. These technologies can be grouped based on their functionalities, into six subgroups:

1. Advanced design and engineering technologies
2. Advanced machining technologies
3. Advanced planning technologies
4. Advanced material handling technologies
5. Advanced management systems
6. Advanced process improvement systems

Industries were asked to indicate the amount of investment in the individual technology, on a five point likert scale of 1 to 5, where 1 indicates no investment and 5 to show heavy investment. Industries were resolute to be either users or non users of each technology sub-group. For example, an adopter of the design and engineering technology sub group would be using a combination of either CAD,CAM,CAE,GT or all the above. Analysis of the AMT adoption of the manufacturing industries surveyed is based on the level of investment in the technology.

4.7 ADVANCED DESIGN AND ENGINEERING TECHNOLOGIES

Manufacturing industries have invested in various design and engineering technologies such as computer aided design (CAD), computer aided manufacturing (CAM), computer aided engineering (CAE), and group technology (GT) to assist them in designing and testing a product, from a structural or engineering point, controlling of manufacturing machinery, and also for part classification and coding systems.
Figure 4.5: Advanced design & engineering technologies in different sector

It is observed by the figure 4.5 that the most common advanced design technology among the industries surveyed is CAD, which encountered above moderate investments, i.e. means score of 3.9; followed by CAM, with mean score of 3.7. The results show that the fewer amounts has been invested in GT with mean score of less than 3.

Figure 4.5.1: Advanced design & engineering technologies in Automobile sector

Figure 4.5.2: Advanced design & engineering technologies in E&E sector
All sectors agree almost to the fact that investment in CAD takes the most vital position followed by CAM and CAE, while GT is the least significant field of investment. In detail, the Automobile relies on CAD the most, followed by electronics industries. Process industries have invested less on all advanced design and engineering technology as compared to other industries. Most sectors consider that GT is not worth much investment.
4.8 ADVANCED MACHINING TECHNOLOGIES

The study examines the level of investment and integration of four types of assembly and machining technologies: computer numerical control machines (CNC), numerical control/direct numerical control machines (NC/DNC), flexible manufacturing system (FMS), and robotics. These AMTs are used to perform repetitive functions and work without permanent alteration of the equipments. Computer numerical control machine operates by the computer and control all types of machining operations such as turning, boring, milling, drilling, machining centre etc. numerical control or direct numerical control machines directly control the machining operation such as turning, boring, milling, drilling, machining centre etc. Flexible manufacturing system is used to coordinate the handling and transport through centralized control. Robotics is to carry out various operations like handling, process or assembly tasks.

As shown in figure 4.6, regardless of the sector of the manufacturing industries, the most important investment is made in CNC technology. All the manufacturing industries have invested less in robotics technology.

Figure 4.6: Advanced machining technologies in different sector
Figure 4.6.1: Advanced machining technologies in Automobile sector

Figure 4.6.2: Advanced machining technologies in E&E sector
Generally, industries have invested the most investment in CNC technologies. It is observed from the figures that all different sectors have invested different level of investment in advanced machining technologies. In automobile industries the maximum investments have been made in CNC technology followed by NC/DNC and flexible manufacturing system. In electronics industries & machinery industries the maximum investments have been made in CNC followed by flexible manufacturing system and NC/DNC. In process industries the maximum investments have been made in flexible...
manufacturing and CNC are almost same followed by NC/DNC. Except the automobile industries all other industries have invested less on robotics technology.

4.9 ADVANCED PLANNING TECHNOLOGIES

Manufacturing industries have invested in various planning technologies such as material requirement planning (MRP), manufacturing resources planning (MRPII), enterprise resources planning (ERP) and activity based counting (ABC) to assist them in planning, scheduling and controlling of material and resources requirements for the production of manufacturing industries.

![Diagram](image)

Figure: 4.7: Advanced planning technologies in different sector

The whole manufacturing industries appear to reach an agreement on the investment in advanced planning technologies. As shown in figure 4.7, their investments in MRP, MRPII, ERP and ABC analysis are generally moderate. The manufacturing industries have invested more in MRP and MRPII and least in ABC analysis.
Figure 4.7.1: Advanced planning technologies in Automobile sector

Figure 4.7.2: Advanced planning technologies in E&E sector

APT1: Material requirement planning (MRP), APT2: Manufacturing resource planning (MRPII), APT3: Enterprise resource planning (ERP), APT4: Activity based counting (ABC).
It is observed from the figures that the automobile industries have invested more in MRP followed by MRP II, ERP and ABC analysis. Electronics industries have invested more in MRP followed by MRPII, ERP and ABC analysis. Machinery industries have invested more in MRP II followed by MRP, ERP and ABC analysis. Process industries have invested more in ERP followed by MRP, MRP II and ABC analysis. The levels of investments in advanced planning technologies are different in different sectors.
4.10 ADVANCED MATERIAL HANDLING TECHNOLOGIES

Material handling technologies are Advanced Manufacturing Technologies (AMTs) used by manufacturing industries to facilitate the handling of material in manufacturing operations. Automated storage and retrieval systems are used to direct automatic loaders to pick and place items for production processes or storage by automatic high lift trucks. Industries employ transport automation by using automated guided vehicles (AGVs) to move materials from one place to another.

![Diagram showing various material handling systems in different sectors](image)

**AMH1: AMHS, AMH2: AGV, AMH3: AS/RS**

Figure 4.8: Advanced material handling in different sector

The study shows that industries surveyed have little investment in material handling technologies. Generally, industries have invested more in automated material handling system as compared to AGV, AS/RS. It is observed from the figure that the level of investment on material handling system is different in different sector.
Figure 4.8.1: Advanced material handling in Automobile sector

Figure 4.8.2: Advanced material handling in E&E sector
As shown in above figures, the automobile and electronics industries have moderate investment in material handling technologies as compared to machinery and process industries. Manufacturing industries have lesser investment in automated storage or retrieval system. The conclusion can be drawn from the study is that the level of investment in material handling technologies in the manufacturing industries surveyed are very limited.
4.11 ADVANCED MANAGEMENT SYSTEMS

Advanced manufacturing technologies can also be worked as production management tools and can be classified as TQM, BPR, SPC, and JIT. Total quality management (TQM) can be summarized as a management system for a customer-focused organization that involves all employees in continual improvement. Business Process Re-engineering (BPR) is basically rethinking and radically redesigning an organization's existing resources. Statistic process control (SPC) is applied in order to monitor and control a process. Monitoring and controlling the process ensures that it operates at its full potential. Just in time (JIT) is simple the storage of unused inventory is a waste of resources. The JIT inventory philosophy defines how inventory is viewed and how it relates to management.

![Advanced management systems in different sector](image)

Figure 4.9: Advanced management systems in different sector

It is observed by the figure 4.8 that the most common advanced management system among the industries surveyed is TQM, which encountered above moderate investment. The investment on advanced management system is different in different sector.
AMS1: TQM, AMS2: BPR, AMS3: SPC, AMS4: JIT

Figure 4.9.1: Advanced management systems in Automobile sector

AMS1: TQM, AMS2: BPR, AMS3: SPC, AMS4: JIT

Figure 4.9.2: Advanced management systems in E&E sector
It is observed from the figures that the investment on advanced management systems is different in different sector. Automobile industries have invested the maximum on TQM followed by BPR, SPC and JIT. Electronics industries have invested the maximum on TQM followed by SPC, BPR and JIT. Machinery industries have invested the maximum on TQM followed by SPC, JIT and BPR. Process industries have invested the maximum on TQM followed by SPC, JIT and BPR. It is observed that TQM is the most important management system in all manufacturing industries.
4.12 ADVANCED PROCESS IMPROVEMENT SYSTEMS

In manufacturing industries advanced technologies are also used to improve the process. Some advanced process improvement technologies are: benchmarking, recycling, kaizen and management training. Benchmarking is the process of comparing one's business processes and performance to industry bests or best practices from other industries. Recycling is a process to change waste into new products to prevent waste of potentially useful materials, reduce the consumption of fresh raw materials, and reduce usage. Kaizen is used for improvement for the better or practices that focus upon continuous improvement of processes in manufacturing, engineering, and business management.

![Diagram showing investment levels in different sectors for APIS1 to APIS4]

Figure 4.10: Advanced process improvement systems in different sector

It is observed from the figure 4.9 that the level of investment by different sector in advanced process improvement system is different.
Figure 4.10.1: Advanced process improvement systems in Automobile sector

Figure 4.10.2: Advanced process improvement systems in E&E sector

Figure 4.10.3: Advanced process improvement systems in M/C sector
It is observed from the figures that the investment on advanced process improvement systems is different in different sector. Automobile industries have invested the maximum on kaizen followed by management training, recycling and bench marking. Electronics industries have invested the maximum on management training followed by recycling, bench marking and kaizen. Machinery industries have invested the maximum on kaizen followed by management training, recycling and bench marking. Process industries have invested the maximum on kaizen followed by recycling, management training, and bench marking.

**4.13 ADOPTION OF ADVANCED MANAGEMENT SYSTEMS**

With emphasize on reducing costs and increasing manufacturing efficiency, a record number of industries are embarking on different forms of advanced management systems. Manufacturing industries performance measurement by adoption of advanced management technologies can be categorized into four different factors such as increase cost effectiveness, development team based commitment, estimate artificial division and improve quality of working. Respondents were asked to rate the industry performance on a 1 to 5 point likert scale, where 1 indicates lower performance, 3 indicates average and 5 indicates well above performance.
It has been observed that due to adoption of advanced management systems, performances of manufacturing industries have improved. As shown in figure 4.11, that in all sectors cost effectiveness is increased. It is followed by development team based commitment, improve quality of work and estimate artificial division.

Figure 4.11: Adoption of advanced management systems in different sector

Figure 4.11.1: Adoption of advanced management systems in Automobile sector
AAMS1: Increase cost effective use, AAMS2: Develop team based commitment, AAMS3: Estimate artificial division, AAMS4: Improve quality of working

**Figure 4.11.2: Adoption of advanced management systems in E&E sector**

AAMS1: Increase cost effective use, AAMS2: Develop team based commitment, AAMS3: Estimate artificial division, AAMS4: Improve quality of working

**Figure 4.11.3: Adoption of advanced management systems in M/C sector**

AAMS1: Increase cost effective use, AAMS2: Develop team based commitment, AAMS3: Estimate artificial division, AAMS4: Improve quality of working

**Figure 4.11.4: Adoption of advanced management systems in Process sector**
It has been observed that due to adoption of advanced management systems, performances of manufacturing industries have improved and performance factors are different for different sectors. In automobile, electronics and process industries owing to adoption of advanced management systems, cost effectiveness has increased followed by development team commitment, estimate artificial division and improved quality of work. In machinery industries due to adoption of advanced management systems, estimate artificial division and quality improvement has been achieved followed by cost effectiveness and development team commitment.

4.14 ADOPTION OF ADVANCED MANUFACTURING TECHNOLOGIES

The adoptions of advanced manufacturing technologies allow industries to diverge from the traditional manufacturing strategies of striving for low-cost leadership and differentiation. Effective adoption of AMT enables industries to achieve economies of scale and scope simultaneously. That is, implementing AMT reduces the cost of future product innovation, allowing the industries to increase its speed of response to market and competitive changes. Therefore, investment in AMT represents a strategic option, the value of which increases in an environment of competitive and market uncertainties. Respondents were asked to rate the industry efficiency in term of productivity, plant efficiency, product management and market performance on a 1 to 5 point likert scale, where 1 indicates lower efficient, 3 indicates average and 5 indicates well above efficient.
It is observed from the figure 4.12 that owing to adoption of advanced manufacturing technologies productivity, efficiency, product management, and market performance are improved. As shown in figure that in different sector due to adoption of advanced manufacturing technologies different factors are improved. It is concluded that efficiency enhancement of manufacturing industries can be achieved through advanced manufacturing technologies.
Figure 4.12.1: Adoption of advanced manufacturing technologies in Automobile sector

Figure 4.12.2: Adoption of advanced manufacturing technologies in E&E sector

Figure 4.12.3: Adoption of advanced manufacturing technologies in M/C sector
Figure 4.12.4: Adoption of advanced manufacturing technologies in Process sector

It is observed from the figures that in automobile industries overall performance is increased by adoption of advanced manufacturing technologies with mean of above 4. Automobile industries are mostly affected by productivity followed by plant efficiency, market performance and product management. Electronics industries are mostly affected by plant efficiency followed by productivity, market performance and product management with mean of above 4. Machinery industries are mostly affected by plant efficiency followed by productivity, product management and market performance with mean of above 4. Process industries are mostly affected by plant efficiency followed by productivity, market performance and product management with mean of above 4. All sectors indicate the mean above 4, it is concluded that efficiency of all sector are increased due to adoption of advanced manufacturing technologies. The level of efficiency is different for different sector.
4.15. ADVANCED MANUFACTURING TECHNOLOGIES NOT IMPLEMENTED

In any manufacturing industry the adoption or implementation of the advanced manufacturing technologies are not so easy, there is some restriction to adopt or implementation of AMT. The cost and time involved for adoption of AMT impact the manufacturing industries. Managers identify the path that should be taken to have the greatest impact with the smallest amount of effort and cost. Managers are able to identify better performing states and then determine the optimal state they can achieve given their budgetary and time constraints. The optimal state may also not be possible for many firms due to other organizational constraints; in which case they can identify the best possible state that they can attain. Managers can use the identification of poor performing states to support the need for change and aid them in choosing the optimal direction for change as well. Advanced manufacturing technologies are not implemented by the industry due to some following reason:

- Basic problem of change
- Lack of understanding by managers
- Ability to manage automation
- Lack of infrastructure facilities

Respondents were asked to agree or disagree from the above reasons for manufacturing industries on a 1 to 5 point likert scale, where 1 indicates totally disagree and 5 indicates totally agree.
As shown in figure 4.13, the most important reason for advanced manufacturing technologies not to implemented or adopted in manufacturing industries is basic problem of change. The other reasons for not adopted advanced manufacturing technologies are different for different sectors.

Figure 4.13: Advanced manufacturing technologies not implemented in different sector

As shown in figure 4.13, that the most important reason for advanced manufacturing technologies not to implemented or adopted in manufacturing industries is basic problem of change. The other reasons for not adopted advanced manufacturing technologies are different for different sectors.

Figure 4.13.1: Advanced manufacturing technologies not implemented in Automobile sector
Figure 4.13.2: Advanced manufacturing technologies not implemented in E&E sector


Figure 4.13.3: Advanced manufacturing technologies not implemented in M/C sector

Figure 4.13.4: Advanced manufacturing technologies not implemented in Process sector

It is observed from the figures that in automobile industries, advanced manufacturing technologies are not implemented due to basic problem of change. Lack of understanding of managers, lack of infrastructure and ability to manage automation are not important reason for not implemented AMT. In process industries advanced manufacturing technologies are not implemented due to basic problem of change and lack of infrastructure. Lack of understanding of managers and ability to manage automation are not important reason for not implemented AMT.

4.16 CONCLUSION

This chapter provides the background information of the respondent industries of their characteristics, their competitive priority, their competitive strength, automation implemented steps, the level of investment of AMTs, and the reason not adopted AMTs and finally the level of performance in regards to their manufacturing capabilities.

Generally, the respondent industries are classified into the automobile sector, electrical and electronics sector, machinery equipment sector, and process sector. Overall, the industries surveyed do not compete on cost leadership...
alone, rather a combination of competitive priority, i.e. flexibility, delivery and quality. The quality is the vital competitive priority followed by flexibility and delivery. The least important priority of all manufacturing industries is the cost. In expression of competitive strength, it can be conclude that industries surveyed do not compete on any particular strength alone, rather a combination of different dimensions of competitive strength i.e. quality cost, responsiveness, flexibility, advanced manufacturing technologies, product customization, information technology, sales and marketing, manufacturing function and innovativeness.

In manufacturing industries all sectors emphasize to implementation the automation in manufacturing industries. In all sectors development and implementation is important factor. Different automation steps diverge according to different sectors.

In terms of AMTs investment, generally surveyed industries have invested moderate in advanced manufacturing technologies. The industries have invested more in design and engineering technologies, followed by machines and planning technologies. Industries have invested least in material handling technologies. There is no apparent indication as to which sectors have more AMTs than other, different sectors have invested different level of investment in AMTs. Automobile sector has invested more in material handling as compared to other sectors.

The manufacturing industries have invested more in advanced managements systems as compared to advanced improvement processes. The performance of industries is improved due to adopted or implemented by advanced manufacturing technologies. Automobile industries have invested more in advanced manufacturing technologies, owing to that the productivity and performances of automobile industries are increased. It can be conclude that owing to the adoption of advanced manufacturing technologies, performance or efficiency of manufacturing industries are increased.