WHY DO FIRMS NOT ENGAGE IN THE PRODUCTION AND EXPORT OF HIGH-TECH PRODUCTS

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PIDE2019FMPHILBE04

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2022

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CERTIFICATE

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Dedication

This Research is Dedicated to my Strength "My Father"

ACKNOWLEDGEMENT

"In the Name of Allah, the Most Beneficent, the Most Merciful. All the praises and thanks be to Allah, the Lord of the 'Alamin (mankind, jinns and all that exists)".

First of all, I praise ALLAH, the Almighty for all His Blessings Bestowed upon me.

I am thankful to my parents for their unconditional love, support, trust and for all those prayers that makes me stand here today.

Now I would like to pay my special regards to my supervisor Dr. Nadeem Ahmed Khan for his guidance and assistance so that I could complete my research.

ABSTRACT

This Study was intended to identify the restraints of the Sialkot Surgical Instrument Industry that hinder the industry to engage in the production of the modern technology or high technology products. This research was a type of qualitative study in order to get an in-depth understanding of the entire phenomenon. Data was collected through interviews with management of the selected companies. Review of company profile and In-depth interviews was conducted from 10 Surgical Instrument firms in Sialkot. The study uses Thematic Analysis to analyze the data. By using a Thematic Analysis, the collected data obtained from the interviews was examined closely and then fifteen codes and six themes were generated. Further the themes were reviewed and defined. The study found out that the Sialkot Surgical Instrument Industry focuses on the manufacturing of low competitive products because of several reasons such as; there are no funds for the R&D investment, lack of government support, lack of brand name, unfair trade deals, and poor management etc. At the end the study has some recommendations for the industry as well as for the government.

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CHAPTER-1

INTRODUCTION

The Surgical instruments are fine instruments that are crafted by an expert in such field. Earlier these instruments were handcrafted but now most of the production is dependent on machines but still the finishing of the instruments are done by the hands of an expert specialists. These surgical instruments do not change after so many years and will not in the upcoming years, as they are designed perfectly and it works as much fine and perfect as in the early times. Nowadays for many countries, the exports of surgical instruments are the major parts of their export items. As compared to past the businesses of all the countries in this tough and alleging world are interacted more easily into their markets (Ali, 2010).

As all the businesses are globally nowadays so, the one's (firms, businesses, industries or the society) who understand the modern and new rules of the business in the economic world will only survive and those who do not understand it will die or expire. The facilitators of this market integration are specialized in manufacturing knowledge and scale economics. Along with many large conglomerates from developed countries some small businesses venture from developed and developing countries are also gaining the goodness of internationalization Mitrof (1987).

Many countries have overcome their recession through raising their exports especially the exports of high-technology products. High-tech products are greatly dependent on innovation that lead to the development and growth of a product. Skillful labor, high cost and sophisticated technology is involved in the production of high-tech products. There are three approaches that are used for the production of high-tech products. These are, sector, product and patent approach. The sector approach is based on the

intensity of a technology while product approach is based on trading of high-tech products and patent approach is based with patent registration. The Sialkot Surgical Instrument Industry should adopt these approaches in order to compete with the upcoming challenges in the world market. The Sialkot Surgical Industry is under threat because this sector has been facing the restriction from marketing to the adoption of new technology. Despite of being in existence for a long while this Industry is still unable to develop a strong marketing techniques and a brand name in international market. The growth and development of the industry is dependent on the exports of modern technology products.

The policies and strategies for exports of a developed countries are generally focused on one vital component i.e. the exports of high-technology products (Sandu & Ciocanel, 2014). High-technology exports are the products with high R&D intensity, such as in aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery. High-technology products displayed highest growth rate as compared to medium and low-tech products (Ali, 2010). The surgical instruments which Pakistan supplies are in four categories in the export markets. These includes dental, surgical, medical instruments and orthopedic appliances such as; alpha, beta, gamma rays and also the equipment that are used in X-rays (M. Hashmi, 2020).

1.1 Historical Background of the Sialkot Surgical Sector

The Sialkot surgical instruments Industry was started at the end of 19th century when an American doctor got its scalpels and some other instruments to the blacksmiths community of Sialkot to repair them as Sialkot was known as the center for metal work in 1890s. The local artisans not only repair the instrument but also successfully replicate it. This is how the Sialkot Surgical Instruments Industry was first started. In

1930 they started to exports these surgical instruments to the international market (Ahmed, 2010).

In 1941 the British government has established an organization called Metal Industries Development Center (MIDC) which aims to provide some common facilities to the artisans and to standardize the local skills of manufacturing surgical instruments. This organization helped the industry to moves from simple and basic metal products to the surgical instruments manufacturers. In 1947, after the independence of Pakistan there were only 17 firms in Sialkot that were registered as the Surgical instrument manufacturing firms. The Surgical Instruments Manufacturers Association of Pakistan (SIMAP) in 1958 was established as an organization representing exporters and manufacturers of the surgical industry; which will protect the interests of the industry. Organization since then play a key role in addressing issues at government level, appointing delegates and participants of trade fairs and exhibitions, managing business issues and representing the industry in various domestic and international forums (Ahmed, 2010)

In 1960s, a number of financial benefits such as higher grants and credit incentives such as the bonus voucher program; by the government has given real impetus to the local surgical industry. As a result, the industry has seen a high level of technological distribution and increased productivity and quality.

In 1970s changes in labor laws led to the dismissal of many people in the industry which led to the formation of part of the vendors in the surgical industry. This component plays an important role in the industry as most of the surgical industry depends on this phase of the various production processes. The 1980s era saw a huge demand for surgical instruments worldwide and especially in the US.

However, in 1994 the US imposed restrictions the authority of U.S. Food and Drug Administration (FDA) regulators on importing surgical instruments from Pakistan and forced the industry to improve its production and management systems and obtain certificates such as ISO, CE and GMP.

On a global scale, surgical instruments were developed in the early 20th century in Nogent-sur-Marne in France, Solingen & Tuttlingen in Germany and Sheffield in England. With the exception of Tuttlingen, these collections no longer exist as important centers for the manufacture of surgical instruments. The last quarter of the 20th century, however, saw Pakistan an emerging as the leading manufacturer of conventional surgical instruments. More recently, China, Malaysia, Hungary, Korea, India and Poland have emerged as major manufacturers of surgical instruments (Ahmed, 2010).

1.2 Major Facts and Figure of the Industry

Following are some concerned facts and figure of the Pakistan Surgical Sector.

- Pakistan is the leading exporter for surgical goods.
- The World market for Surgical instruments are over 944.99 Billion US$ (Ahmed, 2010).
- The total capital of this sector is probably PKR 20 Billion (Imran, Saleem, Iqbal, & Rafi, 2020).
- The total contribution of this sector in National GDP is 0.42% (Manzoor, 2018)
- The total number of surgical instrument manufacturing companies in Pakistan are 2300 and in Sialkot are 1900.

- In Pakistan the number of medium sized firms are 150 and only 30 out of 2300 firms are considered as large manufacturing firms.
- In Sialkot there are 50 medium sized firms 20 are large manufacturing firms.
- Over 10000 different surgical instruments are manufactured in Sialkot. Covering all basic surgical instruments.
- Over 99% production of surgical instruments are centered in Sialkot (Adil, 2014).
- (According to the Surgical Instruments Manufacturers Association of Pakistan (SIMAP) They produced 150-250 million pieces per year with the estimated value of around 225-300 million USD and 95% of the production is being exported.
- They manufactured 60% disposable and 40% reusable surgical instruments (Adil, 2014).
- America import disposable surgical instruments from Pakistan while the reusable surgical instruments are imported by the European Countries.
- Pakistan works as a Vendor for the international brands and export almost all the products to international brands (Khan, 2016).
- These Brands import products from Pakistan and stamp their own logo on it and further export it to the world market (Khan, 2016).
- Some sources say that Germany has shut down their manufacturing facilities in their home country (Khan, 2016).
- About 100,000-150,000 workers are employed directly in the industry
- And over 400,000-450,000 workers are working indirectly with the surgical industry (Ahmed, 2010).

- Pakistan exports to over 140 countries in the world but its top buyers are United states, Germany, France, Italy, UAE, Japan, Brazil, Mexico and Russian Federation (Ahmed, 2010).

1.3 Problems of the Sialkot Surgical Industry

The Sialkot Surgical Instrument Industry is facing some sever problems some of which are discussed below:

Starting from the marketing, it is a basic problem and this Sector is unable to develop a strong marketing techniques. They are failed in owning a brand name in the international market (Khan, 2016).

The second problem faced by this industry is the adoption of new technology. Sialkot Surgical Sector is unable to adopt new technology because there is no R&D investment in this sector. Neither the government is allotting funds nor the private industrialist are investing in the R&D in order to innovate a new technology based product and to stay updated from the modern technology in the medical sciences (Khan, 2016). The Sialkot surgical instruments sector lacks in R&D which plays an important role in the sustainability and growth of the industry in the international market (Manzoor, 2018).

The third problem is that the labors in this sector are informally trained and they do not have linkage with any formal institute so that the labor can get a formal and professional training. There are less trained workers that's why they are far from the manufacturing of modern machinery and emerging technologies. The surgical instrument sector of Pakistan has lack of linkages with the institutions who are offering different training courses on technical educations. These institutions include

Technical education and vocational training authority and Punjab Technical Board of Technology (Manzoor, 2018).

The fourth problem in the surgical sector is the energy sources in Pakistan. Due to the increasing cost of the electricity and the gas supply it affected the marginal profitability of the industry. It is badly affecting the competitive advantage of the sector as a result of increasing cost (Manzoor, 2018).

The Surgical Sector is focusing on low technology products. About 95% of the surgical industry is working under the SME sector, the sector also need to establish a common facility center in order to reduce the production cost.

1.4 Range of Surgical Instruments Manufactured in Sialkot

Sialkot Surgical Instrument Industry produces a large amount and wide range of surgical instruments. These products are made at high standards which meets the standard level of countries like America, United Kingdom and European Union. America and European Union are the leading buyers of the Pakistan surgical instrument. But this sector is only engage in the production of low technology products.

A list of broad range of surgical instruments manufactured in Sialkot are given on the next page;

Table 1.1 Names of the Surgical Instruments

A V Fistula Set	**Basic Ear Instrument Set**	**Caesarian Section Set**
Ent SMR Instruments Set	Ent Tonsillectomy Set	Ent Tracheostomy Set
Eye Cataract Set	Eye DCR Set	General Instruments Set
Appendectomy Set	Circumcision Set	General Surgery Set
Hemorrhoidectomy Set	Hernia Surgery Set	Intestinal Surgery Set
Laparotomy Surgery Set	NSV - Vasectomy Set	Pediatric Surgery Instrument Set
Thoracotomy Set	Wound Surgery Set	Gynecology Surgery Set
Gyne D & C Set	Gyne Delivery Set	Gyne Episiotomy Set
Gyne I.U.D Insertion Set	Gyne I.U.D Removal Set	Gyne L.S.C.S Instruments Set
Hysterectomy (Abdominal) Set	Hysterectomy (Vaginal) Set	Neuro Craniotomy Instruments Set
Ophthalmic instruments and appliances	Dental instruments and appliances	Electro-diagnostic equipment
Parts and accessories for radiation equipment	Medical and dental X-ray equipment	Alpha, beta and gamma radiation equipment
Computed tomography equipment	Ultra-violet and infra-red ray equipment	Dental instruments and appliances
Neuro Laminectomy Set	Orthopedic General Set	Diagnostic
Anesthesia	Vaccination	Suture
Plaster	Bone Surgery	Neurology
Tracheotomy	Cardiovascular	Lung Surgery
Dermatology	Ophthalmology	Otology
Rhinology	Oral Instruments	Tonsil
Sterilization	Urology	Gynecology
Obstetrics	Dental Fitting	Intestinal & Stomach Rectum
Scalpels	Scissors	Saws
Forceps	Clamps	Artery Forceps
Cautery	Syringes	Catheters
Cannula	Needles	Medical furniture
Veterinary	Pedicure Items	Manicure Items

1.5 Background of the study

Nowadays the demand for the technology is rapidly increasing. It has restructured the world as well as the human lives. The surgical sector is now mostly dependent on the modern technology and several systems have been developed for the surgeries and other healthcare. Such as: Robotic surgery, Laparoscopic Simulator, 3-D printing, Health wearables and many more. This is the era of modern technology and Pakistan is far behind from the manufacturing of modern technology. Pakistan has a leading industry of Surgical Instrument Manufacturers but it is only focusing on low competitive products and it is also now under threats from the upcoming competition from the developed countries like Mexico, and China. Pakistan works as a vendor for the other surgical exporting countries (Khan, 2016). From some reports it is stated that some international brands have shut down there manufacturing as they receive best instruments from Pakistan than they produced in their home country. But these industries need upgradation as they are century old surgical instruments manufacturing firms. They do not have their brand name and they work for other brands. Due to this Pakistan is facing the unfair trade deals (Khan, 2016). The Sialkot Surgical Instrument Manufacturing Industry need to shift to its production and export of high-tech products in order to increase the growth rate and to globalize the Pakistan industrial sector.

1.6 Problem statement

Pakistan is a developing country with a small business economy and almost all the surgical instruments producing firms are engage in low-tech products and exports only low-tech products. This sector is facing several problems related to production

and exports i.e. from marketing to adopting new technology. This study will try to find the main hurdles of this industry and elaborate that how to solve it.

1.7 Research objective:

- To identify the main causes of low-tech production in Sialkot Surgical Sector and to find out the hurdles that hinder the firms to engage in the production of High-tech Products.

1.8 Research question:

RQ1: What are the causes of low-tech production in surgical industry of Pakistan?

1.9 Significance of a Study:

This research will help the small enterprises of Pakistan especially the Sialkot surgical industry that how to compete in a global market and how to shift to high-tech products. It will help them in their identity as these firms grows to larger scale they will make their own brand name. It will help them to grow internationally. It will help the world class artisans in a fair trade deals as Globally, the social movements of a fair trade begin to help the developing countries producers to get a fair value for their product.

1.10 Limitation of Research:

The present review has various limitations. One is that the examination concentrates on Surgical Industry focuses on a little number of associated firms in Sialkot Pakistan. Access to these organizations was gained by researcher personal contacts.

- All findings depend on the data given by the respondents

CHAPTER-2

LITERATURE REVIEW

Muhammad Adil (2016) in his article titled: “Surgical industry at a Glance” stated the problems and issues faced by the Pakistan surgical sector. The first problem he mentioned is that there is no brand name developed yet. It’s been more than six decades and still they are unable to develop brand name. Due to this the sector cannot participate directly in tender businesses to serve the customers of the global market. The second problem is that Pakistan is unable to developed its own distribution channel. Pakistan manufacture best quality instrument which is comparable to other countries but due to the lack of proper marketing and distribution channel the industry suffers in the International market. The instruments made in Pakistan is distributed and marketed by international traders and distributors. Also there is no proper management in Pakistan Surgical Sector. In this modern era all surgical industries are technology based but unfortunately Pakistan is far behind from modern technology. There is a lack of trained and qualified engineers in the factories. The non-technical persons are looking forward for operational managements and process supervision (Adil, 2014). For the growth of an industry technical assistance is needed in new product development. The major constraints that the Pakistan surgical industry faces are technology, R&D, marketing, human resource and financial constraints. (Adil, 2014) Many modern and sophisticated technologies are adopted by the US and Germany but still Pakistan is far away from that. These may include computer numeric control machines, medical invasive surgeries, robotic surgeries and many more. Sialkot is not yet engage in these technology because of its unawareness, these technologies are very expensive and our people cannot afford to adopt these

technologies, because they do not have much funds to invest in these technologies. Also there are no trained and professional engineers within the factories to work accordingly the modern technology. The second constraint is that there is no R&D investment in the Pakistan Surgical Sector for the betterment and the growth of medical and surgical instruments. In order to achieve growth in this sector the businesses immediately need to established R&D cells and start doing investments for research and development. The third constraint is that there is no proper marketing channel. The manufacturers are exporting all the instruments to other countries and there is no proper strategy for the local market. After exporting these products those countries re export our products with their own brand name. Unfortunately, Pakistan is also one of that country who import back their own products from other countries like Germany etc. The fourth constraint is financial constraint (Adil, 2014). There are leasing companies and financial institute in Sialkot but most of them have small setups and work as vendors who are unaware of these things and cannot avail this opportunity. At the end the author stated that for the Pakistan surgical industry there is a cake of US $34 billion in the global market for the surgical instruments but we it should only be the support of government to eat this cake.

Muhammad Ali (2010) stated that there are three types of categories of the surgical market i.e. powered instruments, non-powered instruments and wound closure devices. The world market for powered instruments is 32%, for non-powered instrument is 27% and for wound closure devices is 41%. The powered instruments include electro surgery devices, laser machine etc. and non-powered instruments include the basic surgical instruments such as forceps, scissors, scalpels etc. and the wound closure devices include devices used for the closure of wounds. The manufacturers and suppliers of these instruments are located in Pakistan, Germany,

USA, France, England and many more. This market consists of a small, medium and large scale manufacturer. Pakistan is well known for the non-powered instruments manufacturers. The total world market shares for the non-powered instruments are $30 Billion. Pakistan's world market share for non-powered instruments are $250 million in the FY 2008-2009. Pakistan has competitive advantage in manufacturing of surgical instruments over the Germany. The lower cost of labor and production gives the Pakistan a competitive advantage but Pakistan is still far behind from other countries because Pakistan is not investing in R&D, after so many years they are still unable to develop their own brand name. These are the reasons Pakistan is still far behind the developed countries because the developed countries are taking advantage of the higher technological medical devices in the international market. They are also earning big profit on Pakistani Surgical Instruments as Germany has shut down its production facility of low technology products in their home country and import products from Pakistan at relatively cheaper prices than they produced in their home country. It is very important for an industry to screen the market potential before taking a decision to enter into a new market structure. One must clear itself to understand that what type of information is needed to collect from the market for starting a business. For export of the products there are three important factors for screening the market potential. These are economic development, market growth and market size. This research was done for the purpose to give one of the Pakistani company called NATA the best market decision to supply their instruments. The study was done by finding the opportunities and barriers for the company and then supply to the domestic market analysis was done. The results show that it is very difficult for a small company in Pakistan to go for business such as domestic market supply in Pakistan. The reason for this is the purchasing system of the hospitals and a

profit margin that the company earn from domestic market and the other reasons are inflation rate is high and it may reduce the profit margin of a company. They have done their scaling and state that Pakistan is the average potential country for the selling of the surgical instruments with the score of 48.

The Korean based research of (Yeom, Song, Shin, & Choi, 2021) is about the growth for late entry in the medical device manufacturing industry. The medical device manufacturing industry is linked or identified by the R&D investments and technological innovations. The launching of a new product in this industry is a long and complicated process and it takes a lot of time because of the regulations of the industry, validity of medical devices and the safety issue concerns. Countries like Germany, Japan and United State of America are the biggest manufacturers of a medical devices in the world. Medical device manufacturing industry is a high value added industry in the world and to enter into this industry it may seek the financial help from government and also need an institutional support from the government. In Europe, every year more than any other high technology industry such as; IT industry, or Pharmaceutical Industry etc. more copyrights or patents are registered for the medical devices. The Korean Medical Devices Manufacturing Industry is ranked as 9^{th} in the term of market size in the world and it is a latecomer in this industry. The extreme R&D investment and the noticeable achievements in research in the Korean medical device manufacturing industry is increased by 6.82% on average every year. The data for this study was extracted from the medical devices manufacturing firm's database which are registered with the Member of the Faculty of Dental Surgery (MFDS). The time period for this data is from 2011 to 2016. The sample size was 440 and these 440 firms those firms with sales, patent or copyright applications and R&D investment cost. The analysis used to test the data was panel regression analysis. The

findings of this research is that there is a positive relationship between the R&D investment activities plus Business Diversifications i.e. (related and nonrelated diversifications), and the copyright or patent with Sales. While on the other side there is a negative relationship between the strategy of imports and the Sales. The study evident that R&D is an important factor for the technological innovation and is the main key driver to the industrial growth. This research finds out that the survival chances of those firms increases who receives the R&D investment benefits support from government side. Also there is a positive and significant relationship between the R&D strength and the innovations in technology.

The study of (Haq, Ali, & Ahmad, 2021) focuses on the production capacity of the Large Scale Manufacturing Firms in a developing country. The author explores some existing studies which says that the only way for developing countries to increase their production capacity is by installing foreign technologies. The existing literatures only gives the condition to involve the foreign technology in their manufacturing procedures only. As we know that the firms which are engaged in the exports and supply plays an important role to the growth of the economy. Also the growth of a firm is linked with the R&D investments, modernization of the firms, adoption of new and sophisticated technology and skillful labors. All these factors are behind the growth of the manufacturing industry. Skillful labors are the main key drivers for the growth of the manufacturing industry because Skillful labors have the ability to adopt new and sophisticated technology. According to some reports, a few numbers of skilled workers in the industry are better than the huge number of unskilled workers in the industry. Using of modern technology in the production also enhances output of the firm (Narula, 2004) and (Keller, 2004). Different studies suggest different agreements for the growth of a country. Some argued that by the installation of

foreign sophisticated technology in the production process will result in the growth of a country. Some other studies suggest that the proper and complete knowledge about the foreign sophisticated technology and to using that sophisticated technology by its full potential results in the growth of a country. There are also some other studies who argued differently from the above studies. They suggest that the R&D investment, investment in the education line, and the human capital are the reasons behind the growth of the country. Now leaving these different conceptions behind and coming to the point that that this paper aimed about. This paper aims to identify the behavior of the Pakistani firms towards the installed foreign sophisticated technology in their production line. This paper uses two different approaches. The first approach is the quantity of technical workers in opposition to its administrative staff and the second approach is the R&D investment in the production line. For this analysis a filed survey was conducted in the three provinces of Pakistan that are; Punjab, Sindh and Khyber Pakhtunkhwa. The total firms visited were 110 but only 86 firms give the complete data. So now the sample size is 86 firms. And 13 different industrial zones of Pakistan were covered for this research. The questionnaire was divided into three different sections, the first section is about the production level, the second section is about the technological spillover and the third and last section is about the absorptive capacity of the plant. The findings of the collected data were observed that almost half of the firms visited were engaged in the production for both in international as well as the domestic market. So they were using a unique method for the production in order to meet the standards of the international market. They were using modern sophisticated technologies. The results show that about 46% of the firms were engaged in both markets, but for these firms their share of exports was no sufficient and about 49% of the were engaged in the production for the domestic market only

and only 5% of the remaining firms were only engaged in the production of exports only. Now coming towards technological uses, about 8% of the firms uses domestic technology in their production process and about 52% of the firms uses foreign sophisticated technology in their production process and the remaining 40% of the firms uses both technologies in their production process which are domestic technologies as well as foreign sophisticated technologies. The study evident that the technical workers and the R&D investments are the main key drivers for the increasing in the production of the firm. The skilled technical workers have the ability to adopt the modern technology and know the best uses to how potentially utilize the technology. Also R&D brings innovation and plays an important role in the development of a new product. The researchers evidence that the results was not satisfactory because they discovered that mostly the firms did not meet the quality standards and only few firms were engaged in the R&D investments. It is not only about the imported technology to install in the production unit and will increase the production but the important factors are how to utilize it properly and to bring innovations in the products by investing more towards R&D.

The impact of Research and Development (R&D) investment on the export of high technology products in Pakistan is explored by (Usman, 2019). The data for this study was extracted from the financial statements of the companies, from the database of world bank and from the State Bank of Pakistan for the time period of 1995 to 2014. The tests run on the data for analyzing results were OLS (Ordinary Least Square) with the Robust Standard Error. The results show that there is a positive and significant relationship between the R&D investment and the exports of high technology Products. This study also evident that the R&D investments create a new and unique

product which attracts more costumers including international costumers and also the R&D investment creates the opportunities for exports.

Bilal Hussain (2019) in his article stated that by the startup of the export based industry Pakistan can come out of its chronic economic crises, which would help a country to improve its current account balances. For this, the individual businesses should get involved and should decide to go to export oriented businesses. If Pakistan's exports increases, it could eliminate the current account deficit and through this the Pakistan's macro economy will be stabilized. Improvement in export based industry and higher exports are the important facts for country's economy. The government is trying one way and another to incentivized the export based industry for decades but when it comes to export and business the government cannot do much but only can help in increasing ease of doing business and can reduces the cost of doing business. The business persons are responsible to make their decisions by their own and should do marketing of their products in international market. The author arises the question that "why would a Pakistani business leader invest in developing an export-oriented product?" when it comes to export oriented industry the business person will do the cost and benefit analysis first and when they are done with the basic analysis they will likely end up because an export-oriented product is simply not worth the cost of capital.

If Pakistan integrated into the global market the growth will rapidly increases and the poverty will reduces much faster than we only rely on our domestic market (Husain, 2003) also increasing the shares in the world market will put us on faster track of growth. It is so hard to achieve growth from domestic market. Trade liberalization and integration leads a country to de industrialization. He also arises an important question and then answer it itself that: "what are the fastest growing products in the

global market?" it is the high technology products that is the fastest growing in the global market. For achieving this goal Pakistan should make a constructive public-private partnership.

The lack of good government support and policies are the main reason that kept Pakistan away from moving towards high technology and to achieve higher value addition and also prevent the country from the greater export diversification (Malik, Ghani, & ud Din, 2017) and It is irreparable damage to Pakistan in every aspect of life. For today's Pakistan it is an important requirement to bring a good governance. Good governance plays an important role to form a social state.

Razi Syed (2017) in his article stated that the Pakistan surgical sector is one of the five prime export oriented sector and it is facing many problems. The export of this sector is declining due to the export on surgical instruments made from scrap. Due to the increase in the production cost, and the export of the steel scrap are damaging the industry because the local stainless steel production take place from the scrap. According to the Surgical Instrument Manufacturers Association of Pakistan the reason for the declining of export are the export of semi and unfinished goods. The local industry will suffer a lot from this. The Federal Board of Revenue and Ministry of Commerce were pressurized by the Surgical Instruments Manufactures Association of Pakistan to immediately ban the exports of semi-finished, unfinished and forging products. Countries like China, India, Germany, USA import our surgical instruments and then repack them and stamp their name on it and then sell it as their own products. The lack of brand name is another big issue that the Pakistan surgical industry is facing. The author said that developing a brand name is a tough exercise which cannot be possible without the government support, expertise and also it requires a lot of resources which a company cannot done by its own. This study also

says that China and India have no skills in the manufacturing of the surgical instruments but still are rapidly entering in this business only because of a developed brand name. They are only doing branding of our locally manufactured instruments and export it to the rest of the world with the full support of their government. If they could earn great amount of foreign exchange only by branding so why can't we earn from foreign exchange if we are manufacturing the best quality surgical instruments. The surgical sector of Pakistan could start earning $1billion if the government give attention and support to this sector. Some of the barriers through which the exports are falling includes rising prices of the raw materials, increasing utilities costs, high export refinance rates of the central bank, uneven taxation, and high banking services charges. There are no such policies upgraded for Pakistan surgical sector and the Pakistan trade organization is not being asked for the preparation of policies nor their recommendation are included in the policies. In India, there exports have touched $140 billion due to the preparation of practical policies with the consultation of business community. Pakistan is far more behind in developing such policies that's why they only share $450 million (2%) of the $21 billion shares in the international market. The Commerce Ministry has also failed to help in developing a brand name to the industry.

Saad (2019) in his article stated that the exports of Pakistan are continuously declining and government and private sectors are blaming each other for this cause. He stated that poor management skills are the main reason that we can't compete in the global market, but unfortunately no one is talking about poor management skills. He stated that our entrepreneurs invested in many industries like fertilizer, cements, energy sector, automotive and sugar etc. but only for domestic market.

High-tech exportation is greatly impacted by R&D intensity through technological production or firm's capacity etc. (Sandu & Ciocanel, 2014), on 26 European countries they have conducted a research of the impact of R&D and innovation on high-tech exports. And their findings where that there is a positive correlation between R&D and high-tech exports but on different countries their results where different. Their further details said that private R&D has stronger impact that public R&D on high-tech exports. In the crises time of EU, high-tech industry has higher growth rate then low and medium tech industry.

The dramatically change in global exports is through the exports of high-tech from the developing countries. (Srholec, 2007) considered it a good sign but some economists consider it a statistical illusion.

The effects of firm level innovation on high-tech exports of China's different industries and provinces from 2005-2007. The results show that there is very significant effect of innovation on exports of high-tech products across industries and provinces (Fu, Wu, & Tang, 2012).

The effects of R&D and country size on the exports of high-tech products shows that R&D has a positive effect on exports of high-tech products while country size has no effect on exports of high-tech products (Braunerhjelm & Thulin, 2008)

According to the Ricardian view that an increase in R&D investment (high-tech input) results the growth of technological production. These high-tech products are dependent on the innovation of science & technology. These innovations will directly lead to a new and improved products and this will help the industry to get competitive advantage in the international market (Vogiatzoglou, 2009).

Mubarak zeb khan (2016) in his article "Pakistan's shadow surgical instruments' sector" stated that, the Pakistan surgical sector is facing unfair trade deals. The blame is upon the sector who are not able to developed the international brand. Our artisans produced instruments for international brands of United States and European Union. He said that from some reports it is stated that some international brands have shut down their production facilities in their own country because they get high quality products in lower cost from Pakistani artisans than they manufactured on their own. According to Mr. Jahangir Bajwa (Former Chairman Surgical Instruments Manufacturing Association) Pakistan is working as a vendor for these countries. Countries like Germany and US stamped their logos on Pakistan instruments and further exports these products as their own. Pakistan directly cannot export to the Islamic countries due to some excessive registration procedure but through Germany and US the same products are landing to their markets by their own brand names. For this unfair trade deals, the Ministry of commerce is also silent to set some affairs for fair trade deals. So the industry has no other choice but to provide them products at cheap prices. The Pakistan surgical sector is facing many problems related to marketing and adopting new technology. There are no funds for R&D in order to launches new products and they also need to stay tuned. They have no labors trained in making superior products as they have no formal training institutes to train the workers. The Sialkot Surgical sector's position as leading manufacturers and exporters are under threat due to the upcoming competition of new technology and innovations of countries like china and Mexico.

For the global competition the firm or industry must run efficiently and keep updated to the new technology of the competitive world. They should constantly be upgrading to new technology and provides standard products to the customers (Nadvi, 1999).

This study also focuses on how to meet the international standards of quality. He hypothesized that to reach these standards it requires a greater cooperation among the producers and the suppliers and also with the subcontractors. In his study he draws both the qualitative and the quantitative data and investigate that both vertical and horizontal ties of inter firm have been changed. Thus the evidence suggests that pressure for the quality checking marks positive turning point for the industry and it will directly lead the industry to the growth path.

The underdeveloped and developing countries the Small and Medium Enterprises (SME) plays a vital role in the GDP (Gross Domestic Product) and are considered to be the prior sector of the country (Nosheen & Khan, 2020). The SMEs are also playing a contributing part in the decreasing of poverty and employment generation. SMEs gives a platform to the creativity and innovation and also provides opportunities to new businesses that results in increase in national income social stability. The author cited that (IFC) International Finance Corporation publishes a study which shows that the total income level of a country and the Small and Medium Enterprises (SME) units have a positive correlation among them. According to the (SBP) State Bank of Pakistan (2016) a (SE) Small Enterprises are those businesses in which there are up to 50 numbers of employees and their turnover must be up to RS 150 Million per year and now similarly according to them the (ME) Medium Enterprises are those businesses in which there are up to 51-250 number of employees and their turnover must be from RS 150 Million to RS 800 Million per year. Now coming to discuss the problems, lack of a knowledge is the basic problem in the developing and under developed countries. But the fact is that in these countries the illiterate people are more skilled and passionate in their work than the educated one's. in the under developed and developing countries the informal industrial sector

contributes more in the growth then the formal sector and provides more opportunities and utilize the skills of the labors. Mostly the developed countries hire the informal trained labors of the developing and under developing countries and give them jobs because they know that they work more efficiently then the formal workers and also the reason behind this is that on the international forum searching the trained labors is another issue. The developing and under developed countries the Small and Medium Enterprises (SME) are passing through a lot of difficulties. There is a shortage of trained labors and they are also facing the difficulties in searching new consumers. But due to the poverty in these countries and when the poor parents are unable to give the basic necessities of life to their children's then they become helpless and sent their child to the work place (Karadağ, 2016). Now Small and Medium Enterprises (SME) hire these children's and they begin the career of their life there in the Small and Medium Enterprises (SME). Some of them who are lucky becomes the leaders also and starts their own business and become entrepreneur and then they hire the degree holders who works for them. Nowadays in the developing countries women are also contributing in the economy of a country. According to (Taiwo, Ayodeji, & Yusuf, 2012) in Nigeria, in the Small and Medium Enterprises (SME's) the most basic and common problem that came in front of the SME and that stops the SME from growth are poor management, no government support, lack of the financial support, no training institute, lack of experience, low profit, bad infrastructure and at the last the low demand for the services and products. The Small and Medium Enterprises are the important sector of the developing and under developed countries that overthrow the gap of inequality and poverty through decentralization or modernization, through privatization and through free market economy by merging into the world economy. The other hurdles that hinder the Small and Medium Enterprises to grow are the

shortage of electricity and gas, lack of innovation, lack of creativity, lack of research and development, increased taxes, worker's problems, lack of accurate policies and the lack of regulation reforms. The data in this study was collected from different sources such as, from the State Bank of Pakistan, from the Ministry of Commerce, from the World Bank and from the Trading Statistics and Trading Economy. The time series data was taken for the period of FY 2003 to FY 2017. The variables of the study were the Export Refinance, Interest Rate, Production of Electricity, Exchange Rate, Export of Surgical Instruments, Gold Rate and Steel Rate. For a long term they apply Johansen Co integration test and for a short run they have applied Vector Error Correction test. The exports of Surgical Instruments are dependent variable while the rest of the variables are independent variables. The results show that the long run and the short run relationship exist in between Operational Risk, Market Risk and the Exports of Surgical Instruments. There is a positive relationship between production of electricity and export of the surgical instruments, and also between the exchange rate and the export of the surgical instruments. Whereas there is a negatively significant relationship between value of the error correction and a long run relationship between exports of the surgical instruments and the independent variables. There are also some limitations in the study which are that the exports of the surgical instruments are only from the Punjab province and not from all Pakistan, also the production of electricity is only from the Gujranwala Electric Power Company (GEPCO) not from all Pakistan therefore to reach the requirement of the research.

In the developing countries the Small and Medium Enterprises (SME) are the ones who generate a platform to the people to get employed and to earn income. The Small and Medium Enterprises (SME) in the developing countries play an important role in

the exportation of the manufactured products and they are the ones who expose or inter the country in the international market (Hussain, Sandhu, & Zaheer, 2021).The aim of this research is to find the relationship among the Entrepreneurial Orientation (EO) of the globalized or internationalized Small and Medium Enterprises (SME) which the authors named it as (Born International) and their performance of exports in the surgical sector of Pakistan. Now coming towards the methodology of the study. A descriptive statistic was used for the analysis and the data was collected through questionnaires and the sample size was 60 and 60 questionnaires were filled completely. There are two variables in this research and is mentioned above. To find the relationship between both of them the researchers have use the correlation analysis technique. This technique is used to measure the relationship between the variables. The findings of this research are that there is a positive relationship between the Entrepreneurial Orientation (EO) and the export performance of the Small and Medium Enterprises (SME) and also the Entrepreneurial Orientation (EO) has a positive relationship with the improved work performances of the exporting companies. This research also has some limitations which are that they identified the relationship between the Entrepreneurial Orientation (EO) and the Export Performances (EP). Another limitation in this study is that they only fill the questionnaire from the male entrepreneurs and not from the female respondents. As mostly there are male entrepreneurs in the Small and Medium Enterprises (SME) so that is the reason behind this limitation only.

Rehman (2020) the research study aims to analyze the relationship between the exports and imports of the surgical instruments, plus also the exchange rate and the export promotions of Pakistan. The empirical analysis was done on the time series data collected from the State Bank of Pakistan (SBP) for the time period of 2003 to

2017. The tests run on the data for analysis were unit root test, Johansen Co Integration test and the Vector Error Correction test. The test results indicated that there as a positive long term relationship between the export and imports of the medical instruments and also with the exchange rate. Which indicates that the surgical sector of Pakistan in a Pakistan's economy is in line with the international budget crises.

Sandhu & Azhar (2020) in his paper "Four-Factor Explanation on Working of SMEs without Product Brands: A study of Surgical Industry of Pakistan Using Higher Order Model in Smart PLS" explain the hurdles that came in front of the international SME to introduce their product brand in global market. The author explains twenty-two factors that are hurdles in front of a firm to introduced their brand in global market. Further he divided these factors into four main factors of the organization. One is the external factor of organization and the three are the internal factors of the organization. These main factors are, organizational factors, entrepreneurial factors, marketing factors and environmental factors. The environmental factor is external factor effecting organizations to introduce their brand in the global market while the other three are internal factors effecting organizations to introduce their brand in the global market. The organizational factors include: Inconsistent organizational policies, Size of the Firm, Structure of the Firm, History of firms/industry as a vending sector, Organizational culture, Limited competence base, Limited resource base, Negligence of R&D, Lack of core competitiveness. The Entrepreneurial factors include: Risk Aversion of Firms, the Complacency of Entrepreneur, Limited Vision of the Entrepreneur. The Marketing factors include: No linkages with End Users/ Local Health Industry/Hospitals, Neglect of international demands, Lack of international distribution network, Serious product homogeneousness, Lacking strategic awareness

of brand management. The environmental factors include: Weak National Intellectual Property Infrastructures, Lack of Government Support, Competition with sophisticated Firms, Negative Country of Origin Effect, National Culture. This four factor explanation helps the theorists to understand the hurdles of the international SME'S also it offers a practitioner a good foundation. This paper gives a plan to the policymakers and the international SME'S that how to enable their products in the global market.

Hamrick & Bamber (2019) in his study titled: "Pakistan in the Medical Device Global Value Chain" This report was based on primary and secondary sources. The author interviewed surgical firms and also supporting institutions. He does the analysis of surgical industries of the whole world. He said that the Pakistan surgical industry is the leading export industry of Pakistan and produce a wide range of surgical instruments and export it worldwide as they are the low cost suppliers, they have a wide range of surgical instruments plus they have decades of experience in making surgical instruments but above all these they need to upgrade their industries in order to grow internationally. (Hamrick & Bamber, 2019) explains that Pakistan surgical sector has many constraints to upgrade and grow. Some of the constraints he mentioned are that there is a lack of integration between Pakistani surgical industries with the other global lead surgical firms, low level of industry leads firms, they have low productivity and they make only limited products and they are incapable to invest in the modern machinery, also they have limited certification among firms. As there are many firms in this sector but only few firms have been given the approval to export.

Shah et al. (2020) analyze the impact of China Pakistan Free Trade Agreement (FTA on the export formation and deflection. The analysis in this research is that before

(FTA) Free Trade Agreement, data collected from a major 10 industries the Exports of China were 88 Billion US$, while the total Exports of Pakistan from major 10 Industries were 17 Billion US$. The Export formation of Pakistan with a China with the in depth examination shows that after (FTA) Free Trade Agreement the exports are dropped to 6.1 Million US$ per year. According to the Pakistan the annual export shares are dropped to 0.02%. The highest trade between Pakistan with China is the Export of food and Beverages which has 72% shares in the total export. Furthermore, the results show that after the (FTA) Free Trade Agreement most of the industries of Pakistan has shifted their exports to China from the (MFN) Most Favored Nation partners to China. Based on the findings of this research it is stated that (FTA) Free Trade Agreement are useful way to achieve the export growth. But potential (FTA) Free Trade Agreement do not always lead to high growth led by other countries. There are no real benefits from the national (FTA) Free Trade Agreement if the increase in exports with (FTA) Free Trade Agreement partners come at the expense of exported taxes with (Non FTA) Non Free Trade Agreement partners.

Maresova et al. (2020) This research paper is Europe based. In this study the author gives the theoretical framework between the innovation and the regulation and this paper aims to analyze and discuss the industrial development in the conditions of the implementation of the Medical Device Regulation (MDR). The implementation of the Medical Device Regulation (MDR) lies only for the innovation. The reason behind this is the Small and Medium Enterprises (SME) because nowadays all or most of the research on innovations in the medical and surgical devices sector are handled by them more than the big firms. When it comes to the development the Small and Medium Enterprises (SME) are unprotected then the large. This is because when it comes to the administrative cost then the small companies cannot bear the cost and

leave the market because it is too high cost. The high technology medical devices differentiate in many ways from the other technological devices (Maresova, Hajek, Krejcar, Storek, & Kuca, 2020). From the manufacturing to the using it is different from the other technological devices industries. The rapid increase in the science and the technology brings the advancement in the medical devices. In this research the author has done the comparison between the medical devices manufacturing industry and the other technological devices manufacturing industries in the economy. The procedure and the development of a new product is very complicated and a risky procedure because it involves many resources then the other industry in the national economy. In the medical device manufacturing industry due to the existing rules and regulations there is a hurdles or barrier to the entry of new firms. So this provide a relaxation to the old firms from competition and to develop a new product. This restrain conditions from the government side on the rules and regulation are because that the firms involve in this sector may receive or enjoy the good amount of profit or return on their investments. This regulation controls the clinical and preclinical tests of the medical devices plus the registration of the medical devices, manufacturing of the medical devices, also the before market approval of the medical devices, storage of the medical devices, promotions of the medical devices, advertisements of the medical devices, distributions of the medical devices, sales of the medical devices, imports of the medical devices, exports of the medical devices, market control of the medical devices and also the design of the medical devices and the development of the medical devices and every step related to the medical devices. Now coming towards methodology, the data analysis of the study was based on reports of some different international organizations and the statistical survey. The procedure for a medical device when it is manufactured or developed goes under different stages such

as: certification process of the manufacturing of a medical device, numerous numbers of laws, schemes for the medical devices, regulatory of the medical devices and the strict standards for the manufacturing of the medical devices. The further included criteria that the medical devices contains are that it must be user friendly. Either if it is the design of the medical device or if it is the reliability of the device. It should always be easy to use in a clinical setting.

The Impact of Electricity crisis on industrial growth in Pakistan by (Junejo & Khoso, 2018) determine the impact of the electricity situation on industrial growth percentage of output in Pakistan. They took the secondary data from 2005-2015 and it was analyzed in SPSS using the repetitive analysis process. Electricity serves as a major source of industrial investment but since 2005 there has been significant change in Pakistan. The results of this study revealed that all the variables studied in this study were the industrial consumer%, annual growth rate of electricity consumption%, industrial electricity consumption (Gwh) and industrial energy consumption%. They all have a significant and positive impact on the growth of industrial output%. Based on the results we conclude that the industrial growth in the output could be negatively impacted by fluctuations in electricity demand and supply in Pakistan.

2.2 Contribution to Literature:

If we look at the evaluation indicators done in existing literature so far, we came to know that they only focused on the low competitive products. None of the literature in Pakistan is focused on the challenges or hurdles faced by the firms that hinder the firm from high technology production. This study is different from the previous literatures because this study identifies the main issues and challenges faced by the

Surgical Instruments Industry that hinder it from the production of High technology products. Hence, through these additional channels of evaluation, this study will attempt an evaluation of Pakistan's Surgical Industry not just in the context of capturing their failures or successes but rather will also go into the in-depth of the problems of management aspects of this sector.

CHAPTER-3

RESEARCH METHODOLOGY

This chapter covers the detailed information of research methodology adopted by this study and covers a brief discussion of research design and method, various techniques of research and moreover we also specify our model in this chapter. It will present the sample which was selected and will set out the method used for data collection along with the process of data analysis.

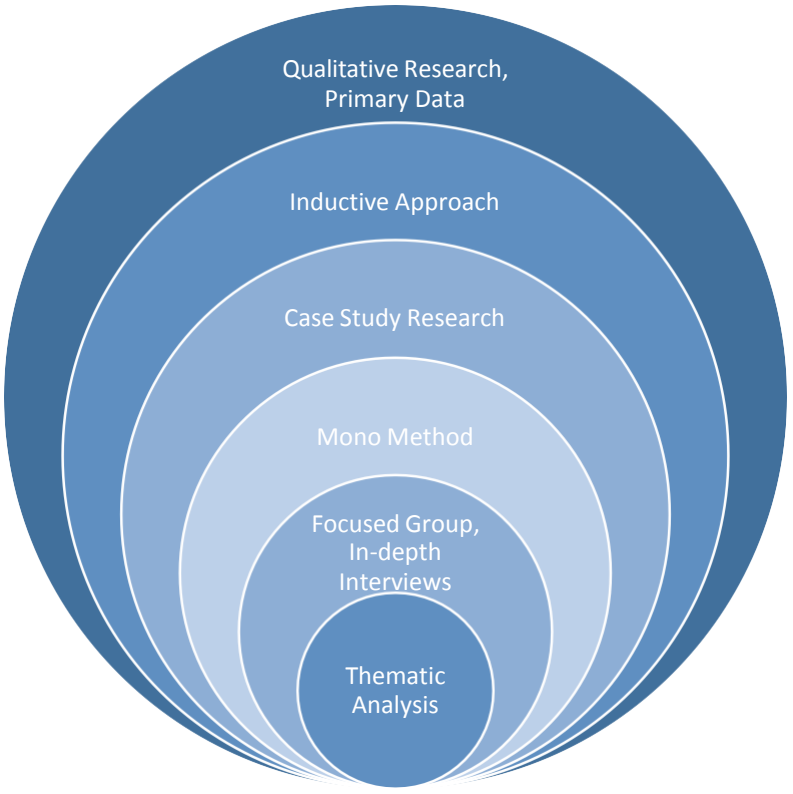
3.1 Qualitative approach:

A qualitative approach was chosen as the research method for this study. The process of research involves empirical work being carried out with the collection of data which can concur, refute or contest theories which in turn allows for understanding and clarification for different observations (May, 1997). Qualitative research involves a process known as induction, whereby data is collected relating to a specific area of study and from this data the researcher constructs different concepts and theories. A qualitative approach was considered more relevant to undertake this research as it allowed greater capacity to gain more depth and meaning based on the Sialkot Surgical Industry.

3.2 Research Design and Method:

For a structured methodology, the Saunders (2007) Research Onion is used here. It is described in 6 layers.

Table: 3.1 Saunders Research Onion



This qualitative research study is a type of Explanatory research because Explanatory research aims to explain why particular phenomena work in the way that they do. The technique for data collection used in this research is primary data collection which is collected through in-depth interviews with the management of selected surgical instruments manufacturing firms. Review of company profile and In-depth interviews is conducted from Sialkot surgical industry. A telephonic interview was conducted from the firms. The semi structured interview includes questions of facilitators, bottlenecks and opportunities for the engagement in the production and exports of low-tech products. All in all, this research is a mono method because it is only qualitative type research and this research would produce case studies for further investigations. The scope of this study also include the challenges faced by the

industry players to grow at a faster pace. Findings of the study is used to propose a policy recommendation at a state level and appraise industry players on focus avenues of further development.

3.3 Interviews:

Semi-structured interviews were selected to carry out this research study. They allowed the participants to elaborate and with that provided more flexibility, range and therefore the capacity to elicit more information from the participant. Semi structured interviews permit scope for individuals to answer questions more on their own terms than the standardized interview permits, yet still provides a good structure for comparability over that of the focused interview (May, 1997). Kumar (2005) views the interview as the most suitable approach for studying complex and sensitive areas as the interviewer has the opportunity to prepare a participant before asking sensitive questions and to explain complex ones to them in person.

While the interview process is a valuable means of collecting rich and in-depth data, it can prove to be an expensive and time consuming process. Interaction between the interviewer and the participant can differ as each interview is unique and the quality of the responses obtained from different interviews may vary significantly (Kumar, 2005). Furthermore, the quality of the data generated is affected by the experience, skills and commitment of the interviewer (Kumar, 2005). A risk of researcher bias can also exist. In addition, it can prove to be a difficult task to gain reliable data on the research subject if there are a small number of participants involved, unlike the quantitative approach which involves a higher number of participants and hence in certain circumstances can provide more far reaching and reliable data results.

3.4 Research Strategy:

The strategy of this paper is a case study, where open-ended questions were asked from the desired sample. Open-ended questions were asked through interviews while showing the interviewees the framework of this study

3.5 Sampling Techniques:

The ideas behind a specific sampling approach vary significantly, and reflect the purposes and questions directing the study (Punch, 1998). In choosing the sample of participants the researcher used a purposive sampling method. This form of sampling is essentially strategic and necessitates an attempt to establish a good correspondence between research questions and sampling (Bryman, 2004). In purposive sampling the targeted members can generate very supportive data for the study and for the purpose they are selected. The inclusion criterion was based on the firms who are engaged in the production of Surgical Instruments. In undertaking this study the researcher chose to interview the large and medium scale manufacturers who have major shares in the export of surgical instruments. Firms were sought through personal contacts of the researcher. Initially seventeen firms were recruited to be interviewed; however, seven withdrew from taking part of the study.

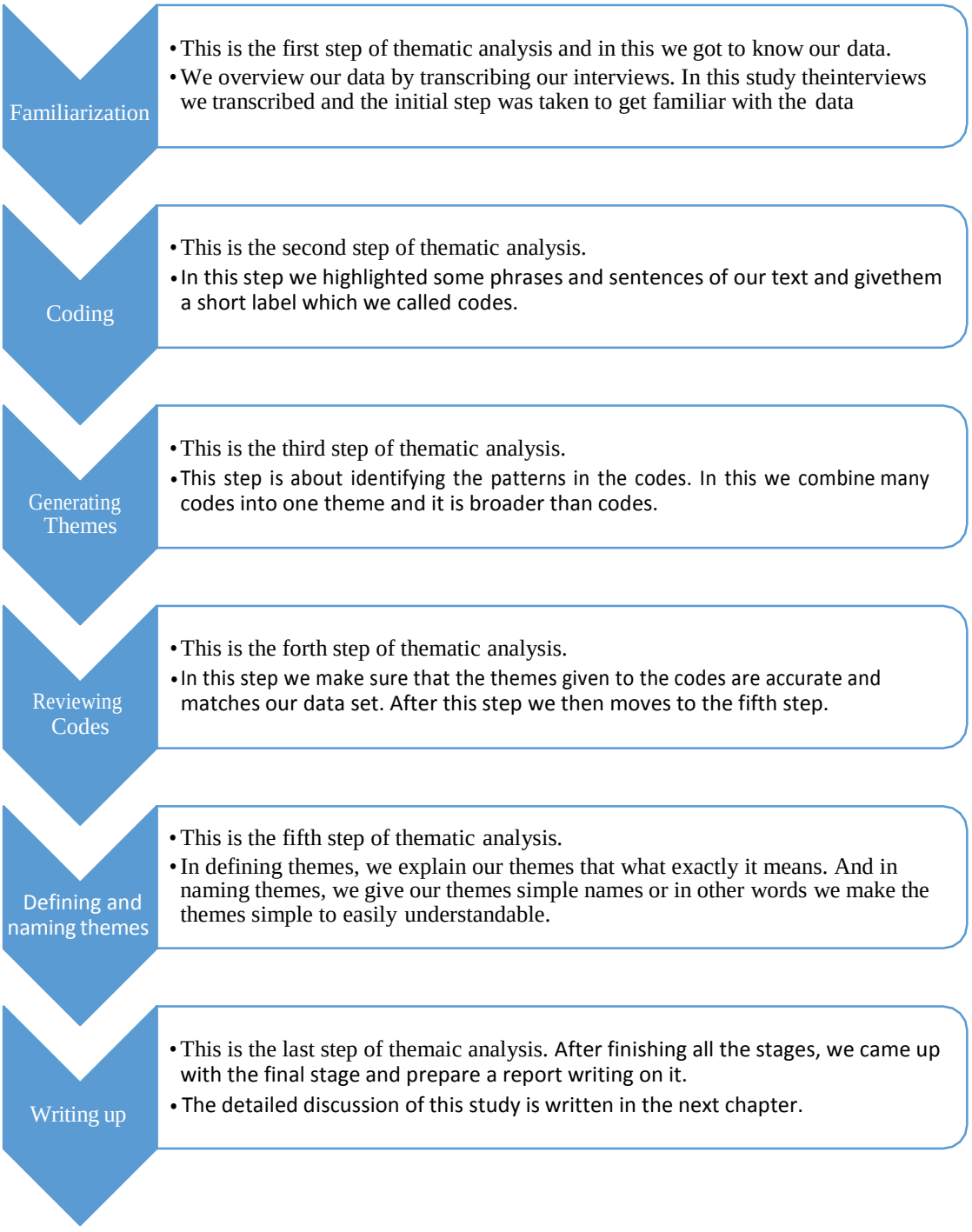
3.6 Locale:

The data is collected from surgical instruments manufacturing firms based in Sialkot. The reason for selecting this area is because Sialkot is the hub of Pakistan surgical instrument manufacturing industry.

3.7 Data Analysis:

In this research we have use the Thematic Analysis to analyze our data. Braun & Clarke (2006) were the first to develop Thematic Analysis for their Psychology Research. But this analysis is so flexible and can be adopted by different types of research. Thematic Analysis is a method of analyzing data of qualitative research method. The data collected from Open questions asked from the respondent and interviews were recorded and noted in transcript form. The collected data is examined closely and then codes and themes were generated and further define themes were defined as shown in the table 4.1 and table 4.2. There are six steps to follow in the thematic approach. In this study all the steps are carefully followed and understood. The systemized data in this study is thematically analyzed by thematic analysis.

Table: 3.2 Steps of Thematic Analysis



CHAPTER-4

RESULTS AND DISCUSSION

Introduction

This chapter comprises the results taken from the interviews which is transcribed, coded and converted into themes. The following table shows that how the codes and themes where emerged from the interviews;

Table: 4.1 Codes Generated from the transcribed interviews.

Codes Generated		
1: Low Competitive Products	**2:** Quality Assured at Large and Medium firms	**3:** Mismanagement
4: Small Firms lacks quality checks	**5:** Highly demanded low Competitive Products	**6:** Comparative Advantage
7: Hurdles in automation	**8:** Lack of Funds	**9:** No Government support
10: No supporting technology	**11:** No Facilities	**12:** R&D investments but in low competitive products
13: No Brand Name	**14:** Unfair trade deals	**15:** Influence of electricity and gas.

Table: 4.2 Turning Codes into themes

Codes	Themes
Low Competitive Products. **Highly demanded low Competitive Products.** **Comparative Advantage.** **R&D investments but in low competitive products.**	Focus on low-tech
Quality Assured at Large and Medium firms **Mismanagement** **Small Firms lacks quality checks**	Poor management
No skillful labors towards High-tech.	Scarcity of Qualified Human Resource
Hurdles in automation **Lack of Funds** **No Government support** **No supporting technology** **No Facilities**	Hurdles to High-tech
No Brand Name **Unfair trade deals**	Unfair trade
Influence of electricity and gas	Influence of energy

4.1 Focus on Low Competitive Products:

From the interviews it is analyze that all the firms are involve in the production of low competitive products. They only made non-powered instruments which includes basic surgical and dental instruments such as forceps, scissors and scalpels etc. There are two categories of products, one is disposable and another is reusable products. They manufactured 60% disposable and 40% reusable surgical instruments. The sector has only demand for low competitive products and they are only expert in the production of low technology products. The industry is focusing on low competitive products because of competitive advantage in low-tech products. They are producing best

quality instruments at lower cost than any other country. From the above literature it is stated that R&D investment has an important role or significant impact on a growth of a productivity of a firm. From the interviews it is concluded that there are no R&D investments towards high-tech machinery. No one is interested in the production of high-tech surgical products.

4.2 Poor Management

There is a poor management in the Sialkot surgical sector. There are no proper policies or facilities for quality checking in this sector. On higher level of production there is quality checking but the lower level of production lacks quality checks. As some part of the industry is hand crafted and families here are also involved in the making of these instruments in their homes. So there the quality check is neglected. Also the disposable products are made in large quantity so most of the time they are been skipped for quality checking. There is also poor management in the distribution of these instruments. Firms are working as a vendor for international brands and they are unable to develop its own distribution channel and export almost all the products to international brands. And there is no supply to the domestic market. Pakistani then buy these instruments from international brands with their stamp on it on higher prices.

4.3 Scarcity of Qualified human resource

This industry is facing is the unavailability of trained and qualified engineers in the factories. The Non-technical persons are looking forward for operational managements and process supervision. For the growth of an industry technical assistance is needed in new product development. The present labors in the industry

are only skilled in the manufacturing of low technology products but they are not trained formally and are trained by traditional system called Ustad and Shagird system.

4.4 Unfair Trade

Despite of being in existence for a long while this Industry is still unable to develop a strong marketing techniques and a brand name in international market. Due to this they face the unfair trade deals. Countries like United States, Germany, Japan, UK, France and Italy etc. are doing the unfair trade. It is reported that some international brands have shut down their manufacturing facilities in their own country because they get high quality products at lower price from Pakistani artisans than they manufactured in their own country. Our artisans produced instruments for international brands of United States and European Union. Pakistan is working as a vendor for these countries. Countries like Germany and US stamped their logos on Pakistan instruments and further exports these products as their own products.

4.5 Hurdles to High-tech

There are many hurdles that stops the surgical sector of Pakistan to moves towards high-tech. Some of which are discussed below. The first hurdle that came forward is that the Sialkot surgical industry is a handcrafted industry. And it cannot be moved to automation. In making of one instrument there are 4 to 5 workers involve in it. The thing is that it cannot be shifted to automation. It is very long and complicated process. High technology products needs higher investments which is directly proportional to the capital. In other words, the more capital the more will be investments but the second hurdle that arises here is that there are no funds available.

One of the big reason behind the unavailability of funds with entrepreneurs is the unfair trade deals that the Pakistan surgical industry is facing. They didn't receive fair amount of revenue from the instruments which results to low saving and low investments. The third hurdle that came forward is that the manufacturing of high technology machinery involves smartification and without government support it is not possible. For the production of high technology products, we need to established a new industry which needs a huge investment and we do not have that much capital. It is very complex procedure it also involves testing which is not available in Pakistan. Pakistan is the one of the country to the world for the supplier of medical instruments but at Government level there is nothing such appreciated steps taken for the development of this sector. As it is mentioned above that it involves a lot of testing which is very costly and the laboratories for that are not available in Pakistan and the owners can't afford it. The smartification is costly and without government support it is difficult to achieved. The forth hurdle that came forward is that there is no supporting technology for developing a smart factory. There are no facilities available in Pakistan for MDR (Medical Device Regulation). Regulation (EU)2017/745 (is a regulation of the European Union on the clinical investigation and sale of medical devices for human use) will impose on the surgical firms in 2024. This regulation requirement is to test their medical devices in the laboratories. But those laboratories are not yet established in Pakistan. The fact is that neither the government nor the private entrepreneurs are investing on this. There are no funds for that. The one who will take MDR will only export surgical instruments to the European Union.

4.6 Influence of Energy

The increasing cost of energy supply pressurizes the profitability of the industry. In the present years the expensive energy in the country is badly affecting the growth, desires and competitiveness of the surgical industry. As we know that the manufacturing of the surgical instruments needs a considerable amount of the gas and electricity supply, so they require it at a relatively reasonable prices. The surgical industry association estimates that in some years Pakistan can simply double their exports by providing unrestricted electricity and gas supply at a cheaper price.

4.7 Discussion

According to the Pakistan Bureau of statistics, at the present age Pakistan exports 324.3 Million USD (2020-21) worth of the surgical equipment around the global market which includes the high income countries market like United States of America, Germany, Italy, France, Belgium etc. As compared to the global trade revenue the revenue share of Pakistan is very small. But Sialkot Manufactured a notable share of the world's production volume. The produce 150-250 million pieces per year. In Pakistan, Sialkot centered 99% of all manufacturers of surgical equipment, which is a small but fully exported industry. About 95% of the total production is exported to the foreign countries. Pakistani Surgical instruments are usually sold to high-end manufacturers at a very lower price, and they charge a significant premium (100-300%) in addition to the cost. The Pakistan Surgical industry contributed 0.12% to GDP and 1.04% to national exports of Pakistan.

The Sialkot surgical instrument Manufacturing Industry lies in a broad number of categories. It products range from basic metals to rubber and plastic materials for

example, forceps, gloves, syringes etc. From low to medium technology instruments for example, Simple Diagnostic Instruments to Sterilizers. The Sialkot surgical instrument manufacturing industry mainly focuses on the basic metal instruments such as scissors, cutters and forceps etc. This industry is heavily dependent on the manufacturing of the stainless steel instruments. Generally, they produce two types of products, the first is disposable products and the second is reusable products. They manufactured 60% disposable and 40% reusable surgical instruments. The Sialkot Surgical Instruments Manufacturing Industry is today at a junction. The increasing cost of the energy, shortage of a labor and poor management yells for the improvement of the infrastructure of the surgical industrial sector. Wishing to raise the value chain will also open the doors to exciting opportunities for new product development. For example, orthodontic and orthopedic instruments and devices, electro-mechanical medical devices and cosmetic and beauty instruments. Building state of the art surgical equipment requires to investment in the automation through CNC deployments and other advanced equipment such as 3D printers, plotters, Robotic Surgery, laparoscopic Stimulator, Health wearables and multi-axis machine tools. The Sialkot surgical industry also needs to establish a Research and development capacity because R&D investment has an important role or significant impact on a growth of a productivity of a firm. In Pakistan very few firms have the capacity to design new products but this may only happen in close cooperation with their customers in developed countries.

This case represented the matrix framework for considering about the future, scenarios and avenues of the potential techno-market approaches. From a business-like context (“Pakistan 2015”) that maintaining the current state of slower growth and slower elimination of competition, the industry can transform into a new market

("Made in Pakistan") or focus on bringing the capabilities of technology to its current markets ("Specialty Replicator"). Each of these situations is linked with its own set of advantages and disadvantages, resource requirements and previous set of regulatory requirements. The fourth future (“Design Design”) really highlights the potential of the Pakistani Surgical Equipment sector but innovation in the industry require more new investment in the industry.

The reasons for why firms are not engaging in the high-tech production and exports are that it may be incompatible and poor management skills, lack of R&D investments, lack of professionals, the private entrepreneurs are not investing in high R&D because of its high cost. If an entrepreneur will do a cost and benefit analysis the cost for the product is much higher than the profit plus there are no supporting technologies so that why they are not engaging in the manufacturing of high-tech.

Coming towards our research question the reasons behind the production of low technology products in the Sialkot surgical industry is the high demand for low technology products in the international market. Sialkot has the comparative advantage in the manufacturing of the low technology products. They are the only producers of high quality low competitive products with a very low cost in the whole world. They are also focusing more on the low technology products because they have no funds available for the production of high technology products.

There are also some other issues on the macro level that hinder the growth of the industry, which we need to overcome. Overcoming the outdated practices of working and also the old habits of the labors, dealing the general level of literacy of the labor in the industry, dealing with the fears and challenges of adopting new technology,

build a culture of cooperation and trust, agreement on a code of conduct (so that companies do not push unnecessarily) and building Pakistan's reputation.

4.8 Global Trade of Surgical Instruments

The Surgical Instruments are manufactured in Germany and Pakistan along with some other countries like United States of America, Japan, France, United Kingdom, China, India etc. Above all these countries Germany is considered the best in innovation, technology and quality of surgical instruments. Only Germany is considered to be the competitor of the Pakistani Surgical Instrument Manufacturing Industry. But here we will do a cross country analysis of Pakistan with India because both are developing countries.

4.8.1 Pakistan Export Markets

Pakistan Surgical Instrument Manufacturing Industry has two main lines of production. The first and the dominant is line is the Surgical Instruments and the second line is Dental Instruments. About 97% of Surgical Instruments are exported out of the total exports reported under SITC 87229. About 2% of the Dental Instruments are exported out of the total exports reported under SITC 87219. Only 1% of the other instruments are exported out of the total exports. These instruments are stethoscope, sphygmomanometer etc. The Surgical Instruments are surgical scissors forceps, scalpel and bone rongeur etc. And the Dental Instruments are tooth extraction forceps, impression trays and carvers etc. Further these Surgical Instruments Manufactured in Sialkot is divided into three broad categories which are, Disposable Instruments, Reusable Instruments, and the third line is Manicure, Pedicure and Veterinary Instruments.

4.8.1.1 Disposable Instruments

The Sialkot Surgical Instruments Manufacturing Industry produce about 60 % of disposable instruments or products. Being disposable surgical instruments these products are made from low quality raw material or low standard stainless steel which is being locally produced in Pakistan and as compare to the imported raw materials or stainless steel it is the half of its price. So it is less costly products. The largest market for the disposable surgical instruments is America.

4.8.1.2 Reusable Instruments

The Sialkot Surgical Instruments Manufacturing Industry produce about 40% of these reusable surgical instruments. These surgical products have almost 30,000 different types and these surgical products are mostly used in the operation theater and it has their own preference level of sterilization and it is being sterilized frequently. Being reusable surgical instruments these products are made from the high quality raw material or high quality stainless steel which is mostly imported from the foreign countries. It is highly cost surgical instruments then the disposable surgical instruments. The largest market for the reusable surgical instruments is European Countries.

4.8.1.3 Beauty Cosmetics and Veterinary Instruments

The Sialkot Surgical Instruments Manufacturing Industry also produces the third line which includes the Beauty Cosmetics which includes the items for Manicure, pedicure such as nail filers, nail cutters, clippers etc. Also they manufactured the Veterinary Instruments such as, Nail clipper, speculum, hoof grinders, dehorners, ear syringes etc. The largest Market for these instruments are both Europe and America.

4.8.1.4 Distinguishing Cost

There are some misconceptions that says that the using of the disposable surgical instruments is better than the using of reusable surgical instruments because the reusable surgical instruments are highly costed then the disposable surgical instruments. According to Raynetta Stansil (2019) she stated that the disposable surgical instruments are less costly than the reusable surgical instruments. In a study "the cost per use and operational performance of reusable versus disposable forceps" resulted that the for the disposable forceps the average cost got out to be 38$ and for the using of the of the reusable forceps the average cost got out to be 415$ which is much higher than the cost came out for the production of the disposable surgical forceps.

4.8.2 Percentage Share of Pakistan in The World Market:

Table: 4.3 Percentage Share of Pakistan in The World Market from 2009-2020

Value in USD Million	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
World	34,126.5	36,883.9	41,192.9	42,414.5	45,181.5	47,765.0	45,796.2	47,605.5	50,005.7	54,619.2	57,825.3	58,112.2
Pakistan	233.0	219	271.7	291.4	296.8	319.5	332.6	326.0	361.1	375.5	405.5	361.3
% share in Pakistan	0.7%	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.6%

Source: International Trade Center, 2020

The above table shows that the Pakistan's market share in the global trade for surgical Instruments is only 0.7%. The low market share in terms of value appears to be primarily due to the absence of continuous product & process innovations aimed at producing products which fetch higher prices in global markets. It is indicating that the surgical industry, despite being in existence for a long time, is not performing to its full

potential. Compounded Annual Growth Rate from 2016-2020 was 2.6%. Despite the lack of fiscal space, the Government of Pakistan has been giving incentives to the industry to grow, however, the full development and export potential of the industry is yet to be realized. It is becoming increasingly clear that the government and industry need to come up with a joint strategy which encompasses product, process and new market development if the industry is to achieve its potential.

4.8.3 High Technology

High technology products are those products which involves high Research and Development (R&D) Investments. It also includes the knowledge of the modern technology and scientific applications.

There are many advance technologies in a surgical technology which are improving the health care of the patients. Some of which are mentioned here, such as; Robotic Surgery, (3-D) 3 Dimensional Visualization, Teleoperation, Computer-Assisted Manipulation, Electronic 3D preoperative planning and many more.

4.8.3.1 Industrial Analysis

4.8.3.1.1 High Technology Medical Devices Exporting Countries

The following table shows the exports of the High technology Medical devices by the countries in the world Market.

Table: 4.4 Leading medical device exporting countries worldwide in 2015

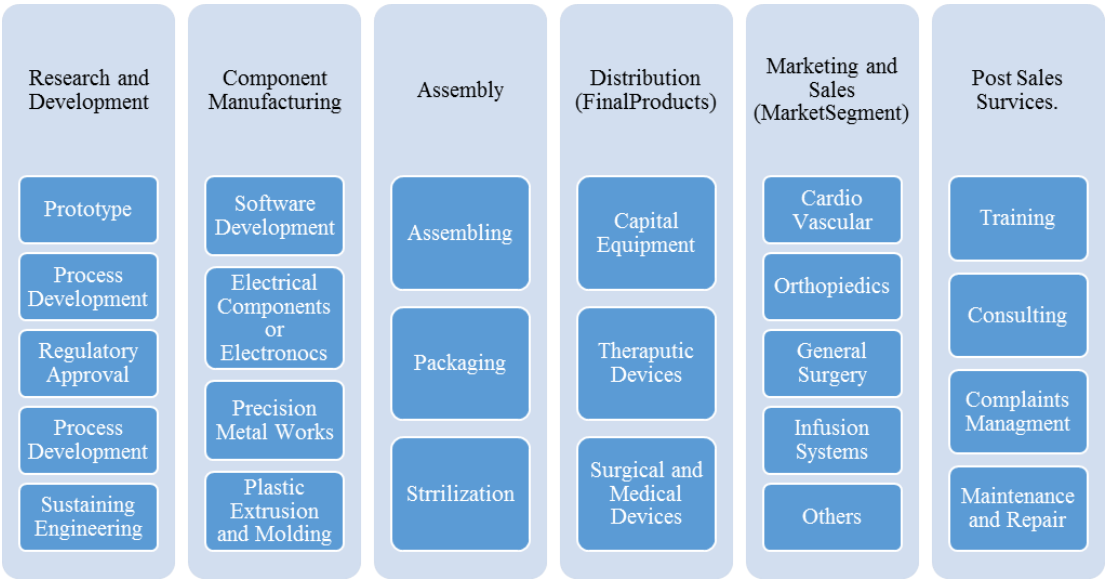
Countries	Exports in Million U.S. Dollars
United States	44511 Million US $
Germany	27232 Million US $
Netherlands	18104 Million US $
China	13932 Million US $
Belgium	12995 Million US $
Ireland	11316 Million US $
Switzerland	10629 Million US $
Mexico	8406 Million US $
France	7612 Million US $
Japan	6625 Million US $
United Kingdom	6493 Million US $
Singapore	5987 Million US $
Italy	3639 Million US $
South Africa	2548 Million US $
Denmark	2206 Million US $
Costa Rica	2095 Million US $
Austria	2032 Million US $
Australia	1862 Million US $
Hong Kong	1850 Million US $
Malaysia	1804 Million US $

4.8.3.1.2 Value Chain of High Technology Medical Devices

The Manufacturing Process of High technology medical devices are mainly divided into three main components and those components are sub divided into further components. But According (Gereffi, Bamber, & Frederick, 2013). They have presented a value chain model for medical devices. According to value chain presented by them there are six main components and that components are sub

divided into further more components. The infographic of value chain is presented as under.

Table 4.5: Medical Device Global Value Chain



Source: (Gereffi et al., 2013)

4.8.4 Export Trends of Pakistan and India

4.8.4.1 Export trend of the Pakistan Surgical Instrument Industry from Fiscal Year 2015-2021

Table 4.6: Export Trends of Pakistan Surgical Instruments.

FISCAL YEAR	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
EXPORTS (MILLION USD)	262.3	250.6	248.8	279.667	303.0	324.3

Source: Pakistan Bureau of Statistics

4.8.4.2 Export trend of the Indian Surgical Instruments Industry from Financial year 2015-2020

Table 4.7: Export Trends of Indian Surgical Instruments.

YEAR	2015	2016	2017	2018	2019	2020
EXPORT (MILLION USD)	299.57	302.88	333.36	377.18	398.05	448.89

Source: Statista.com 2021

These trends show the exports of surgical instruments industry. This show that the exports of India are relatively higher than the exports of Pakistan. Although both the countries are developing countries and Pakistan is the major exporter surgical instruments but due to their incapacity they cannot manage these affairs accurately.

4.8.5 Imports of Surgical Instruments

4.8.5.1 Countries Wise Imports of Surgical Instruments from Pakistan

The following table shows the top trading partners of Pakistan. These countries import Surgical Instruments from Pakistan in the Year 2020. (“Surgical Instruments and appliances used in medical, surgical, dental or veterinary sciences, including scintigraphy apparatus, other electro-medical apparatus and sight-testing instruments.")

Table 4.8: Countries wise imports of Surgical Instruments

Countries	Shares	Imports in Million US $
China	31 %	75 Million US $
United States of America	14.1 %	34 Million US $
Germany	8.58 %	20 Million US $
Japan	8.34 %	20 Million US $
Ireland	4.03 %	9.75 Million US $
Singapore	3.45 %	8.57 Million US $
Mexico	2.87 %	6.96 Million US $
Malaysia	2.66 %	6.43 Million US $
Netherlands	2.47 %	5.99 Million US $
Switzerland	1.97 %	4.77 Million US $

4.8.5.2 Surgical Instruments Imported by Pakistan

Imports structure of 9018 ("Instruments and appliances used in medical, surgical, dental or veterinary sciences, including scintigraphy apparatus, other electro-medical apparatus and sight-testing instruments") to Pakistan in 2020. The following table shows the imports structure of surgical equipment to Pakistan. They are represented by the main commodity groups on the next page**:**

Table 4.9: Imports of Surgical Equipment's by Pakistan

HSN Code	Instruments and Appliances	Shares	Imports In Million US $
901839	Catheters, cannula and the like	39 %	96 Million US $
901890	Instruments & appliances used in medical, surgical, Veterinary sciences, including other electro medical apparatus and sight testing instruments., N.E.S. in 9018.	27 %	66 Million US $
901819	Electro diagnostic apparatus used in medical, surgical, dental, veterinary sciences (including apparatus for functional exploratory examination that is for checking physiological parameters), N.E.S. in 9018.	13.6 %	32 Million US $
901831	Syringes with or without needles	7.98 %	19.3 Million US $
901813	Magnetic resonance imaging apparatus.	2.69 %	6.51 Million US $
901812	Ultrasonic scanning apparatus.	2.51 %	6.09 Million US $
901832	Tubular metal needles & needles for sutures	2.15 %	5.2 Million US $
901850	Ophthalmic instruments & appliances. N.E.S. in 9018.	1.83 %	4.44 Million US $
901811	Electro Cardiographs	1.12 %	2.71 Million US $
901814	Scintigraphic apparatus.	0.524 %	1.26 Million US $

The Above table show the Surgical Instruments imported to Pakistan. Although most of these products are manufactured in Sialkot but due to negligence of the Competent Authority or the Industry, they cannot manage these affairs accurately and Pakistan is importing back those products which are made in its own country.

CHAPTER-5

RECOMMENDATIONS AND CONCLUSION

5.1 Recommendations for the Surgical Instruments Manufacturing Industry

The industry should develop a self-control working techniques in order to deal with the worker problems and also they should deal with the quality control issues.

The industry should set their own standards for the quality control and a seal for the approval of a quality of the instruments so that in order to avoid the examples of substandard goods.

The Industry should develop the R&D sections in the firms and should invest on the automation and work for the industrial upgradation.

The Industry should hire the competent graduated engineers to fill the gap of human resource.

The E-commerce platforms like Amazon and Alibaba etc. can be used as trading channels. Foreign merchants such as Vietnam and China uses e-commerce platforms. The use of other marketing channels also reduces over-reliance on exhibitors and marketing consultants, many of whom are not experts in the Surgical Instruments when dealing with foreign buyers.

5.2 Recommendations for the Government

The Pakistan's Board of Investment (BOI) should promote the large players in the Sialkot Surgical Instruments Manufacturing Industry to established a Joint Venture

with the International Firms for the sake of a technological development. There is potential for Pakistani manufacturers to enter into Joint Venture with German or Chinese firms. By doing so, it will help to extend their market reach, also build credibility with a particular target market, also it will give access to technical expertise and know-how that your company maybe lacking it will also help to access intellectual property. Without Joint Venture it is inaccessible for Pakistan to enter a new market or to flourishes their Industry.

For the upcoming MDR compliance of the EU, The Government may bring in foreign consultants for a limited time to assist in MDR compliance. Any cost of hiring consultants, building a lab etc. should be reflected in the pricing of the instruments that need compliance with MDR. If prices do not reflect the costs associated with compliance with MDR, the Pakistani taxpayers might end up subsidizing consumers in the EU.

Conclusion

It is concluded that the production and exports of high-tech products increase the growth rate and decreases poverty of a country. High-technology exports are the products with high R&D intensity. High-technology products displayed highest growth rate as compared to medium and low-tech products during the crises in EU countries (Sandu & Ciocanel, 2014). Pakistan is the leading exporter for surgical goods and over 99% of the production of surgical goods are centered in Sialkot. Over 10,000 different surgical instruments are manufactured in Sialkot. From some reports it is stated that some international brands have shut down there manufacturing as they receive best instruments from Pakistan than they produced in their home country. These industries are under high threat because they do not have a specific brand name and other brands are doing unfair trade deals. Pakistan exports 324.3 Million USD (2020-21) (Pakistan Bureau of Statistics) worth of the surgical equipment around the global market which includes the high income countries market like United States of America, Germany, Italy, France, Belgium etc. As compared to the global trade revenue the revenue share of Pakistan is very small but Sialkot Manufactured a notable share of the world's production volume. The Pakistan Surgical industry contributed 0.12% to GDP and 1.04% to national exports of Pakistan. A Thematic Analysis used in this study for the findings of a data. The data is collected through in-depth interviews with management of the selected companies. Review of company profile and In-depth interviews is conducted from 10 firms engaged in Sialkot surgical industry. A telephonic interview was conducted from the firms. It is analyzed that all the firms are involve in the production of low competitive products. This sector has only demand for low competitive products and they are only expert in the production of low technology products. The industry is focusing on low competitive products

because of competitive advantage in low-tech products. It is also observed that there are no R&D investments towards high-tech machinery. No one is interested in the production of high-tech surgical products. They are only investing in low-tech products and are doing research and development (R&D) investment to bring innovation in the low competitive products, for example they started the manufacturing of electrosurgical instruments which involves high frequency electrical current for coagulating tissues etc. The reasons for why firms are not engaging in the high-tech production and exports are because of the incompatible and poor management skills, lack of R&D investments, lack of skillful labors, also neither private entrepreneurs nor the government are investing in high R&D because of its high cost. If an entrepreneur will do a cost and benefit analysis the cost for the product is much higher than the profit plus there is no supporting technology, they have no brand name which results in the unfair trade deals which means low returns on their exports. Also in Pakistan the energy crises are affecting the Manufacturing sector badly. According to the economic survey of Pakistan (2017) the production level of an industry is badly affected by the shortage of electricity and gas in Pakistan. Pakistan has been facing some serious problems in terms of power shortages, if this major problem is not addressed it will have a devastating effect on Pakistan's economic growth (Qasim & Kotani, 2014)). So that why they are not engaging in this. There is no government support in the surgical sector that drive or push the sector for realizing its full capabilities or capacity. So now the support of public sector is required to achieve its potential. They need to support the automation, address the issues or problems of the infrastructure of the sector, there is a need to establish a technical training institutes for the rapid growth of the industry.

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