

Cluster Development Initiative



Diagnostic Study

# SURGICAL CLUSTER SIALKOT



The CDI is Jointly Implemented by PSIC and UNIDO



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## Diagnostic Study Surgical Cluster Sialkot

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## Acronyms

<b>APO</b>	Asian Productivity Organization	<b>MFEPT</b>	Ministry of Federal Education and Professional Training
<b>AOBO</b>	Analysis of business operations	<b>MIDC</b>	Metal Industries Development Centre
<b>ATC</b>	Apprentices Training Center	<b>MOC</b>	Ministry of Commerce
<b>BDSPs</b>	Business Development Service Providers	<b>MOF</b>	Ministry of Finance
<b>BDS</b>	Business Development Service	<b>MOST</b>	Ministry of Science and Technology
<b>BOI</b>	Board of Investment	<b>NAVTTCC</b>	National Vocational & Technical Training Commission
<b>BVC</b>	Bureau Veritas Certification	<b>NES</b>	Neuro Endovascular Surgery
<b>CDI</b>	Cluster Development Initiative	<b>NIBAF</b>	National Institute of Banking and Finance
<b>CE</b>	European Conformance	<b>NPO</b>	National Productivity Organization
<b>CFC</b>	Common Facility Center	<b>PBIT</b>	Punjab Board of Investment & Trade
<b>CPEC</b>	China-Pakistan Economic Corridor	<b>PCSIR</b>	Pakistan Council of Scientific and Industrial Research
<b>CQD</b>	Cost, Quality and Delivery	<b>PESTEL</b>	Political Economic Social Technological Environmental & Legal
<b>CSR</b>	Corporate Social Responsibility	<b>PKR</b>	Pakistani Rupee
<b>EDB</b>	Engineering Development Board	<b>PMS</b>	Performance Management System
<b>ENT</b>	Ears, Nose & Throat	<b>PSDF</b>	Punjab Skills Development Fund
<b>ERP</b>	Enterprise Resource Planner	<b>PSIC</b>	Punjab Small Industries Corporation
<b>EU</b>	European Union	<b>PSQCA</b>	Pakistan Standards & Quality Control Authority
<b>FBR</b>	Federal Board of Revenue	<b>PVTC</b>	Punjab Vocational Training Council
<b>FDA</b>	U.S. Food and Drug Administration	<b>R &amp; D</b>	Research & Development
<b>FOB</b>	Free on Board	<b>SBP-BSC</b>	State Bank of Pakistan- Banking Services Corporation
<b>FY</b>	Financial Year	<b>SCCI</b>	Sialkot Chamber of Commerce & Industries
<b>GDP</b>	Gross Domestic Product	<b>SECP</b>	Securities and Exchange Commission of Pakistan
<b>GIZ</b>	Deutsche Gesellschaft für Internationale Zusammenarbeit	<b>SGS</b>	Société Générale de Surveillance (General Society of Surveillance)
<b>GMP</b>	Good Manufacturing Practice	<b>SIMAP</b>	Surgical Instruments Manufacturers Association of Pakistan
<b>GoP</b>	Government of Pakistan	<b>SIMTEL</b>	Sialkot Material Testing Laboratory
<b>HR</b>	Human Resource	<b>SME</b>	Small & Medium Enterprise
<b>HS Code</b>	Harmonized System Code	<b>SMEDA</b>	Small & Medium Enterprise Development Authority
<b>IC&amp;ID</b>	Industries, Commerce & Investment Department	<b>STPF</b>	Strategic Trade Policy Framework
<b>ICT</b>	Information and Communications Technology	<b>SWOT</b>	Strengths Weaknesses Opportunities & Threats
<b>IMF</b>	International Monetary Fund	<b>TDAP</b>	Trade Development Authority of Pakistan
<b>ISO</b>	International Organization for Standardization	<b>TVET</b>	Technical and Vocational Education and Training
<b>IPR</b>	Intellectual Property Rights	<b>TEVTA</b>	Technical Education & Vocational Training Authority
<b>IST</b>	Institute of Surgical Technology	<b>TRTA</b>	Trade Related Technical Assistance
<b>IT</b>	Information Technology	<b>UNIDO</b>	United Nations Industrial Development Organization
<b>JICA</b>	Japan International Cooperation Agency	<b>USA</b>	United States of America
<b>JV</b>	Joint Venture	<b>USD</b>	United States Dollar
<b>KPIs</b>	Key Performance Indicators	<b>VCA</b>	Value Chain Analysis
<b>MDG</b>	Millennium Development Goals	<b>5F</b>	Five Forces Model



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## Executive Summary

The cluster concept has gained prominence as an economic policy tool aimed to foster innovation and the growth of a competitive private sector in developing as well as developed countries. Clusters play a critical role in generating employment, income, increasing exports, fostering innovation, and opportunities for the local community and become drivers of broad-based local economic development.

The Government of Punjab has recently adopted the “Punjab Growth Strategy”, which incorporates a target of an 8% annual GDP growth within the Province. The Industrial Sector Development Plan, an element of the Growth Strategy, is oriented to increase private sector investment, thereby increasing job creation and exports. As part of the development plan, the Government has introduced Cluster Development Initiative (CDI) to support the growth and competitiveness of key manufacturing clusters in particular through Punjab Small Industries Corporation (PSIC). This initiative is part of a larger cooperation on “Jobs and Competitiveness” programme with the World Bank.

In the framework of the Punjab Jobs and Competitiveness Programme, the Government of Punjab has signed a cooperation agreement with United Nations Industrial Development Organization (UNIDO) to provide technical assistance for the development of industrial clusters in Punjab province and to support their further integration into global value chains.

In Pakistan, the surgical instruments manufacturing cluster is mainly located in and around Sialkot, Punjab, covering about 99% of the country’s production of surgical instruments. There are around 3,600 companies operating in and around Sialkot. The objective of this study is to assess the competitiveness of the surgical cluster in Sialkot, understand the dynamics of the supply and demand factors, support mechanisms as well as the linkages between the backward and forward industries and cluster actors. Principal firms of the cluster, companies with backward and forward linkages, support institutions and Business Development Service Providers were met and interviewed as well as data and information gathered from secondary sources were analyzed in order to understand the common problems, advantages and disadvantages of the cluster.

This study addresses the factors that have contributed to the development of the cluster and the barriers that hinder its growth and helps understand the comparative socio-economic environment of the cluster, identify the most effective leverage points for intervention, provide a baseline for future monitoring and evaluation and help build initial trust with and among the stakeholders. The study also entails potential intervention areas to overcome the prevailing issues vis-à-vis possibilities of joint actions on the part of cluster actors.

In view of the data analyzed using a number of analytical tools such as PESTEL, Value Chain Analysis, Porter’s Five Forces & Diamond Model, Cluster Map & Cooperation Matrix and SWOT, a number of recommendations addressing short to long term challenges of the cluster have been identified. Some of the key issues identified during this study are presented hereunder:

- ✓ The world market share is stagnant at 0.3% for the surgical cluster of Sialkot over the last ten years. Surgical cluster has not been able to diversify its product range thereby increasing rivalry level among the cluster companies and generating unhealthy practices. This in turn has led to price war among the cluster companies.



- ✓ Surgical cluster has not been able to develop brands and effective marketing strategies. Since the cluster is competing in the international market where big players have strong presence with influential marketing strategies, therefore no one off company, keeping in view the size of the cluster companies, has so far been able to develop a brand at par with international giants. This in turn has limited the role of a majority of the cluster companies to full supplier package providers only.
- ✓ The surgical instruments manufacturing processes require skilled labor force for their completion. To attract and retain the labor force, cluster companies are competing with other manufacturing sectors such as readymade garments, protective gears, sports goods and leather garments vis-à-vis the growing service sector in Sialkot. Since working conditions in terms of health and safety are better in other clusters as compared to grinding and polishing sections of surgical cluster companies, therefore, the surgical cluster companies have now started facing issues related to availability of skilled labor force.
- ✓ The Surgical cluster is operating at lower labor productivity level and has not been able to comprehend the production wastages incurred due to absence of effective performance management systems. Most of the companies are being operated by the owners having neither the competency to envision this aspect, nor the desire to engage professionals to overcome this challenge. Therefore, presence of professional managers in the cluster companies is rare. In addition, the technical know how about a manufacturing process can't be perceived as a substitute to the performance management system. This anomaly has resulted in poor labor productivity levels of a mere 30-40% thereby deteriorating all the Key Performance Indicators at a firm level in terms of Cost, Quality and Delivery (CQD). Since the cluster is competing on the price basis, there exists a significant potential to reduce cost of production by eliminating non-value-added activities in the surgical instruments production supply chain.
- ✓ Pakistan's import under HS Code 9018 increased from USD 158 Million in 2012 to USD 268 Million in 2016. There is an increase of over USD 100 Million in imports whereas the increase in exports is only USD 38 Million during the same period. Since the comparison here is made only for the HS code 9018, therefore it is important to consider the factors causing this trend, thereby providing an opportunity to explore import substitution possibilities.

In order to address the challenges faced by the surgical cluster Sialkot including above narrated issues, this study contains a set of recommendations in certain areas such as innovation, marketing & branding, skilled workforce, performance management system & labor productivity, import substitution, access to finance, image building of SIMAP, etc.

## Introduction

### Objective of the Diagnostic Study

The objective of this study is to assess the competitiveness of the surgical cluster in Sialkot, understand the dynamics of the supply and demand factors, support mechanisms as well as the linkages between the backward and forward industries and cluster actors. Principal firms of the cluster, companies with backward and forward linkages, support institutions and business development service providers were met and interviewed as well as data and information gathered from secondary sources were analyzed in order to understand the common problems, advantages and disadvantages of the cluster.

This study addresses the factors that have contributed to the development of the cluster and the barriers that hinder its growth and helps understand the comparative socio-economic environment of the cluster, identify the most effective leverage points for intervention, provide a baseline for future monitoring and evaluation and help build initial trust with and among the stakeholders. The study also entails potential intervention areas to overcome the prevailing issues vis-à-vis possibilities of joint actions on the part of cluster actors.

### Jobs & Competitiveness Programme & The Cluster Development Initiative

Keeping in view the stagnant growth of the manufacturing clusters in Punjab, the Government of Punjab has recently adopted the “Punjab Growth Strategy” which incorporates a target of an annual 8% GDP growth within the Province. The Industrial Sector Development Plan, an element of the Growth Strategy, is oriented in increasing private sector investment, thereby increasing job creation and exports. As part of the development plan, the Government has introduced Cluster Development Initiative (CDI) to support the growth and competitiveness of key manufacturing clusters in particular through interventions of the Punjab Small Industries Corporation (PSIC). This initiative is part of a larger cooperation on “Jobs and Competitiveness” programme with the World Bank.

In the framework of the Punjab jobs and competitiveness programme, the Government of Punjab has signed a cooperation agreement with UNIDO (United Nations Industrial Development Organization) to provide technical assistance for the development of industrial clusters in Punjab province and to support their further integration into global value chains.

The purpose of CDI is to create an enabling environment for growth and prosperity of industries, to create better quality of life through economic uplift in Punjab and to up-grade technology and enhance productivity, quality and profitability of local industries. The lead on the implementation of the CDI for the Government of Punjab is with the Punjab Small Industries Corporation (PSIC) as a government institution.

In consultation with UNIDO, clusters with high potential for growth in Punjab were identified and four prominent clusters selected as the pilot clusters;

- ✓ Readymade Garments
- ✓ Auto parts
- ✓ Leather Footwear
- ✓ Surgical Instruments

### Cluster Development

The cluster concept has gained prominence as an economic policy tool aimed to foster innovation and the growth of a competitive private sector in developing as well as developed countries. Clusters play a critical role in generating employment, income, increasing exports, fostering innovation and opportunities for the local community, and become drivers of broad-based local economic development.



The foundations of this paradigm can be traced back to the work of the economist Alfred Marshall, who in *Principles of Economics* (1890) described the phenomenon as “the concentration of specialized industries in particular localities” and noted that these agglomerations of small-scale businesses enjoyed economies of scale comparable to those of large firms. More recently, Michael Porter popularized the concept of industry clusters in his book “*The Competitive Advantage of Nations*” (1990). Thereafter, there has been a surge of interest in clusters as drivers of economic growth and hubs of innovation, and during the last two decades, Cluster Development approach was introduced all around the world in different industrial, agriculture, services and tourism sectors in developed and developing economies, yielding successful results in terms of increased competitiveness of the SMEs.

As a starting point for Cluster Development, it is imperative that a thorough diagnostic study needs to be carried out and cluster strategy and an action plan built upon the main findings of the study, in consultation and most importantly in consensus with the cluster stakeholders.

## Limitations of the study

It is important to stress that, in a complex socio-economic environment and in a micro and small enterprise cluster environment, no one-off study can be expected to identify all relevant issues and their remedies. The diagnostic study provides an entry framework, a snapshot of the existing business environment with current possible opportunities and threats and Cluster’s advantages and disadvantages, which need to be regularly fine-tuned and revised with the stakeholders and supplemented with specialized studies, on a need basis, at later stages.

# 1. Overview of the Industry

## 1.1 Introduction to Medical Devices & Instruments:

The term medical device can be referred to any instrument, apparatus, implement, machine, appliance, implant, software, material or other similar or related article, manufactured with an intention to be used alone or in combination for human beings for diagnosis, prevention, monitoring, treatment or alleviation of disease or compensation for an injury. According to the definition of U.S. Food and Drug Administration (FDA), any instrument, machine or apparatus used in the purpose of diagnosing disease, cure, treatment or disease prevention is called a medical device. The term medical device and instrument can be used interchangeably.

Medical devices are classified into four categories – Class I, Class II (a), Class II (b) and Class III, based on the risks associated with the device. Class I devices are deemed to be low risk and are therefore subject to the least regulatory controls (e.g. Surgical Retractors / Tongue Depressors). Class II (a & b) devices are higher risk devices than Class I and require greater regulatory controls to provide reasonable assurance of the device's safety and effectiveness (e.g. Class II (a): Hypodermic Needles / Suction Equipment, Class II (b): Lung Ventilator / Bone Fixation Plate). Class III devices are generally the highest risk devices and are therefore subject to the highest level of regulatory control (e.g. Heart Valves / Implantable Defibrillator).

Surgical instruments are tools or devices that perform functions such as cutting, dissecting, grasping, holding, retracting or suturing. Most of the instruments are made from stainless steel. Other metals such as titanium, chromium, radium and molybdenum are also used. There are several types of surgical instruments<sup>1</sup>:

- ✓ Graspers, such as forceps
- ✓ Clamps and occludes for blood vessels and other organs
- ✓ Retractors, used to spread open skin, ribs and other tissue
- ✓ Distracters, positioners and stereotactic devices
- ✓ Mechanical cutters (scalpels, lancets, drill bits, rasps, trocars, ligature, etc.)
- ✓ Dilators and specula, for access to narrow passages or incisions
- ✓ Suction tips and tubes, for removal of bodily fluids
- ✓ Sealing devices, such as surgical staplers
- ✓ Irrigation and injection needles, tips and tubs, for introducing fluid
- ✓ Tyndale's, to help "wedge" open damaged issues in the brain
- ✓ Powered devices, such as drills, dermatomes, etc.
- ✓ Scopes and probes, including fiber optic endoscopes and tactile probes
- ✓ Carriers and appliers for optical, electronic and mechanical devices
- ✓ Ultrasound tissue disruptors, cryotomes and cutting laser guides
- ✓ Measurement devices, such as rulers and clippers

The medical devices & instruments contribute significantly in world trade. During 2016, the world trade of medical devices & instruments was USD 532.87 Billion<sup>2</sup>. The Harmonized System (HS) Code 90 is used for Optical, Photographic, Cinematographic, Measuring, Checking, Precision, Medical or Surgical Instruments and Apparatus; Parts and Accessories thereof.

<sup>1</sup>An overview: Surgical and Medical Instruments Industry of Pakistan, TDAP

<sup>2</sup>Trade Map

Under HS Code 90, there are thirty-two 4 digit codes in which world trade is undertaken. Concisely speaking, HS Code 9018 (Instruments and appliances used in medical, surgical, dental or veterinary sciences, including scintigraphic apparatus, other electro-medical apparatus and sight-testing instruments, Neuro Endovascular Surgery NES) has the largest share of 21.12% or USD 112 Billion in world trade of medical and surgical instruments. HS Code 9018, 9013, 9021, 9027 and 9031 collectively contribute 58% under HS code 90. The world trade of all 4 digit codes under HS Code 90 along with their share in total world trade is shown in Table – 1.1.

<b>Table – 1.1</b>			
<b>Four Digit Codes Wise World Trade under HS Code 90</b>			
<b>HS Code</b>	<b>Types of Instruments</b>	<b>World Trade (USD in Billion)</b>	<b>Share in Total World Trade</b>
9018	Instruments and appliances used in medical, surgical, dental or veterinary sciences, incl. scintigraphic apparatus, other electro-medical apparatus and sight-testing instruments, Neuro Endovascular Surgery (NES)	112.54	21.12%
9013	Liquid crystal devices not constituting articles provided for more specifically in other heading; lasers (excluding laser diodes); other optical appliances and instruments not elsewhere specified in chapter 90	71.31	13.38%
9021	Orthopedic appliances, incl. crutches, surgical belts and trusses; splints and other fracture appliances; artificial parts of the body; hearing aids and other appliances which are worn or carried, or implanted in the body, to compensate for a defect or disability	51.35	9.64%
9027	Instruments and apparatus for physical or chemical analysis, e.g. polarimeters, refractometers, spectrometers, gas or smoke analysis apparatus; instruments and apparatus for measuring or checking viscosity, porosity, expansion, surface tension or the like; instruments and apparatus for measuring or checking quantities of heat, sound or light, incl. exposure meters; microtomes	39.55	7.42%
9031	Measuring or checking instruments, appliances and machines not elsewhere specified in chapter 90; profile projectors	38.48	7.22%
9032	Regulating or controlling instruments and apparatus (excluding taps, cocks and valves of heading 8481)	33.88	6.36%
9001	Optical fibers and optical fiber bundles; optical fiber cables (excluding made up of individually sheathed fibers of heading 8544); sheets and plates of polarizing material; lenses, incl. contact lenses, prisms, mirrors and other optical elements of any material, unmounted (excluding such elements of glass not optically worked)	26.81	5.03%
Others		158.95	30%
<b>Total</b>		<b>USD 532.87 Billion</b>	

Source: Trade Map

When further broken down to 6 digit code, HS Code 901890 has the maximum share of 42.8% among the product categories under the HS Code 9018. HS code 901890 covers instruments and appliances used in medical, surgical or veterinary sciences. The world trade of all 6 digit codes under HS Code 9018 along with their share in total world trade of 9018 is shown in **Table – 1.2**.

<b>Table –1.2</b>			
<b>Six Digit Codes Wise World Trade under HS Code 9018</b>			
<b>HS Code</b>	<b>Types of Instruments</b>	<b>World Trade (USD in Billions)</b>	<b>Share in Total World Trade of 9018</b>
901890	Instruments and appliances used in medical, surgical or veterinary sciences, NES	48.25	42.87%
901839	Needles, catheters, cannula and the like, used in medical, surgical, dental or veterinary sciences (excluding syringes, tubular metal needles and needles for sutures)	27.39	24.34%
901819	Electro-diagnostic apparatus, incl. apparatus for functional exploratory examination or for checking physiological parameters (excluding electro-cardiographs, ultrasonic scanning apparatus, magnetic resonance imaging apparatus and scintigraphic apparatus)	10.65	9.46%
901831	Syringes, with or without needles, used in medical, surgical, dental or veterinary sciences	5.10	4.53%
901849	Instruments and appliances used in dental sciences, NES	4.44	3.95%
901813	Magnetic resonance imaging apparatus	4.43	3.94%
901812	Ultrasonic scanning apparatus	4.27	3.80%
901850	Ophthalmic instruments and appliances, NES	3.67	3.26%
901832	Tubular metal needles and needles for sutures, used in medical, surgical, dental or veterinary sciences	2.42	2.15%
901811	Electro-cardiographs	0.91	0.81%
901820	Ultraviolet or infra-red ray apparatus used in medical, surgical, dental or veterinary sciences	0.41	0.36%
901841	Dental drill engines, whether or not combined on a single base with other dental equipment	0.38	0.34%
901814	Scintigraphic apparatus	0.22	0.19%
<b>Total</b>		<b>USD 112.54 Billion</b>	

*Source: Trade Map*

As more than 95% of Pakistan’s export of surgical instruments falls under HS Code 9018, therefore, this report mainly considers this code for all the analyses and recommendations. Pakistan’s export and import scenario along with share in world trade under HS Code 9018 is shown in **Table –1.3**.





Export			Import		
Total Export (USD Million)	World Export (USD Billion)	Share in World Export	Total Import (USD Million)	World Import (USD Billion)	Share in World Import
346.58	112.54	0.30%	268.89	110.05	0.24%

*Source: Trade Map*

## 1.2 Global Scenario

The surgical instruments manufacturing industry has grown gradually in terms of volume and range of instruments produced, driven by the demand of healthcare and rise in global population. Simultaneously, innovations & advancements in medical sciences and increased levels of research & development have opened up new windows for the design and production of technologically advanced equipment such as electro-cardiographs, electro-diagnostic equipment, ultra-violet equipment, infra-red rays, syringes, needles, sutures, catheters, cannulas, dental drills and ophthalmic instruments.

### Export Scenario

The United States, Germany, Netherlands, Mexico, Belgium and China are amongst the leading exporters of medical instruments and equipment in terms of value. During late 20th century, countries such as Germany transformed from factors and efficiency driven economies to knowledge driven economies and started tapping high-end, technologically sophisticated manufacturing. As a result, labor intensive industries such as conventional surgical instrument manufacturing relocated to developing countries.

Pakistan has been considered a key player in the global market for manufacturing conventional surgical instruments [HS Code 9018], particularly disposable instruments. China and Malaysia also play an important role in this sector due to lower production costs.

In Pakistan, the production of surgical instruments is mainly concentrated in and around Sialkot, Punjab. Industry sources claim that more than 95% of surgical manufacturing companies are located in Sialkot. The surgical cluster at Sialkot produces on average over 150 Million pieces of surgical instruments a year with an estimated value of Rs. 40 Billion<sup>3</sup>. The total global export volume under HS code 9018 is USD 112.5 Billion involving 208 countries. Predominantly USA and Germany are the top exporters with a share of 23.48% (USD 26.4 Billion) and 11.61% (USD 13.06 Billion) respectively in 2016. Pakistan is at 34th position in the list of exporters of instruments under this code with a share of 0.30% (USD 346.58 Million).

World export market for HS Code 9018 has increased from USD 69 Billion in 2007 to USD 112 Billion in 2016, an increase of USD 43 Billion as shown in Figure – 1.1. Average growth rate during these 10 years has been around 6%. The growth rate remained negative during 2009 and 2015 at -3.2% and -3%, respectively due to world economic recessions.

<sup>3</sup>Sector Skills Study, Punjab Skills Development Fund

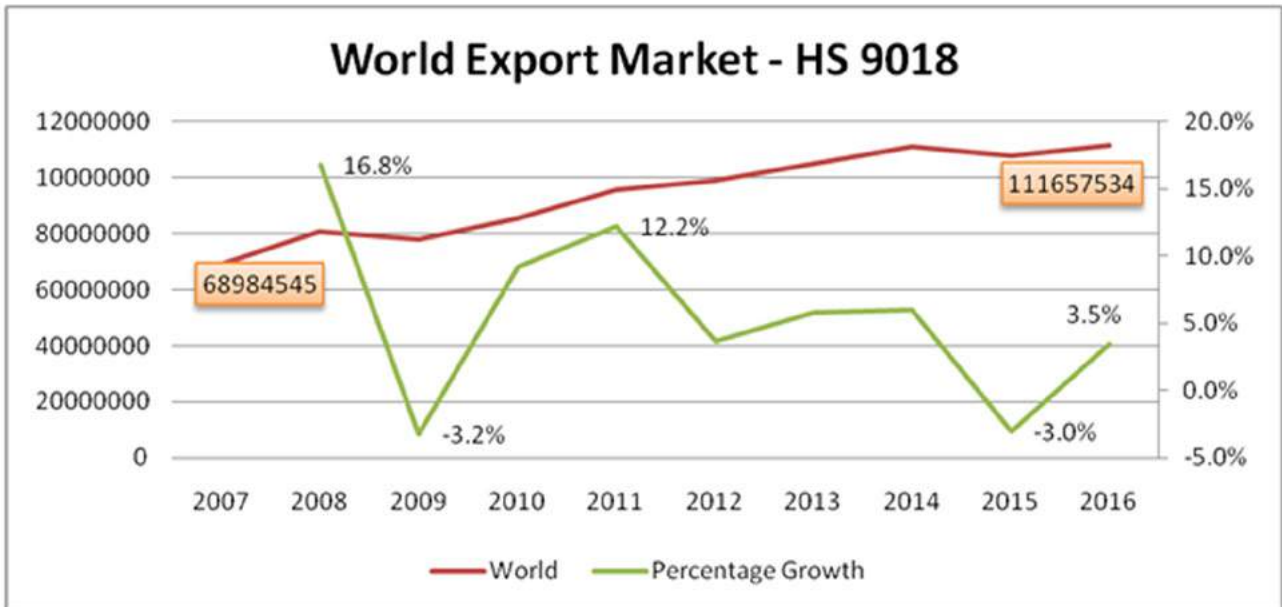


Figure 1.1

The share of top ten (10) countries over the last 10 years in world export under HS Code 9018 are shown in Figure – 1.2. These 10 countries cumulatively account for 75% of the world export market share for HS Code 9018.

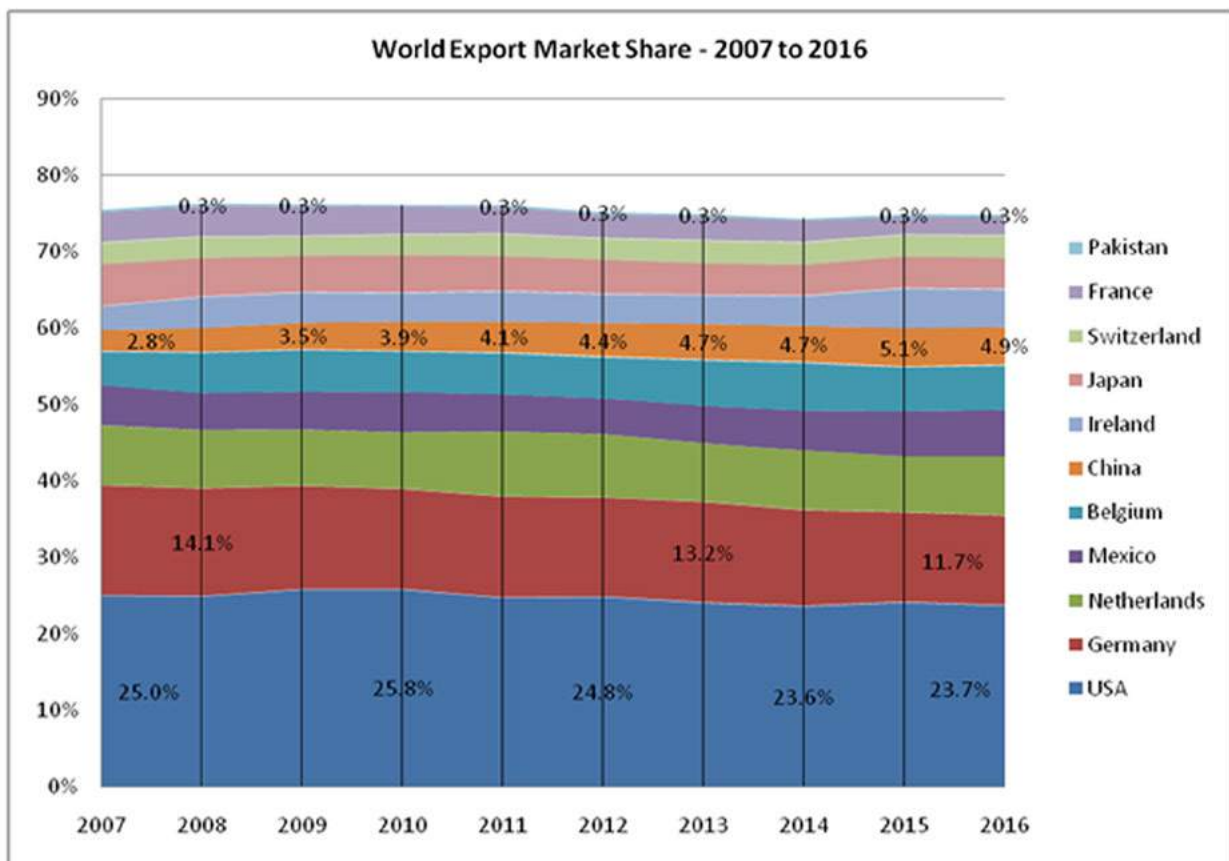


Figure 1.2

USA has been the leading exporter with 23.7% share in the world export market. However, Germany's export market share has reduced from 14.1% to 11.7% during this period. China has gained market share by 2.1% from 2.8% in 2007 to 4.9% in 2016. Pakistan's export market share has been stagnant at 0.3% during this period.

China, as shown in the following figure – 1.3, has the highest rate of market share growth at an average of 12.9% during the period from 2007 to 2016, followed by Ireland at 12.5% for the same period. However, during this period USA and Germany's export growth rates for HS Code 9018 has been at 5% and 3.4%, respectively.

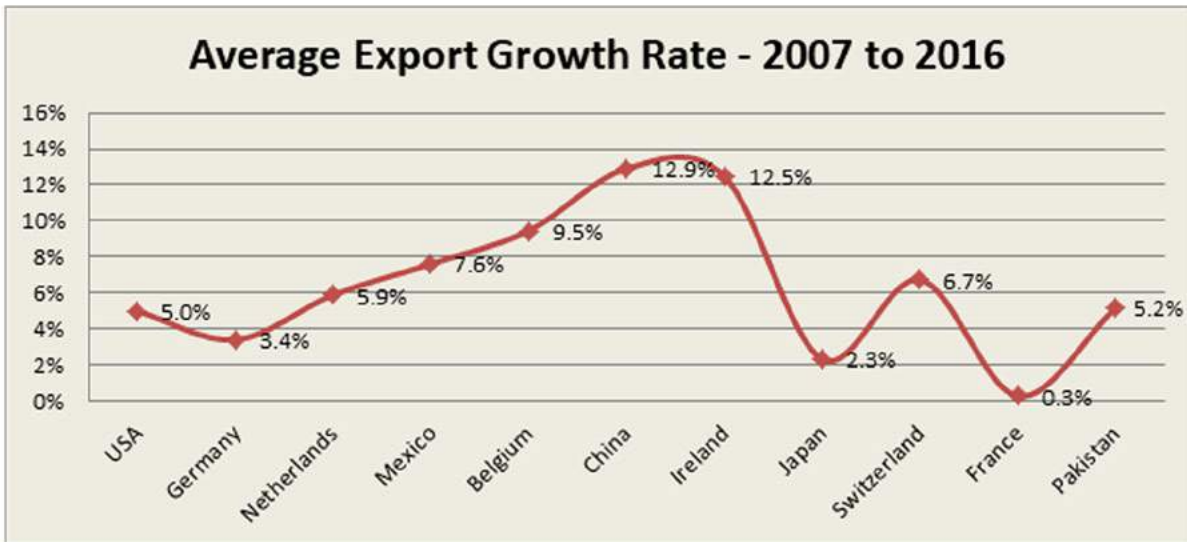


Figure 1.3

## Import Scenario

The share of top ten (10) countries over the last 10 years in world import under HS Code 9018 is shown in Figure – 1.4. The total import volume under HS Code 9018 is USD 110.05 Billion involving 226 countries. Predominantly USA and Germany are the top importers with a share of 20.07% (USD 20.1 Billion) and 7.7% (USD 8.45 Billion), respectively, in 2016. China's import market share has increased from 2.1% in 2007 to 6.2% in 2016. Pakistan is at 49th position in the list of importers of instruments under this code with a stagnant share of 0.24% (USD 268.9 Million). These 10 countries cumulatively account for 63% of world import market share for HS 9018.



Figure 1.4

### 1.3 Surgical Instruments Cluster, Sialkot

In Pakistan, the surgical instruments manufacturing cluster is mainly located in and around Sialkot, Punjab, covering about 99% of the country's production of surgical instruments<sup>4</sup>. There are around 3,600 companies operating in and around Sialkot in which the number of large scale manufacturers is around 20. These companies have worldwide presence and have their offices in the countries of import. Around 50 medium size units are also operating in Sialkot and some of them also have their offices in the importing countries<sup>5</sup>. The rest of the companies consist of small scale firms and traders. Total production capacity of the cluster is 200 Million pieces per annum. The cluster is producing around 100 Million pieces thus utilizing 50% of the installed capacity. The total capital investment of the cluster is PKR.12.00 Billion<sup>6</sup>. However, in view of our interaction with the cluster companies we have found that the capacity utilization has increased substantially from 50% to more than 70%.



The surgical cluster is providing direct employment to 100,000-150,000 personnel and 350,000 to 400,000 people have been employed indirectly. At present, there are around 10,000 different types of instruments being produced and exported from Pakistan to different destinations in the world. The cluster is manufacturing two types of surgical instruments: a) Disposable instruments, which constitute 60% of the exports, and b) Reusable instruments, which are 40% of the exports.

The medical and surgical instruments are produced for international buyers / brands with a diversified range of designs, covering all sections of surgery such as Electromedical Instruments, Micro Surgery Instruments, Cardiovascular, Endoscope, Gynecological, ENT, Respiratory Aid, Orthopedic Instruments, Hollowware, Anesthesia Products, Hospital Furniture, Dental Instruments, Veterinary Instruments, Beauty Care and Beauty Saloon Instruments. About 95% of production is export oriented.

The advanced countries of Europe and America are the leading buyers of Pakistan's surgical instruments. The cluster falls under the light engineering industry. Over the years, due to availability of specialized skill set, the cluster has been able to sustain its global market share.

<sup>4</sup>Sialkot Chamber of Commerce and Industry "Surgical Industry at a Glance"

<sup>5</sup>Surgical Instruments Manufacturers of Pakistan (SIMAP)

<sup>6</sup>Sialkot Chamber of Commerce and Industry "Surgical Industry at a Glance", Surgical industry at a glance by Rawalpindi Chamber of commerce and industry

<sup>7</sup>Surgical industry at a glance by Rawalpindi Chamber of commerce and industry



Pakistan's exports under HS code 9018 have grown at an average rate of 5.2% during the period from 2007 to 2016 as shown in the figure – 1.5. Pakistan's exports under this code witnessed negative growth rate of 9.9% and 4.2% for two consecutive years, 2009 and 2010, respectively. The export market growth rate remained negative 1.2 % in the year 2016. Maximum export market growth rate of over 25% has been witnessed in the year 2011.

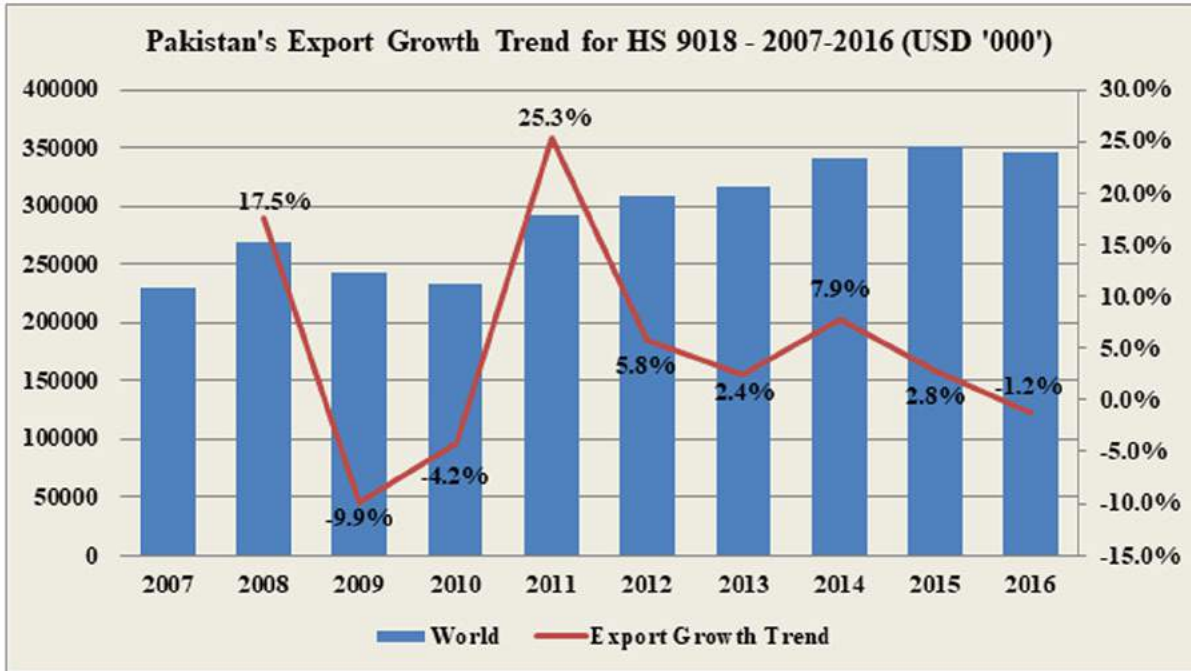


Figure 1.5

The historical review of Pakistan's import and export under HS Code 9018 is shown in Figure – 1.6.

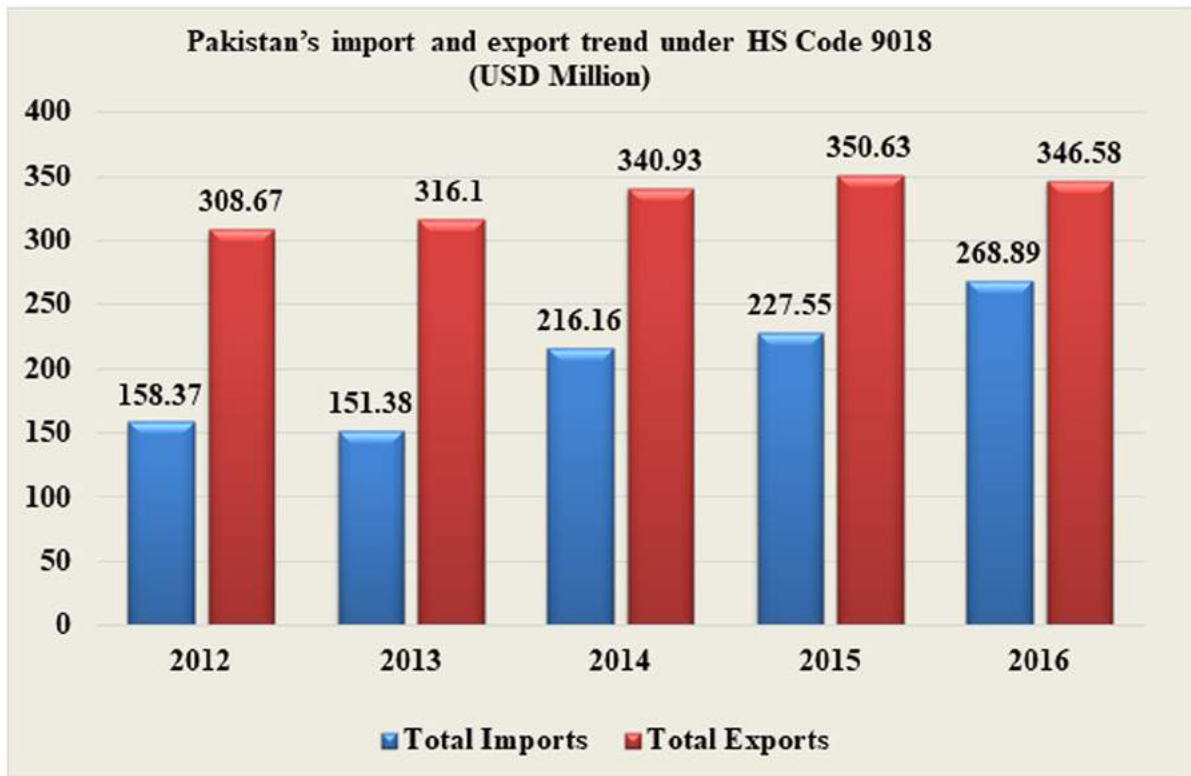


Figure 1.6 (Source: Trade Map)

As shown in Figure – 1.6, Pakistan’s imports under HS Code 9018 increased from USD 158 Million in 2012 to USD 268 Million in 2016. There is an increase of over USD 100 Million in imports whereas the increase in exports is only USD 38 Million during the same period. Since the comparison here is made only for the HS code 9018, therefore it is important to consider the factors causing this trend thereby providing an opportunity to explore the ways for import substitution.

The surgical instruments produced in Sialkot are exported all over the world. USA is a big importer of surgical instruments from Pakistan. About 29% surgical instruments are exported to USA. After USA, Germany and United Kingdom are major export destinations of Pakistan’s surgical instruments. The top ten (10) buyers of Pakistan’s surgical instruments under 9018 along with their share in total Pakistan’s export under same code is shown in figure – 1.7. The graph also shows the trend over the last 10 years in terms of gains and loss of market share to these leading export destinations. The exports have decreased to the EU based countries; however, Pakistan’s surgical exports are increasing to USA, India and China.

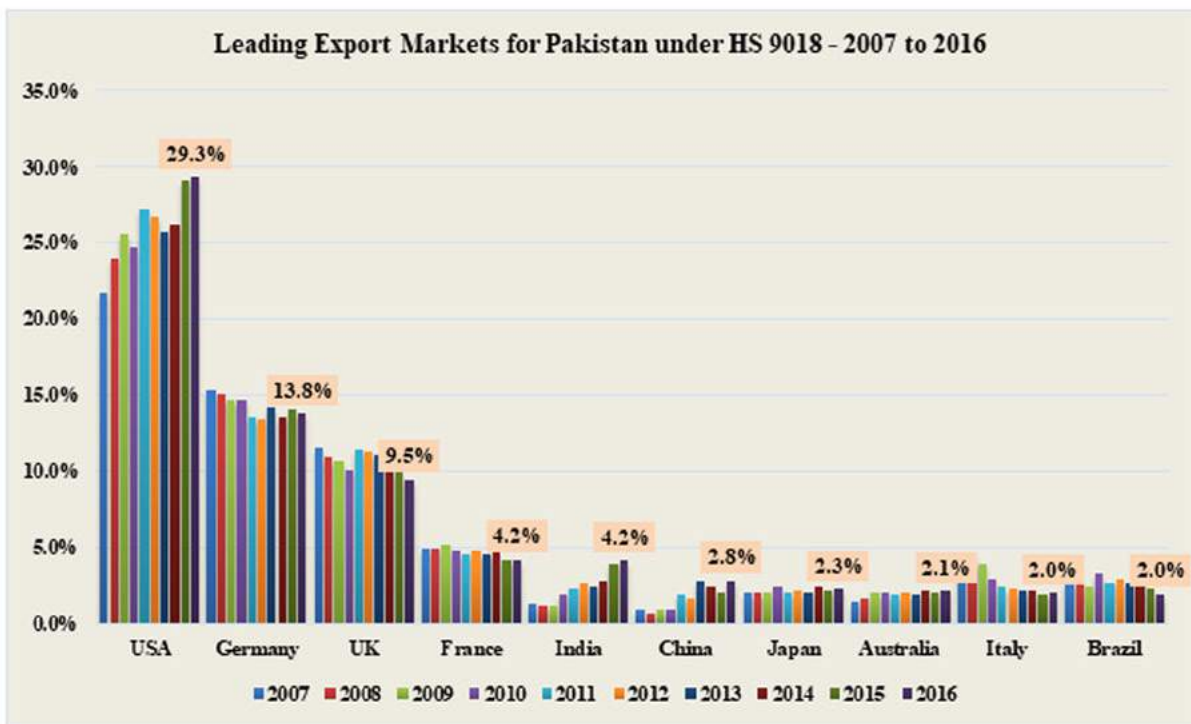


Figure 1.7 (Source: Trade Map)

Pakistan is also importing surgical instruments under HS Code 9018 from the world. China is the leading supplier of instruments. Pakistan is importing about 20% surgical instruments from China. After China, USA and Germany are prominent exporters to Pakistan with a share of 15% and 13% respectively. The top ten (10) countries from where Pakistan is importing surgical instruments under 9018 along with their share in total Pakistan’s import under same code is shown in Table – 1.4.



<b>Country</b>	<b>Total Export to Pakistan (USD Million)</b>	<b>Share in Pakistan’s total Import</b>
China	54.56	20.29%
United States of America	41.51	15.44%
Germany	35.16	13.07%
Japan	24.54	9.13%
Singapore	15.26	5.67%
Ireland	11.10	4.13%
Netherlands	10.45	3.89%
United Kingdom	9.54	3.55%
Malaysia	8.05	2.99%
Belgium	6.83	2.54%

*Source: Trade Map*

## 1.4 History and turning points of the Cluster

The history of surgical instruments in Sialkot spans over 100 years. Blacksmiths of Sialkot were used to produce knives and swords and later on other implements related to agriculture. In the early 20th century during British rule in India, the blacksmiths of Sialkot started producing and repairing surgical instruments for Mission Hospitals. Later on, in the 1930s, the British personnel engaged these blacksmiths to produce and sell their instruments in England.

To strengthen the institutional setup of this cluster, in 1941, the British Government established ‘Metal Industries Development Centre’ (MIDC) in Sialkot. MIDC was provided with the equipment as well as experts to train the local laborers. It helped this cluster to upgrade from production of basic metal items to acceptable quality surgical instruments. In 1947, due to migration of leading Hindu traders and industrialists, the local industry faced a serious setback. Pakistan inherited a total of 17 registered surgical instrument manufacturers in Sialkot<sup>8</sup>.

‘Surgical Instrument Manufacturers Association of Pakistan’ (SIMAP) was incorporated in 1958 to promote and safeguard the interests of this cluster. SIMAP since then has played a central role in addressing issues at the Government level, nominating trade delegations and participants for trade fairs and exhibitions, handling inter industry issues and representing the industry at local and international forums.

The Government announced incentive schemes during 1960s to support the surgical instrument industry. These incentive schemes encouraged the industry to adopt better technology to improve the quality and productivity of the surgical instruments. During the 1970s, a number of challenges came about in terms of strict labor laws, nationalization and enhanced power of trade unions.

<sup>8</sup>Surgical industry at a glance by Rawalpindi Chamber of commerce and industry



To counter these challenges, the surgical companies adopted new strategies including outsourcing of the production processes to small vendors so as to avoid the possibilities of impeachment through newly enforced regulations. The 1980's and 1990's were the period of high demand and regulations for surgical instruments industry. In 1994, restrictions were imposed by US Food and Drug Administration (FDA) on Pakistani surgical instruments and made it mandatory to attain certifications such as ISO 9000, European Conformance (CE-Marking) and Good Manufacturing Practice (GMP) to improve the management and manufacturing systems of the surgical manufacturers. On one hand these strict requirements created short term missed opportunities, but on the other hand they helped in improving the awareness of the factory owners and establishing organizational management systems at their respective enterprises.

In 2001, 'Sialkot Material Testing Laboratory' (SIMTEL) was established with the technical and financial support of FDA, USA. The project is being jointly managed by TDAP & SIMAP. The laboratory is equipped with modern, sophisticated and hi-tech testing equipment conforming 'Made in Sialkot' medical instruments to the International Standard specifications along with provision of consultancy services to the manufacturers and exporters to improve the manufacturing techniques and processes of medical instruments. This endeavor has reduced the burden of testing and consultation costs from the industry thereby increasing their cost competitiveness along with the convenience of frequent interaction with the lab.

It is very important to note here, in the recent history of Sialkot Surgical cluster, no turning points have been observed in terms of innovation of products or markets. There are clear indications that the cluster has reached the saturation point and cluster companies are left with cost leadership strategies only with the existing product range mainly consisting of conventional instruments.

## 1.5 Geographic Location

In Pakistan, the surgical instruments manufacturing cluster is located in the urban areas of Sialkot city in Punjab province. The major production units are in the center of the city within 15 sq. km range. The main areas where the manufacturing of surgical instruments is concentrated include Commissioner Road, Airport Road, Gohad Pur, Kulluwal Road, Jinnah Park Colony, Roras Road and Muslim Street. A snapshot of geographical spread of the firms in Sialkot is presented in **Figure – 1.8**.

It is obvious from the image that the cluster started from the centre of the city and companies' concentration is independent of the product types or technologies. Mostly companies located at the centre of the city, excluding companies established at the industrial estate, are not purposely built incurring substantial production wastages due to poor layouts as well as opportunity cost to expand these premises is very high due to prevailing property prices in the city centre. Therefore, the companies are relocating to the outskirts of the city to overcome the issues arising from land constraints of the current premises. Also, availability of better infrastructure facilities such as roads, electricity and gas are facilitating such decisions related to relocation.





## Geographic Location of Surgical Cluster in Sialkot



**Figure 1.8** Source: Diagnostic Study of Industrial and Handicrafts Clusters in Punjab, Punjab Small Industries Corporation (PSIC)

### 1.6 Socio Economic Structure of Sialkot

Sialkot is one of the leading industrial and export oriented cities of Punjab, Pakistan having per capita income of more than USD 1,200/-<sup>9</sup>. The diversified industrial concentration with distinct product range and specialized skills make this city prominent in the province. According to the census conducted by Bureau of Statistics, Punjab in 2017, the total population of Sialkot district is around 3.89 Million among which 49% are males while 51% are female<sup>10</sup>. The literacy rate of Sialkot is 76%<sup>11</sup> whereas the unemployment rate is 27.1% and poverty level is 5.63%<sup>12</sup>. About 300,000 people are working directly or indirectly in the industrial sector of Sialkot. Sialkot has the honor to have Pakistan's first privately owned international airport 'Sialkot International Airport' and a separate dry port. Almost 60% of total exports of Sialkot are carried out via Sialkot Dry Port Trust and 40% is exported from other ports like Lahore, Islamabad and Karachi. Proper health and education facilities are available in Sialkot. There are 4 district hospitals in Sialkot, Daska, Sambrial and Pasrur (one at each) along with a number of small medical facility centers. A number of colleges, private universities and technical/vocational training institutes are also available in Sialkot.

Sialkot industry contributes significantly in total exports of the country. It is the 2nd largest exporting city of Pakistan. During 2015, the total export of Sialkot was around USD 2 Billion which was 9% of Pakistan's total export<sup>13</sup>. Around 10,000 firms have been registered in different industrial sub-sectors in Sialkot including sports goods, leather tanneries, leather garments, protective gears, surgical instruments and ready-made garments.

<sup>9</sup>Punjab Portal

<sup>10</sup>Bureau of Statistics, Punjab

<sup>11</sup>Diagnostic Study of Industrial and Handicrafts Clusters in Punjab, Punjab Small Industries Corporation (PSIC)

<sup>12</sup>Impact of CPEC on Social Welfare in Pakistan: A District Level Analysis, Pakistan Institute of Development Economics

<sup>13</sup>"Pakistan's business climate If you want it done right". The Economist. 27 October 2017

## 1.7 Major Cluster Actors

Surgical instruments manufacturing cluster, Sialkot consists of traditional and dynamic production firms. The major cluster actors in production can be classified into four different categories i.e. large-scale firms, medium-scale firms, small-scale firms and vendor segment. Large-scale manufacturing production units which are around 10% of the cluster firms, hold the major share of the total production (around 50%) and are involved in export activity with relatively less labor employed (about 15%) as shown in Figure - 1.9. The medium-scale firms constitute 40% of the cluster and have ~40% employment share with significant production activity (~35%). The rest of the production and employment is at a small scale and constitutes the vendor segment of the cluster<sup>14</sup>.

### Production & Employment Distribution Among Cluster Companies



*Figure 1.9*

On the basis of revenue of the firms, the cluster can be classified into four types of firms i.e. high sales firms, medium sales firms, low sales firms and vendors working in the cluster. There are 20 large firms having annual turnover of around PKR. 60-100 Million with average employment of 250-350 employees in each firm. While medium size segment in the cluster consists of around 50 firms with PKR. 10-60 Million revenues annually and accounts for employment to 50-250 personnel on average in each firm. The third part of this cluster consists of 150 small-scale firms with annual sales of each firm ranging from PKR. 1-10 Million per annum and providing employment to 10-50 personnel. The fourth and largest part, in terms of numbers, of this cluster consists of vendors. There are more than 3,000 vendors in the cluster. These vendor firms generally specialize in one or two processes of instrument making. The revenue of the firms falling under this category ranges from PKR. 1-1.5 Million annually<sup>15</sup>.

<sup>14</sup>Diagnostic Study of Industrial and Handicrafts Clusters in Punjab, Punjab Small Industries Corporation (PSIC)

<sup>15</sup>Diagnostic Study of Industrial and Handicrafts Clusters in Punjab, Punjab Small Industries Corporation (PSIC)

## Surgical Value Chain

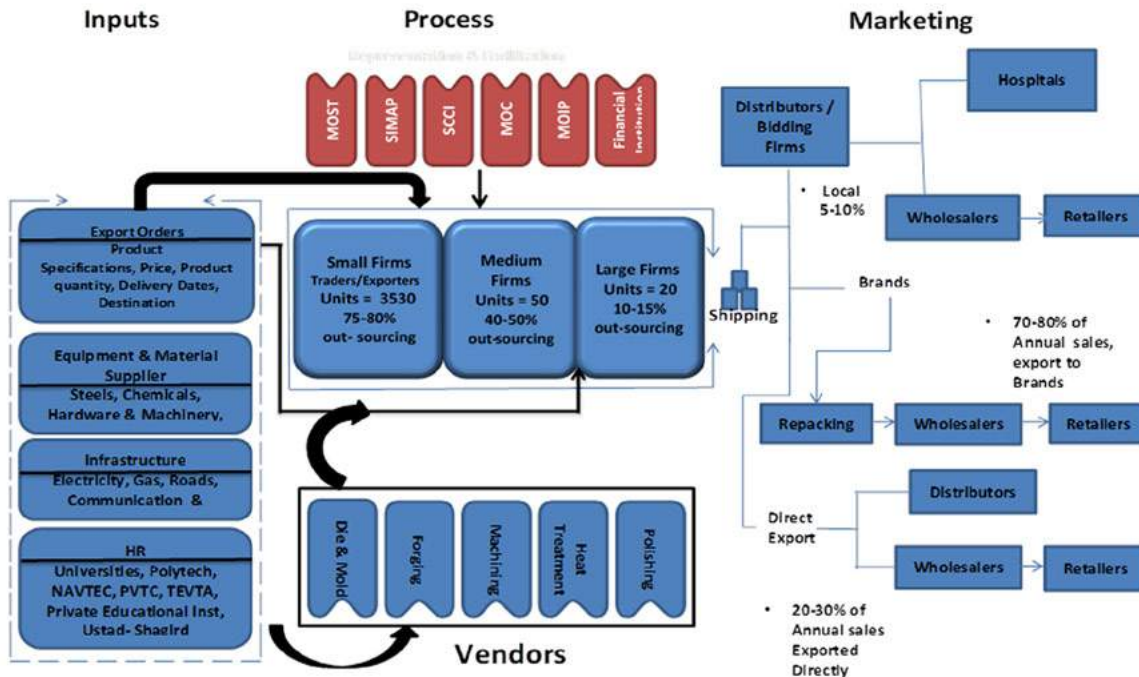


Figure 1.10

As most of the production processes are outsourced to the vendors, the role of traders is widespread in this cluster. Traders provide the raw materials, specifications and working capital to the small vendors. They also mainly carry out the final inspection and packing processes.

## Segmentation of Cluster Firms



Figure 1.11

## 2. Institutional Setup

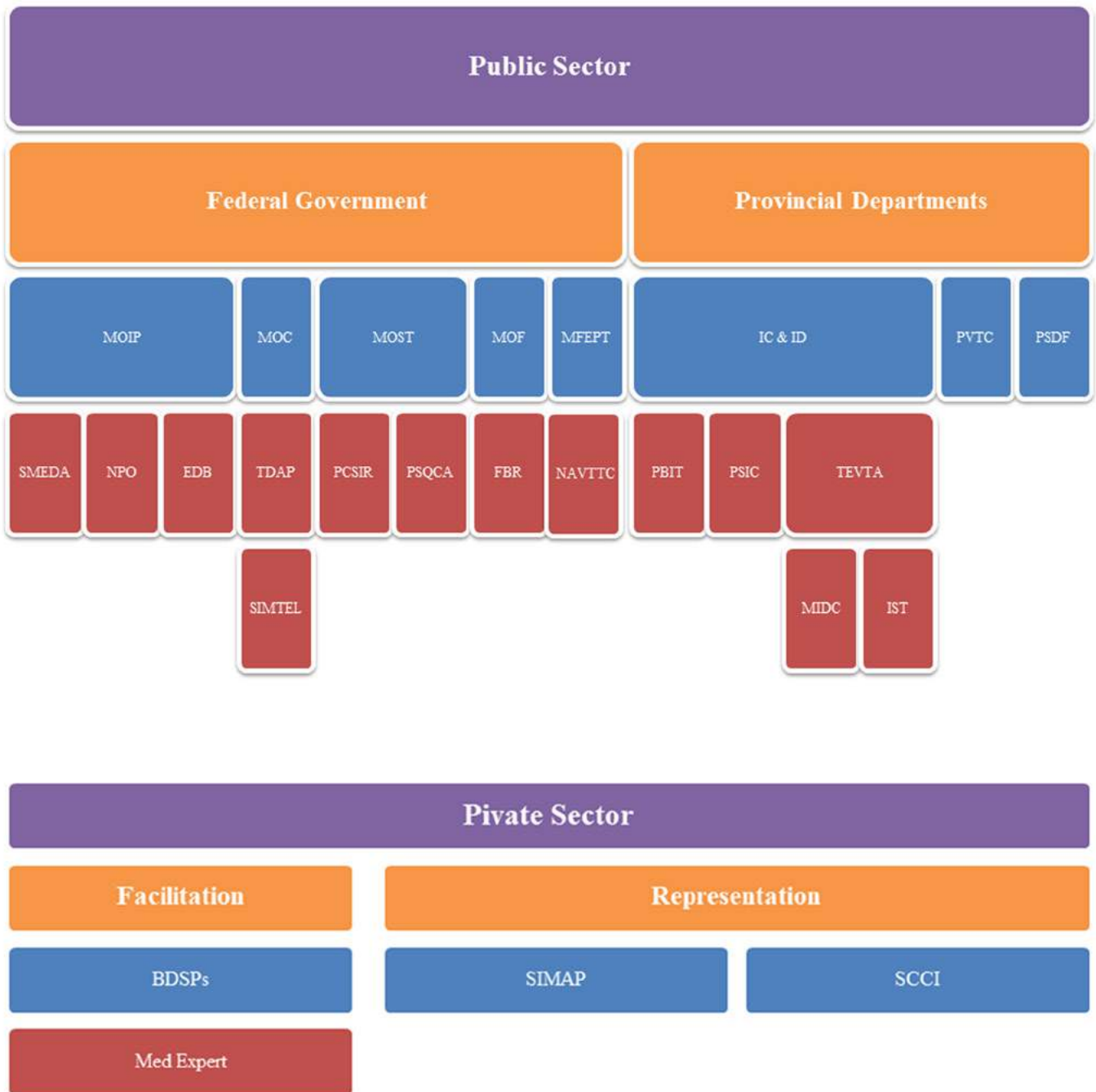


Figure 2.1

## 2.1 Federal & Provincial Ministries

### 2.1.1 Ministry of Industries & Production (MOIP)

Ministry of Industries & Production (MOIP), Government of Pakistan is playing a role of facilitator to create an enabling environment for efficient, sustainable and inclusive industrial development in the country. MOIP formulates and implements strategies for sustainable industrialization in Pakistan. Important organizations working under MOIP include Small & Medium Enterprises Development Authority (SMEDA), National Productivity Organization (NPO), Engineering Development Board (EDB) and Pakistan Industrial Technical Assistance Centre (PITAC).

**SMEDA** is not only an SME policy-advisory body for the Government of Pakistan, but also facilitates other stakeholders in addressing their SME development agendas. The major objectives of SMEDA include formulation of policy to encourage the growth of SMEs in the country, advise the government on fiscal and monetary issues related to SMEs, facilitation of Business Development Services to SMEs, conducting sector studies and analysis for sector development strategies and donor assistance for SME development through programs and projects.

**NPO** promotes enhancement of productivity culture in public and private sector organizations by providing training, seminars, workshops, consultancy, release of index surveys, qualification certification, promotion of a comprehensive understanding of energy and the environment, research on productivity. NPO has also acquired membership of World Confederation of Productivity Science (WCPS) and World Network of Productivity Organization (WNPO) to expand its linkages in 52-member countries of WCPS that are committed to productivity improvement.

**EDB** is the apex Government body under MOIP entrusted to strengthen the engineering sector and integrate it with the world market to make it the driving force for economic growth. EDB has four operational groups i.e. Tariff Group, Policy Development Group, Sector Development Group and Business Development Group. It's objective is to develop growth strategies for engineering sub-sectors and integrate Pakistan's engineering sector with global markets, as well as focus on tariff rationalization, indigenization, deletion monitoring and vendor development, giving international exposure to industry, handholding of industry, creating comprehensive databank of industry and benchmarking & training.

### 2.1.2 Ministry of Commerce (MOC)

The Ministry of Commerce (MOC), Government of Pakistan has a mandate to contribute in national economy through trade liberalization and facilitation, improving export competitiveness and reducing cost of doing business with the aim to achieve higher market access for Pakistani products. The major functions and roles of the MOC include imports and exports across custom frontiers, export promotion, commercial intelligence and statistics, tariff policy and its implementation, anti-dumping duties, countervailing duties and safeguard laws, inter-provincial trade, domestic commerce, organization and control of chambers and trade associations, law of insurance and regulation and control of insurance companies. The key attached departments of MOC include the Trade Development Authority of Pakistan (TDAP), Securities and Exchange Commission of Pakistan (SECP) and Competition Commission of Pakistan (CCP).

**TDAP** participates in 60 to 80 international trade exhibitions annually and sends 20 to 40 trade delegations abroad every year. It also organizes the Expo Pakistan annually in Pakistan, which is well-attended by foreign buyers and runs the Expo Centre, Karachi providing a permanent exhibition space for holding trade events. It also implements various trade policy initiatives announced by the Ministry and undertakes various sector-development projects from the Export Development Fund (EDF). TDAP regularly supports the SIMAP's members in participating in trade fairs at subsidized rates.

**Sialkot Material Testing Laboratory (SIMTEL)** was established in 2001 by the Ministry of Finance (MOF) through the Export Development Fund (EDF). The Laboratory provides consultancy to the manufacturers and exporters for improving their production techniques and processes. SIMTEL charges a nominal fee for material testing and quality assurance services.

### 2.1.3 Ministry of Science and Technology (MoST)

The Ministry of Science and Technology (MoST), Government of Pakistan has been functioning since 1972. It is the national focal point and enabling arm of the Government of Pakistan for planning, coordinating and directing efforts to initiate and launch scientific and technological programs and projects for sound and sustainable socio-economic development to achieve the vision of a better Pakistan. The organizations under MoST include Pakistan Council of Scientific and Industrial Research (PCSIR), Pakistan Standards and Quality Control Authority (PSQCA), National University of Science and Technology (NUST), etc.

**PCSIR** is supporting local/ indigenous industry at the national level for process design / technological development, trouble shooting, quality assurance & quality control. PCSIR in collaboration with SIMAP has established a Common Facility Center (CFC) at Sialkot within the premises of SIMAP to support casting based metal industry and provides the technical inputs to the surgical cluster for better product design & development.

A Certification Incentive Programme for SMEs under PQI Initiative 2025 is being implemented by PCSIR to subsidize the cost of certification for SMEs. The objective of this project is to enhance compliance level of the export oriented SMEs in the international export market. The project is worth PKR 750 Million with a gestation period of four years starting from 2016. The project is gaining attraction of the SMEs and more and more SMEs are trying to avail this opportunity. In addition, under this project a series of trainings are being conducted to raise awareness among the SMEs related to various certifications such as ISO-9000, ISO-14000, CE-Marking, Good Manufacturing Practices (GMP), Product Certifications, etc.

**PSQCA** has the mandate for systematic development of standards relating to products & processes in consultation with stakeholders, establish procedures to conform to national & international standards, develop standardization & improve analytical methods for state of the art technology, assist manufacturing and services sectors to obtain quality systems and environment certification under ISO-9000 & ISO-14000, focal point for national, regional and international organizations & institutions such as ISO, IEC, Codex Alimentarius and WTO, National Enquiry Point (NEP) for WTO Agreement on Technical Barrier to Trade (TBT) and introduce measures through standardization regarding consumer safety and health.

### 2.1.4 Ministry of Finance (MoF)

Ministry of Finance (MoF), Government of Pakistan deals with subjects pertaining to finance of the Federal Government and financial matters affecting the country as a whole, preparation of annual budget statements and supplementary/excess budget statements for the consideration of the parliament accounts and audits of the Federal Government as assigned under the Rules of Business, 1973. The MoF has a mandate to pursue sound and equitable economic policies that put Pakistan on the path of sustained economic development and macroeconomic stability with a view to continuously and significantly improving the quality of life of all citizens through prudent and transparent public financial management carried out by dedicated professionals. The Federal Board of Revenue (FBR) is administered by the Ministry of Finance, Revenue and Economic Affairs Division, Government of Pakistan.

**FBR** is a federal agency that administers tax laws for the Government of Pakistan and acts as the central revenue collection agency of Pakistan. It was founded in 2007. Earlier, it was working as Central Board of Revenue (CBR). FBR is an entity responsible for formulation and administration of fiscal policies and levy and collection of federal taxes.

### 2.1.5 Ministry of Federal Education and Professional Training (MFEPT)

The Ministry of Federal Education and Professional Training (MFEPT), earlier known as the Ministry of Professional and Technical Training was established in July 2011 in the wake of the 18<sup>th</sup> Amendment with the vision to develop Pakistan as a progressive and prosperous country by providing equal opportunities to all citizens enabling them to acquire knowledge through primary, secondary and higher education, including technical and professional training; creating a knowledge society leading to knowledge economy. There are a number of departments working under this Ministry including Higher Education Commission (HEC) and National Vocational and Technical Training Commission (NAVTTTC).

### 2.1.6 Industries, Commerce & Investment Department (IC&ID)

The Industries, Commerce & Investment Department (IC&ID), Government of the Punjab is one of the major government institutions striving to promote industrial development, trade and investment in the province. IC&ID is keen on creating a business-friendly investment climate in line with the federal government policies and present the province of Punjab as an attractive investment destination for the entrepreneurs / investors. The attached departments are Directorate General Industries, Prices, Weights & Measures Punjab, Consumer Protection Council (CPC), Controller Printing and Stationary Press, Punjab. The attached companies are Punjab Board of Investment and Trade (PBIT), Punjab Industrial Estates Development and Management Company (PIEDMC), Faisalabad Industrial Estate Development and Management Company (FIEDMC), and Punjab Model Bazaars Management Company (PMBMC). The attached autonomous bodies are Punjab Small Industries Corporation (PSIC) and Punjab Board of Technical Education (PBTE). The attached institutions are Technical Education and Vocational Training Authority (TEVTA) and Punjab Skills Development Fund (PSDF).

**PBIT** is the trade and investment promotion agency of Punjab, Pakistan, established in 2009. PBIT has three key objectives: facilitating new and existing businesses, creating a mutually beneficial business environment through proactive policy advocacy both at the provincial and federal level and promoting Punjab as the ultimate investment destination. PBIT provides investors and businesses with a one-window facility and reduces their time to market their products. In essence, PBIT acts as a catalyst in harnessing the innate potential of Punjab.

**PSIC** was established in 1972 with the mission to promote sustained industrial development through provision of market driven credit, infrastructure and technological support contributing to employment generation, poverty alleviation and socio-economic uplift of the province.

## 2.2 Chambers and Associations

### 2.2.1 Sialkot Chamber of Commerce & Industry (SCCI)

Sialkot Chamber of Commerce & Industry (SCCI) is an important source of guidance and business for the local producers and exporters. SCCI was established in 1982 and is the premier trade body representing the export oriented industry of Sialkot with a mandate to safeguard the interests of the business community in Sialkot. The main objective of SCCI is to promote, trade and protect the economic interest of businesses in Sialkot.

### 2.2.2 Surgical Instruments Manufacturers Association of Pakistan (SIMAP)

Surgical Instruments Manufacturers Association of Pakistan (SIMAP) is the representative body of the surgical cluster. Over the years, the membership of the association has reached more than 3600 mainly consisting of the principle firms and traders. Since the surgical cluster is mainly export oriented, therefore it is mandatory for every firm involved in export to be a member of SIMAP. However, the small vendors working for principle firms and traders are not members of SIMAP. Since the vendors do not carry out the export activity, therefore they avoid political affiliation to specific groups competing in the association, and feel that the association activities are not worth the time and effort required to maintain the membership of the association, therefore they don't become members.

The Exporters/Principle firms take part in the associations' activities including election process, formulation of policy recommendations, trainings, seminars, trade fair participation and other interventions. The elections are held annually to elect the office bearers of the association.

The association facilitates its members by advocating and lobbying with Government institutions for favorable policy measures and incentives. In addition, the cooperation being provided by the association to other organizations is significant and appreciated by its members.

## 2.3 Technical & Vocational Training and Educational Institutions

Technical & vocational training institutes play an important role in producing skilled manpower for the industry. These institutes are also necessary to upgrade the existing industry with modern and latest technology along with required skill set to operate that technology.

### 2.3.1 Technical Education and Vocational Training Authority (TEVTA)

Technical Education and Vocational Training Authority (TEVTA) was founded in 1999 with the mission to enhance global competitiveness of Punjab through a quality and productive workforce by developing demand driven, standardized, dynamic and integrated technical education and vocational training services. TEVTA has 129 Training Institutes, 18 Service Centres and 07 Apprenticeship Training Centres throughout Punjab. In Sialkot, TEVTA has a Regional Directorate of Apprenticeship Training Centre (DATC).

**Metal Industries Development Centre (MIDC)** was established during 1941 in Sialkot by the British Government to strengthen the institutional setup of the surgical cluster. Initially, MIDC remained very active in providing technical assistance and common facilities to the surgical cluster, however, the Centre lost its effectiveness due to limited human resource capacities and absence of latest machinery. At present, MIDC is working under the administrative control of Technical Education & Vocational Training Authority (TEVTA), Government of Punjab.



**Institute of Surgical Technology (IST)** has been established in the premises of MIDC, Sialkot with the aim of providing technical training for the surgical cluster. IST is working under the administrative control of MIDC, TEVTA, Government of Punjab. Currently, IST is offering courses in computer applications and Auto CAD (2D+3D). The students are paid a monthly stipend for the training period. Since surgical specific procurement of machinery for the institute is under process, therefore no visible contribution on the part of IST in terms of surgical cluster related trainings are observed.

### 2.3.2 Punjab Vocational Training Centre (PVTC)

Punjab Vocational Training Council (PVTC) was established in 1998 on Public Private Partnership mode by the Government of Punjab. PVTC offers various vocational trainings in collaboration with GIZ (German Development Agency), Punjab Skills Development Fund (PSDF), United Nations International Children's Education Fund (UNICEF), Japan International Corporate Agency (JICA), British Council, and other National and International Development Agencies. PVTC is providing vocational trainings in more than 100 trades, which cover industrial, agriculture, health and service sectors. PVTC has 326 Vocational Training Institutes (VTIs) throughout the Punjab with an annual training capacity of 160,000 trainees per annum. These VTIs are managed by the Autonomous Boards of potential employers. Up till 2017, more than 440,000 trainees have successfully graduated from PVTC, out of which about 74% have been gainfully employed or are working as entrepreneurs. PVTC has a Teacher Training Institute (STTI) to train its trainers both in the pedagogical skills as well as in their skills up-gradation.

VTI Sialkot is not offering any specific surgical related courses, however, general courses such as web designing, Auto-CAD and Machinist partially cater to the needs of the surgical cluster. VTI, Sialkot offers six months vocational training along with two months internship programme. The students are accommodated with monthly stipends for the training period.

### 2.3.3 Punjab Skills Development Fund (PSDF)

Punjab Skills Development Fund (PSDF) is a not-for-profit company set up under the Companies Ordinance, 1984 by the Government of Punjab; it was established in 2010 in collaboration with the Department for International Development, UK. Up till 2017, PSDF has trained 150,000 youth in over 200 trades and it works with over 250 private and public-sector training providers. PSDF is also focusing on establishing a training market, which responds to the training needs of individuals and various industrial sectors. However, PSDF has not collaborated so far with any surgical company or service provider to address the prevailing issues of labor shortage in the surgical cluster.

### 2.3.4 National Vocational & Technical Training Commission (NAVTTTC)

National Vocational & Technical Training Commission (NAVTTTC) was established in December, 2005 as an apex body for Technical & Vocational Training and is attached with the Prime Minister's Secretariat. NAVTTTC works under the Ministry of Federal Education and Professional Training. NAVTTTC facilitates, regulates and provides policy direction for skill development in Pakistan. NAVTTTC is responsible for setting-up of national occupational skills standards, development of curriculum, national qualification framework, labor market information analysis, training of trainers, public private partnership and setting-up of institutional standards for TVET providers. Since its inception, NAVTTTC has taken several interventions for reforming TVET sector in Pakistan. As a first step, it evolved a National Skills Strategy (NSS) in consultation with all the stakeholders including chamber of commerce, employers, academia policy makers and donors. The NSS provides a comprehensive action plan for revamping of TVET in the country. Several actions have already been taken, which include development of national qualifications system for teachers, code of conduct, accreditation system, skill standards and curriculum in priority areas.

## 2.4 Private Business Development Service Providers (P-BDSPs)

### 2.4.1 Med Expert

Med Expert is a private Business Development Service Provider working in Sialkot. Med Expert is providing consultancy services related to CE Marking (Class 1), ISO 9001, ISO 13485, Medical Devices Technical Documentation and provides information related to registration of medical devices with the health authorities/departments in the countries of export.

Following table 2.1 shows different services required by the cluster in terms of providers, recipient and payee against the services.

<b>Service / Function</b>	<b>Provider</b>	<b>Recipient</b>	<b>Who pays?</b>	<b>Mechanism</b>
<b>R&amp;D services</b>	Cluster Companies	Cluster Companies	Cluster Companies	Buyer provide samples to the cluster companies
<b>Testing and laboratory services</b>	SIMTEL and PCSIR	Cluster Companies	Cluster Companies	Manufacturer provide the samples for testing and labs provide with test reports on materials specification
<b>Upgrading services</b>	Foreign manufacturers/local machinery indenters	Cluster Companies	Cluster Companies	Manufacturers either purchase directly from abroad or through local indenters
<b>Skills development service</b>	TEVTA, PVTC, MIDC	Cluster Companies	Government	Vocational training institutes develop semi-skilled workers to be inducted by the companies
<b>Financial services</b>	Commercial Banks	Cluster Companies	Cluster Companies	Commercial banks operate in line with the SBP policy and regulations
<b>Management consulting services</b>	Individual Consultants	Cluster Companies	Cluster Companies	Factories engage individual consultants mainly to fulfill certification requirements such as documentation
<b>Product and Market development</b>	Cluster Companies	Cluster Companies	Cluster Companies	Cluster companies carry out this job individually



<b>Export services</b>	Cluster Companies/TDAP	Cluster Companies	Cluster Companies	TDAP provides facilitation and subsidies to participate in int'l exhibitions
<b>Non-financial investment support services</b>	Cluster Companies	Cluster Companies	Cluster Companies	Mainly carried out by the cluster companies using their own resources
<b>Standard and certification (national, international, ISO series)</b>	SGS, BVC, Others	Cluster Companies	Cluster Companies	As per international practices set by the accreditation bodies
<b>Insurance services</b>	Insurance Companies	Cluster Companies	Cluster Companies	Insurance mainly for the export goods
<b>Logistics</b>	Transportation Companies	Cluster Companies	Cluster Companies	Cluster companies engage logistics companies as needed
<b>Management support for implementing upgrading measures</b>	Individual consultants/ Donor agencies/public sector projects	Cluster Companies	Cluster Companies	Depending upon the type of project activities and interest of the top management of cluster companies

## 2.5 Donor Agencies

### 2.5.1 United Nations Industrial Development Organization (UNIDO)

United Nations Industrial Development Organization (UNIDO) is the specialized agency of the United Nations that promotes industrial development for poverty reduction, inclusive globalization and environmental sustainability. UNIDO has supported Pakistan in building capacity at the level of clusters of enterprises such as fans, surgical equipment, protective gear (boots and gloves), cutlery and also for agriculture products such as fisheries, mangoes and kinnows. UNIDO had carried out a benchmarking study for the surgical cluster in collaboration with NPO. The report is based on the data of 80 surgical instruments units using the Competitiveness Benchmarking System Tool. The study has highlighted key issues pertaining to the Surgical Instrument sector in terms of Poor Branding Practices, Production Management, Quality Assurance, Performance Measurements, Energy Requirements and Consumption Patterns, IT Infrastructure and Applications, Technology Availability, CSR, Personnel Training and Development Needs.

## 2.6 Certification Bodies

In Sialkot, 07 certification bodies are working. The detail is shown in Table – 2.2:

Table – 2.2 Certifying Bodies working in Sialkot		
Sr. No.	Certification Bodies	Certifications Offered
i.	SGS	Quality Management Certification (ISO 9001), Food Safety Management (ISO 22000), Environmental Management Certification (ISO 14001), Health & Safety Management Certification (OHSAS 18001), Information Security Management Certification (ISO 27001), Food Safety System Certification (FSSC 22000), Hazard Analysis and Critical Control Points (HACCP), Halal Food Management System (PS3733), International Featured Standard (IFS), British Retail Consortium (BRC) Standards
ii.	ISOQAR Pakistan	ISO 9001, ISO 14001, Health & Safety Management Certification (OHSAS 18001), IT Service Management (ISO 20000), ISO 22000, Business Continuity Management Certification (ISO 22301), ISO 27001, Energy Management (ISO 50001), Quality Management for Oil & Gas (ISO 29001), FSSC 22000, BRC Food Safety Standard, ISO 20121, BS EN 1090 (CE Marking) Structural Steel
iii.	QA International	ISO 14001
iv.	RINA Spa	ISO 9001, ISO 14001, ISO 50001, CE Marking, Climate Change Certification, Food Certification, Personnel Certification, Green Building Certification, Railway Certification
v.	Moody International	ISO 9001, ISO 14001, OHSAS 18001, ISO 50001, ISO 22301, Antibribery Certifications (ISO 37001), Information Security Certification (ISO 27001)
vi.	Bureau Veritas Pakistan Pvt. Ltd.	ISO 9001, ISO 14001, OHSAS 18001, ISO 50001, ISO 22301, ISO 37001, ISO 27001
vii.	QS Certifications	Quality Scheme (QS 9000)

## 2.7 Banks / Financial Institutions

The State Bank of Pakistan (SBP) is authorized to work as the ‘Central Bank’ of Pakistan under the State Bank of Pakistan Act, 1956. Under this Act, the SBP has the powers to regulate the monetary and credit system of Pakistan and to raise its growth in the best national interest for securing financial stability and complete utilization of the country’s productive resources. The SBP has two divisions, **i) SBP-Banking Services Corporation (SBP-BSC), and ii) National Institute of Banking and Finance (NIBAF).** SBP-BSC handles currency and credit management, facilitates the inter-bank settlement system and carries out operational work relating to development finance, management of public debt, foreign exchange operations and export refinance. NIBAF provides executive development trainings to new and old employees of SBP.



There are 34 commercial banks operating in Pakistan under State Bank of Pakistan. The branch network position of these banks is shown in Table – 2.3:

<b>Table – 2.3</b>		
<b>Number of Banks with Branches operating in Pakistan</b>		
<b>(As on December, 2016)</b>		
<b>Type of Bank</b>	<b>No. of Banks</b>	<b>No. of Branches</b>
Pakistani Banks	30	12,983
Foreign Banks	4	10
<b>Total</b>	<b>34</b>	<b>12,993</b>
Public Sector	Commercial	2,347
	Specialized	628
Private Sector	21	10,008

*Source: State Bank of Pakistan*



## 3. Cluster Assessment

### 3.1 Recent Trends in Surgical Cluster

This section depicts recent trends for Sialkot surgical cluster about various parameters including sales, profits, exports, number of markets, customer satisfaction, production capacity, number of products, prices, returns, rejects, debts, fixed assets, working capital, credit, taxes paid, inventory levels, employee turnover, blue collar & white collar, males and females. Due to sensitive nature of some of the parameters, there was limited response from the companies. However, the overall responses from companies are robust enough depicting an actual picture of the aforesaid trends.

According to the survey results, **sales** volume of 47.5% of the cluster companies increased due to the fact that companies are striving to diversify their products and markets. Moreover, 35% companies show a decreasing sales trend due to increased cost of production and ever increasing stringent export market requirements and legislations in the countries of export. In addition, 17.5% of the cluster companies show no change in their sales. There is a prevailing belief in the cluster that companies with increased sales volume have actually cut into the customer base of the companies showing a decrease in sales volume. However, some companies are putting substantial efforts to enhance their market share through product and market diversification. Similarly **profit** margins of 62.5% of the companies have decreased due to price war among the cluster companies and increased cost of production, despite steady growth in sales volume, while 32.5% showed no change in their profit margins. However, only 5% of the companies have witnessed an increase in their profit margins due to higher quality and price of their products. Over the last three years, the cost of production factors such as labor, energy, raw materials, etc. have increased along with manifold increase in the cost of transportation. For instance, minimum wage rate in Pakistan has increased from PKR 13, 000 in 2015 to PKR 15, 000 in 2017.

**Exports** of 39.5% companies have decreased in terms of value as export market requirements in terms of non-tariff barriers are changing thereby leading to higher costs to meet such requirements. Also delay and non-repayment of export rebates (ranging from 5 to 7%) are creating hurdles for the companies to re-invest in technology and business expansion. 10.5% of the respondent companies show no change in their exports. The export volume of 50% of the respondent companies increased since these companies have enhanced production proportion of single use items as compared to the re-useable items. The single use items normally consist of medium to large order quantities and lower unit price as compared to the small order quantities of re-useable items with higher unit price. Due to this reason, the sales volume and revenues of companies are increasing but their profit margins are squeezing.

In addition, the exports of 40% of the companies have increased with the exploration of new markets such as Russian Federation, Far East and Africa hence increasing their **number of markets**. Some companies (32.5%) showed no change in their number of markets/customers, such companies either used long term contracts with fixed number of customers or they didn't pursue market diversification strategies.

It has been revealed in the survey that 20.5% of the companies showed an increase in their **number of products** while 23.1% showed decrease in their number of products. The companies with decreased number of products are either concentrating their efforts to specialize in fewer product ranges or losing the export market share. The number of products of 56.4% of the companies is stagnant as most of the companies are manufacturing only traditional instruments due to lack of research & development. They rely on the design and specifications provided by their customers and the prices of those instruments are either constant (48.7%) or decreasing (7%).

Moreover, 43.6% are witnessing a decrease in their prices due to price war among the cluster companies.

**Debts** of 95.8% of the companies are found to have no change as they are not acquiring credit facilities from any financial institution. Only 4.2% of the companies showed increase in their debts.

The survey result depicts that **taxes paid** by 61% of the cluster companies is increasing due to the implementation of new duties and taxes on the import of raw materials and machinery. 16.7% of the cluster companies show decrease in their taxes paid as they are losing their business in the international market while 22.2% of the companies show no change in their taxes paid. 55% of the cluster companies show an increased trend in their **employee turnover**. This is due to the reason that the skills are not being transferred to the new generation as people are preferring to adopt alternate ways of earnings instead of coming towards the surgical sector. It is important to mention here that the surgical cluster competes with other industrial clusters such as leather garments, protective gear, sports goods and ready-made garments present in Sialkot to attract and retain the labor force. Since working conditions are generally better in other clusters as compared to the shop floors in surgical companies, therefore the surgical cluster is facing challenges to attract the fresh workforce. 45% of the cluster companies show no change in their employee turnover while none of the companies show a decreasing trend in their employee turnover.

Responses in terms of percentages to the parameters by the surveyed companies are shown in Figure – 3.1.

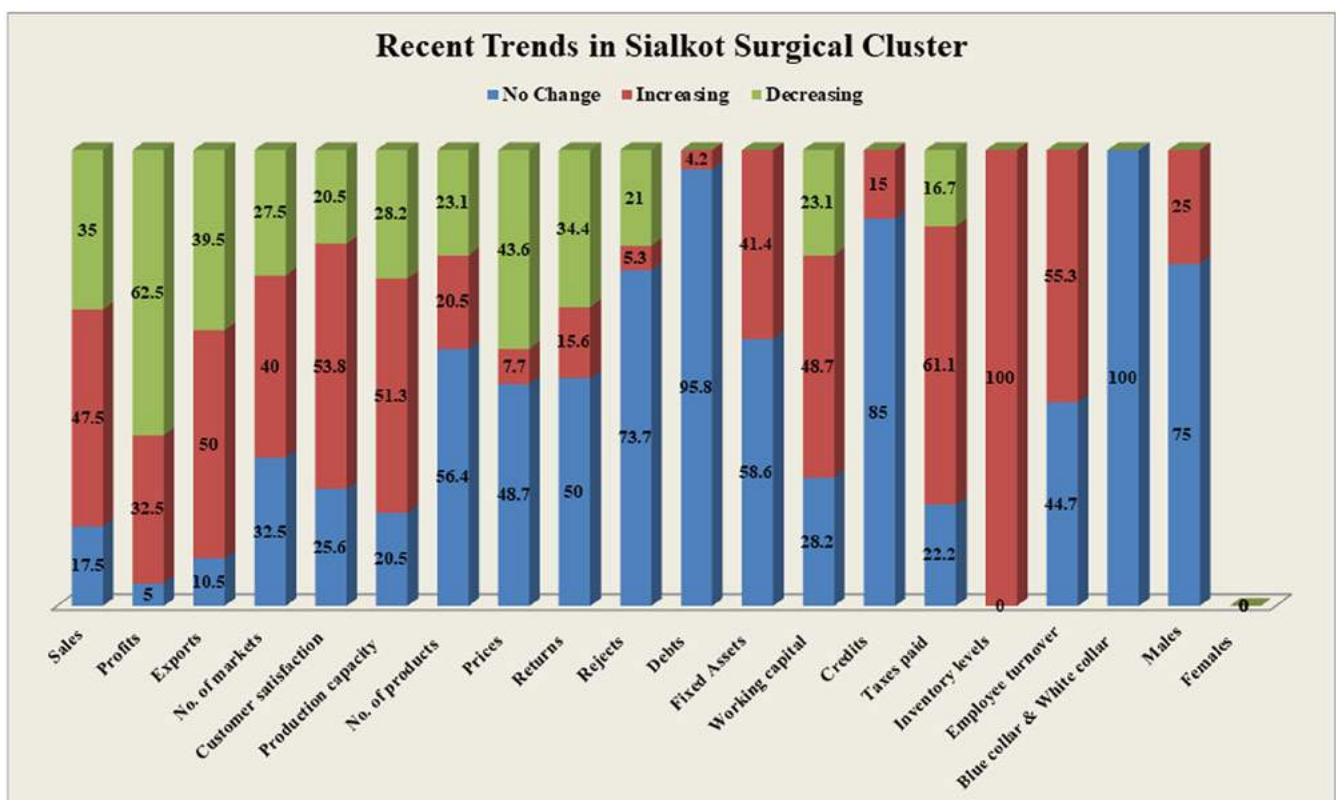






Figure 3.1

### 3.2 Production Processes & Flow Chart

The production processes of surgical instrument manufacturing are shown in Table – 3.1.






Table – 3.1 Production Processes								
Process #	Process Description	Detail of Process and inspections	Machines, Instruments and Chemicals required	Small	Medium	Large	Traders	Vendors / Outsource
1.	<p>Steel Purchase</p> 	Supplier selection to whom steel is to be purchased, sample evaluation etc.	Vernier Caliper, Measuring Roll, Measuring Gauge	✓	✓	✓	✓	
2.	<p>Receiving 100% Inspection</p>	Visual Inspection of Steel, steel ingredient analysis	Checking of seven elements for standardization	✓	✓	✓		✓
3.	<p>Forging</p> 	Forging is the process of shaping malleable metals by means of hammers and presses.	Forging Hammers and Presses.					✓
4.	<p>Trimming</p> 	A process to remove scale from the metal surface and deburr the metal forgings from 'flash' on the sides of the instruments formed during the forging process.	Trimming Die, Eccentric Press, Shot Blasting Machine					✓
5.	<p>Annealing</p> 	During the forging process the metal due to high temperature exposure and rapid cooling becomes hard and brittle. To relieve the stresses from the forged instrument, the instrument is annealed by maintaining the forgings at a known temperature to homogenize metastable condition and to soften the metal.	Brick Furnaces					✓





6.	<p>Milling &amp; Machining</p> 	<p>A Process to Mill the surface area where required for fitting of the two parts of instruments</p>	<p>Milling Machine, Milling Cutters, Milling Drills.</p>			✓		✓
7.	<p>Filing &amp; Fitting</p> 	<p>A Process to fit two parts of instruments each other and to make a shape of instruments accurate.</p>	<p>File, Grinding Wheel</p>		✓	✓		✓
8.	<p>Receiving 100 % Inspection</p> 	<p>A process to inspect and measure the dimensions of the instruments, visual inspection for pits and cracks etc.</p>	<p>Vernier, Scale, Measuring Gauge, etc.</p>		✓	✓		✓
9.	<p>Heat Treatment</p> 	<p>A process to reduce the temper of the instruments for polishing process</p>	<p>Vacuum Furnace, Air Quenching etc.</p>			✓		✓
10.	<p>Grinding</p> 	<p>A Process to reduce the unevenness of the surface of the instruments.</p>	<p>Electric Machine, Grinding Belts etc.</p>		✓	✓		✓



11.	<p>Assembling/Setting/ Fitting</p> 	<p>A process of joining two or more parts of one instruments each other and adjusting for accurate function of the instrument.</p>	<p>Small Hammer, Files, Drill Machine, Grinding wheel, Screw Driver</p>		✓	✓		✓
12.	<p>Sand Blast</p> 	<p>A chemical Process on instruments by dipping into chemical by use of Direct electric current to make the surface of the instrument more shinny and even.</p>	<p>Direct Electric Current Plant, Phosphoric Acid and Sulphuric Acid and Glycerine</p>		✓	✓		✓
13.	<p>Polishing</p> 	<p>A process to make surface of the instruments smooth and even from all areas</p>	<p>Polishing Machine, Polishing Wheel, Pink Lustre, White Lustre etc.</p>	✓	✓	✓		✓
14.	<p>Q.C Inspection 2%</p> 	<p>A process for random inspection to ensure accurate quality</p>	<p>Vernier Caliper, Foot Roll, Measuring Gauge, etc.</p>	✓	✓	✓	✓	
15.	<p>Ultrasonic Cleaning</p> 	<p>A process to remove all type of dust particles, lustre impurities from the surface and from the inner parts of the instruments.</p>	<p>Ultrasonic Machine, Triklone</p>	✓	✓	✓		✓



16.	<p>Lubrication</p> 	A process to lubricate the joint parts for free moving	Paraffin Oil / Surgical Grade Oil	✓	✓	✓		✓
17.	<p>Tuck Check</p> 	A process to check the scratch, pitting etc. on the surface of instruments						
18.	<p>Setting</p> 	A process to make accuracy in functioning of the instruments by adjustment and setting.	Files, Grinding Machines, Hammers, Screw Drivers, Punching Pin.	✓	✓	✓		✓
19.	<p>Boil test</p>	A process to check and extract the rust particles from inner side of the instruments to the surface	Heating arrangements and Water.	✓	✓	✓		✓
20.	<p>Passivation</p> 	A process to remove rust particles from the instruments.	Chemical and Water	✓	✓	✓		✓
21.	<p>Final-Polishing</p> 	A Process to make final finish of the instruments with very smooth surface.	Polishing Machine, Polishing Wheel, Pink Lustre, White Lustre, Cotton Brush Wheel etc.	✓	✓	✓		✓
22.	<p>Etching / Stamping</p> 	A process for marking the devices with code #, logos, etc. by chemical means	Electric Etching Machine, Cleaning and Alkaline Chemical	✓	✓	✓	✓	

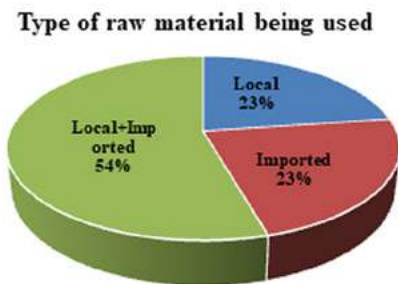


23.	<p>Cleaning and Checking</p> 	A process to clean the instrument by soft cloth, and checking of functioning of the instrument	Soft piece of cloth cotton gloves,	✓	✓	✓	✓	
24.	<p>Final Inspection 100%</p> 	Checking of instruments, surface finish, sizes, functioning, evenness etc.	Vernier Caliper, Foot Roller, Master Sample, etc.	✓	✓	✓	✓	
25.	<p>Q.A. Inspection 4%</p> 	A process for random inspection to ensure accurate quality	Vernier Caliper, Scale, Measuring Gauge, etc.	✓	✓	✓	✓	
26.	<p>Packing &amp; Labelling</p> 	Packing of instruments in polythene bag /cardboard boxing and cartons and labelling of instruments with lot number device name etc.	Packing Machine, Label	✓	✓	✓	✓	
27.	<p>Storage</p> 	All the packed devices stored in the storeroom for completion of total order.	Nil	✓	✓	✓	✓	
28.	<p>Distribution / Shipping</p>	A process of export of the instruments by means of shipments through air or sea		✓	✓	✓	✓	

### 3.3 Raw Materials

Cluster companies in Sialkot are producing surgical instruments mainly for international brands. The raw materials used in the production of surgical instruments are specified by the customers. Since the use of the surgical instruments has varied degree of sensitivity so are the requirements of materials to produce these instruments. In this perspective, the raw materials used in the production of surgical instruments are subject to stringent material quality testing and quality controls.

Survey results revealed that 23% firms are using local raw materials; 23% firms are using imported raw material for production of surgical instruments and 54% firms are using both local and imported raw materials (Figure – 3.2). It is important to bear in mind the distinction between single use and re-useable surgical instruments and different requirements of raw materials to produce them accordingly. Since the useful life of single use instruments is limited to one time use only, therefore the customers' requirement includes the lowest possible price for such instruments, thereby forming a preference of using cheaper raw materials. These cheaper raw materials are locally available and constitute around 60% of the total raw materials usage. There are around 50 domestic suppliers in Sialkot and allied cities for supply of local and imported raw materials to production firms.



*Figure 3.2*

Steel is imported both by steel suppliers / traders and production firms. Generally, large firms directly import steel whereas small / medium firms meet their imported steel requirements from domestic suppliers / traders. The large surgical manufacturing companies place bulk order raw material orders for the sake of cost effectiveness and sell the surplus raw materials in the local market. Around 35% firms purchase imported raw material from domestic suppliers / traders / firms. The production firms directly import raw materials from different countries including, ~33% from Japan, ~23% from China, ~20% from France and ~17% from Germany (including forging).

While inquiring the problems of the firms related to provision of raw material, 50% firms expressed satisfaction on availability, quality and price of local and imported raw materials, however 35% firms showed dissatisfaction as to fluctuation in prices of local and imported raw materials and batch-to batch variations in composition and sizes of local raw materials. It is important to note that, if the companies have not maintained significant level of inventories of raw materials, the likelihood of price fluctuations in the raw materials between the duration of order taking and order execution could result in order re-negotiations, squeeze in profit margins, order cancellation and customer loss. On the other hand, keeping higher level of inventories involve higher opportunity cost, especially for the SMEs. None of the firms mentioned any problem related to quality, price and availability of imported raw material, however, a few firms highlighted problems in custom clearance and import duties on the import of raw material.

Most of the surgical manufacturers have been maintaining long term relationships with the suppliers to create a mutually rewarding experience in terms of quality, price and flexibility. As a result of this long-term relationship between the raw material suppliers and instrument manufacturers, they facilitate each other for the short-term credits.

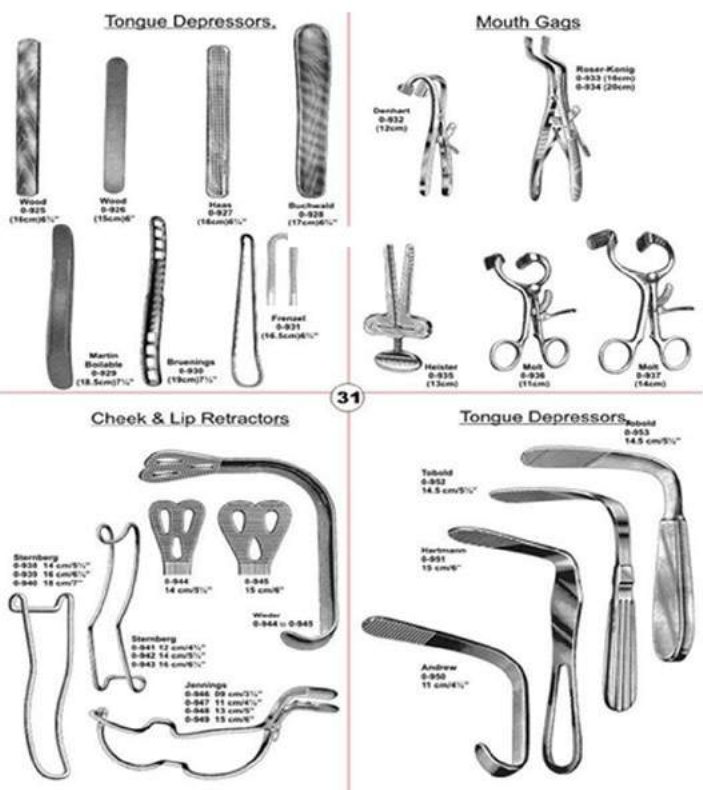
The detailed inputs used for production of surgical instruments can be outlined as shown in Table – 3.2:

Table - 3.2 Inputs used for production of Surgical Instruments (HS 9018)	
Stainless Steel Sheets and Strips (AISI 410 & 420)	Hot Rolled Stainless Steel Bars
Compositions and Salts	Grinding Belts
Emery Powder	Trichloroethylene
Felt Mops	Satin Finishing Wheels
Granules and Flakes from Gloss Powder	Grinding Wheels
Electroplating Polishes	Emery Grains
Electropolishing Chemicals	

### 3.4 Production Detail

The production process of surgical instruments involves low to medium tech machinery and equipment along with very specialized workmanship skills.

During interviews, it was found that ~50% firms have production plans, ~42% firms don't have production plans and the remaining 8% either have informal production plans or use the customer orders as their production plans. On further analysis, it has been found that the large firms established production planning and control departments to carry out the function of production planning. These departments receive orders or forecast data from marketing personnel and then develop a master production plan. These production plans are then distributed to other departments such as stores to check the existing inventory levels, procurement to place raw material orders, production to assess the production requirements in terms of machinery, equipment and workforce. Since the small firms have not established proper production planning departments, therefore these firms strive to collect resources on the basis of customer orders. In such cases, frequent delivery delays and quality issues occur on the part of such manufacturers.



Sialkot surgical cluster is a good example of nearly perfect market competition where external transaction costs are competitive due to substantial increase in the number of vendor companies over the period, thereby minimizing opportunistic behavior on the part of vendor companies. Therefore, outsourcing of core processes to the vendor companies is a widespread phenomenon in the surgical cluster.

Almost all companies are outsourcing the forging process to the vendor industry in Sialkot and Daska. The only reason for internalizing processes, other than forging, of 19% companies is related to the quality consciousness, ~14% firms perform both in-house and outsourced operations in equal proportion, ~35% firms mainly outsource their production and some perform in-house whereas ~8% firms completely outsource their production processes (Figure – 3.3). Another reason to outsource the process is the discretion / choice of labor which is more likely to work on contractual basis instead of salary.

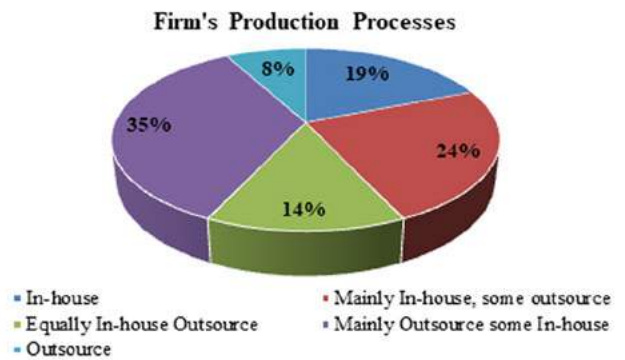


Figure 3.3

In terms of availability of factors of production to execute the orders, there have been no issues recorded. However, production quantity of the firms has been affected due to variation in demand by international buyers.

As far as production capacity utilization is concerned, ~70% firms are utilizing from 81% to 100% whereas 30% firms from 61% to 80%. There is no firm utilizing production capacity below 60%. The higher level of production capacity utilization is enforcing the argument that external transactional costs have been minimized due to huge vendor base competing with each other to retain customers at competitive prices.

The cluster companies have developed production flow charts to comply with the certification requirements. The companies do not calculate their production and procurement lead times due to lack of awareness as to the contemporary production concepts, tools and techniques and Performance Management System (PMS) in terms of departmental Key Performance Indicators (KPIs). We will discuss in detail the prevailing level of implementation of PMS in surgical cluster later on.

### 3.5 Technology

In Sialkot, the surgical production cluster companies use low to medium technology in operations such as forging, heat treatment, machining, annealing, ultrasonic cleaning, sand blasting and then highly skilled labor in operations such as filing, grinding, polishing, fitting and quality inspection.

Local and imported (mostly refurbished) machinery is used by cluster companies to perform machine based operations. There are ~85% firms using imported machinery particularly refurbished and ~15% firms are using both local and imported machinery (Figure – 3.4). Most of the companies prefer to induct refurbished machines and equipment as compared to the high tech imported machines due to prevailing price difference vis-à-vis availability of cheap labor to operate the refurbished machines. Generally, the firms purchase imported machinery from local suppliers in Sialkot, Daska, Gujranwala and Lahore, and in some cases, import directly. The imported machinery from China, USA and Japan

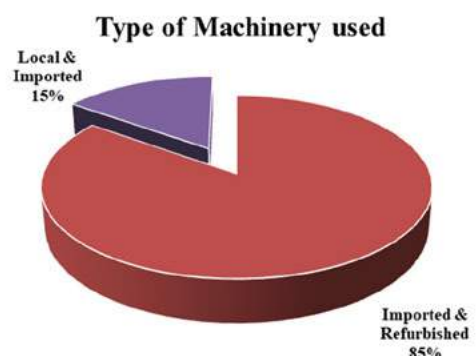


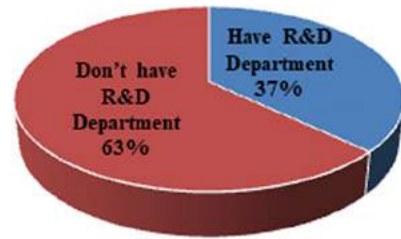
Figure 3.4

is used preferably in the cluster. It was pointed out during the survey that firms don't frequently change / upgrade their existing machinery. The firms using local machinery meet their demand from Gujranwala, Daska and Lahore. The local machinery is cheaper in price as compared to imported machinery. However, imported machinery is able to produce consistent quality products with precision and minimal rejections.

### 3.6 Innovation and Research & Development

Survey result shows that 63% firms do not have R&D departments, whereas R&D departments exist in 37% of the responding firms (Figure – 3.5). It is important to comprehend the underlying reasons causing limited R&D activities on the part of surgical instruments manufacturers. Foremost is that more than 80% surgical cluster companies rely on the cottage and small vendors for the production of surgical instruments. There are more than 3,000 vendors working for all types of exporters such as principal firms, medium firms and exporters/traders.

**Firm's Trend towards R&D Department**



*Figure 3.5*

Traders/exporters mainly perform inspection and packing activities in-house while they outsource all the other production processes to the vendors. The vendor base can be further divided based on the production processes. Due to this division of labor in the vendor base and the very small scale of their facility, it is extremely difficult for the exporters/traders (more than 50% of total cluster firms) to realize innovative ideas using the concurrent engineering approach where all the relevant process owners can meet to discuss the possibility of designing and product development. Also, exporters and traders are price chasers, they are not interested in innovation and new products. Therefore, the overall function of innovation/R&D is globally divided. This means that mostly branded firms are setting the pattern and design of new products. The exporters are the link between design and production so the firms don't feel it necessary to make extra expenditure on R&D.

Firms having R&D departments are more concerned in obtaining new orders than producing new products. Among them, 47% firms do R&D in process improvement, 7% firms in product & market development, and 40% in both product development & process improvement. None of the firms has collaboration with R&D institutions such as PCSIR, MIDC, SIMTEL and engineering universities. Since the cluster firms are only producing as per customer requirements or reverse engineering, therefore matters related to Intellectual Property Rights (IPR) do not come into play. Furthermore, IPR enforcement in Pakistan is weak further deteriorating the possibilities of R&D related activities. While inquiring about maintaining of record of upgrading / diversifying of firm's process / product from the firms who have R&D department, 47% firms responded that they have maintained records for future reference, 47% firms didn't maintain any record and 6% firms maintained it informally.

In a nutshell, product innovation needs investment in R&D and strong collaboration with research centres, universities and industry, as well as a well-coordinated information flow along the supply chain; these aspects are extremely weak in the cluster.

### 3.7 Marketing & Market Analysis

The marketing strategy of this cluster is almost similar in nature. More than 80% of the large-scale firms have their sub offices in importing countries to get orders and to remain in contact with international importers. The most widely used practices to get business from international buyers are personal coordination with the customers and participation in international exhibitions & trade fairs. These frequent visits and participations in international exhibitions enable the cluster firms to introduce their products in the international market. Generally, large and medium scale producers participate in exhibitions. The small-scale firms have limited participation level in the int'l exhibitions due to budgetary constraints and marketing skills required for such activities. Cluster firms are now adopting e-commerce tools to exploit the export potential. The survey result shows that ~70% firms market their products through the internet and participation in exhibitions and ~30% firms get orders through their personal relations.



During the study, the following types of sales channels have been observed:



Figure 3.6

The survey result depicts that the 5 largest export markets of interviewed firms include USA, EU, Japan, Middle East and China. This fact underpins the importance of market diversification vis-à-vis potential to exploit regional trade with the neighboring countries.

It is very important to mention here that Pakistan is importing instruments to the tune of USD 265 Million and exporting USD 323 Million under the same HS Code. This fact highlights a good potential of import substitution. However, the surgical instruments manufacturers are not inclined to avail this opportunity due to some bitter experiences with the public sector hospitals in terms of bidding hassles and late payment procedures. All the firms are of the view that export of instruments is more profitable and hassle free than selling in the local market in general and to the public-sector hospitals in particular. In addition, developing and maintaining customer-buyer relationship with the public sector bodies is neither transparent nor long lasting. In view of the public sector hospitals, this is also worth consideration that in the absence of reliable local instruments brands, health related bodies prefer to pay more to the international suppliers of good repute for all types of instruments. In addition, the hospitals are also bound to follow the Public Procurement Rules and Regulations, which are cumbersome for the potential bidders. Therefore, only a limited number of companies participate in the bidding process. Since this cluster produces more than 60% single use instruments with low sale price and low profit margins, therefore it is not possible for surgical companies to compete in the local market with low profitability and delay in payments.

In the surgical cluster, only 32% firms have developed marketing plans whereas 52% firms have no marketing plans and 16% firms have informal marketing plans (Figure – 3.7). The cluster firms are facing serious capacity issues in the development of their marketing plans. The companies also have limited capacities analyzing the export market data continuously to identify new markets vis-à-vis penetration strategies in the existing markets. The prevailing cut throat competition as to the product pricing has been highlighted by more than 90% of the respondent firms; in fact, the cluster companies have suggested formulating strict regulations enforcing minimum price mechanism for the instruments. All indicators are pointing towards saturation of the industry and the strategic need for upgrading. Identifying new markets or minimum price may be a short-term remedy but will not create the push that is needed for functional upgrading.

Another important aspect highlighted by the respondent companies relates to the data pilferage of international customers from the custom authorities. This practice involves bribing the custom authorities to access the customers' data of rival companies and subsequently quoting lowest possible prices of instruments to these customers thereby indenting customers at the cost of cluster reput and increasing rivalry among the cluster firms. This practice has generated huge trust deficit among the cluster firms hindering the possibilities of joint actions and common well-being of the cluster stakeholders.

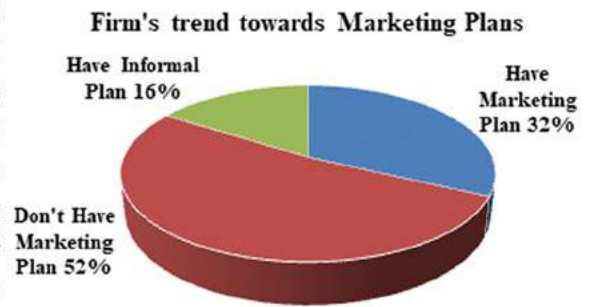


Figure 3.7

The cluster firms involved in exports are facing issues of tax rebate and refunding of sales tax from the government side. Since the firms are competing mainly on price to win customers, therefore they are also used to include tax rebates and sales tax refunding as their profit margins. The delay or non-payment of these incentives affects the companies' cash flows negatively thereby hindering the overall competitiveness vis-à-vis reinvestment into future business expansion activities. However, as the vendor base in the cluster is not directly involved in exports, therefore they are not directly affected by the problems related to tax rebates and duties.

The quality of the surgical instruments is acceptable in the international market as revealed during the survey. Indeed, 50% companies try to create comparative edge on the basis of quality of their products. However, it is reiterated on part of the companies that they have been unable so far to project the comparative edge of good quality surgical instruments of Sialkot as a brand in the international market.

### 3.8 Business Resources

The surgical cluster in Sialkot consists of family owned sole proprietorships, partnerships and in some cases limited liability companies. Business resources therefore are at the disposal of respective owners. The existence of a vision, mission and organizational objectives depends upon the leadership style of the owner(s). Although the importance of formulating and implementing a business plan can't be overemphasized as this entails future direction of the organization along with its capacity to allocate requisite resources to realize such plans.

However, there are only 16% firms in surgical cluster Sialkot who have developed business plans, 37% firms shared that they have informal business plans whereas 47% firms don't have either formal or informal business plan (Figure-3.8). In addition, the firms with no business plans or having informal business plans shared that they lack the capacity and resources to develop and implement business plans.

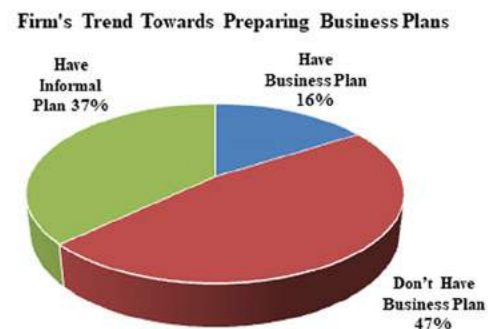
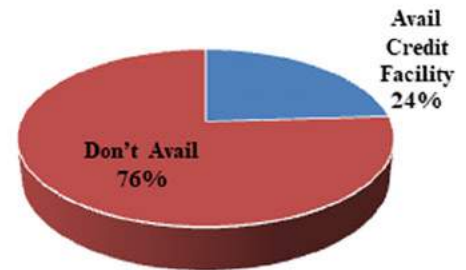


Figure 3.8

It is very important to mention that including the large and medium size firms, the surgical cluster companies in Sialkot are not well aware about the formal techniques of productivity improvement, marketing and performance management systems. In the absence of these practices, the firms have not been able to identify the efficiency and effectiveness of their resource utilization.

The firms in the surgical cluster of Sialkot don't prefer to avail loan / credit facility from banks. Only 24% firms shared that they avail credit facility from banks, whereas 76% firms responded that they don't avail any assistance from banks in meeting their financial needs (Figure - 3.9). Mainly three issues have been noticed discouraging SMEs to avail access to finance. These issues in terms of priority are high interest rates, mortgage requirements and cumbersome procedures. Therefore, they meet their financial needs from personal resources.

**Firm's Trend on availing Credit from Banks**



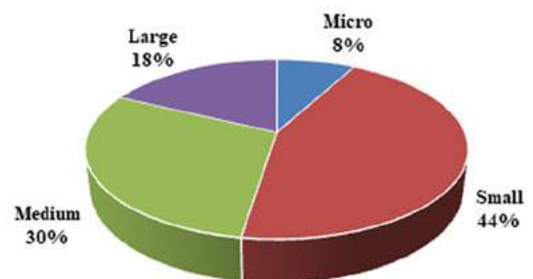
*Figure 3.9*

Most of the cluster firms are not using IT based solutions such as Enterprise Resource Planner (ERP) to control business operation areas. The survey result shows that only 22% of respondent firms use standardized or customized modules of software for inventory management and accounting and finance, whereas 78% firms are controlling their business operations manually or electronically through computers using spreadsheets. Large size enterprises where the complexities of controlling the operations through conventional techniques pose high risks of leakages are now moving towards IT based solutions. The medium and small size enterprises where the scale of operations is small and relatively easy to manage using the conventional and free of cost software like MS office are not inclined to invest in high cost IT solutions. IT based high cost solutions are not one-time investments, rather they require a dedicated team for their effective functioning and maintenance.

### 3.9 Human Resource

During the survey, 8% micro (1-10 employees), 44% small (11-50 employees), 30% medium (51-250 employees) and 18% large firms (250+ employees) have been visited and interviewed to gather data / information representing all segments of the cluster supply chain (Figure - 3.10).

**Firms Visited**



*Figure 3.10*

The ratio of female workers was observed as very minimal; firms don't prefer to employ female workers. Their comprehension is that the working environment and type of work are not suitable for females.

The survey results showed that 4% firms arrange training for their workers outside their organization, 42% firms provide no training to their workers, 42% firms shared that they provide On Job Training to their workers so their work doesn't suffer. Moreover, 13% firms arranged foreign trainings for their middle management on supervisory skills (Figure - 3.11). Since a majority of the firms engage labor force on contractual basis, therefore they are not inclined to invest on the training and development of the labor. Actually, the labor moves frequently among the cluster companies depending upon the size of orders available with the companies.

If some company does not have any order for production, the labor will automatically move to another company having production orders in hand. Furthermore, there is a prevailing comprehension on the part of the principal firms that if they invest on contractual labor without having assurance of loyalty from the labor, the investment related to the training and development of the workforce will be wasted. Contrarily, this mind set keeps the potential of labor skill improvement untapped thereby impacting the labor productivity and product quality adversely.

However, all the firms desired for capacity building in processes, technology, polishing, marketing & branding. Moreover, all the firms also shared that it is becoming difficult to find skilled labor force especially for the grinding and polishing section. They are foreseeing that the scarcity of polishing workers will further weaken the output of the surgical cluster. On the other hand, during our discussion with polishers, it was revealed that the method and the environment in polishing sections are harmful for health therefore youth prefers other traits available in the market instead of polishing. During discussions with available public training institutes in Sialkot, it was also highlighted that youth doesn't prefer to enroll in surgical related training courses due to aforesaid reasons.



Figure 3.11

### 3.10 Infrastructure & Superstructure

The cluster firms have adequate space in terms of land for their business operations, but the building structures are mostly not purpose built. Assumingly, the land was gradually expanded and no professional construction / design was followed properly. Therefore, the layouts are haphazard and pose serious obstacles in the production flows. Distances among the departments are huge resulting in usage of extra labor and equipment to transfer materials from one department to the other. The poor layout also creates communication gap among the production departments, which further exacerbate the quality feedback loop. The processes are not synchronized creating line balancing losses. This is the reason that some firms are now planning to relocate their production facilities to overcome the production losses as a result of poor layouts.

Almost all the firms are operating in self-owned premises. Around 56% firms have departments to perform specific activities, 42% firms don't have departmental structures and 3% firms have informal setups. As described earlier, both local and imported machinery have been installed to carry out the production activities. However, local parts are used mostly in cases of repair of the machinery.

Main utilities such as electricity, gas, water and telecommunication are easily available. Backup generators / other sources are available in case of electricity shutdown. The power shortages have been reduced substantially during the tenure of the incumbent government therefore power availability is not an issue anymore, as per the respondent firms; however, affordability has been stressing the cost competitiveness.



*Organized Shop Floor*



*Un-Organized Shop Floor*

### 3.11 Quality Control & Corporate Social Responsibility

The cluster generally feels that improving quality and standards is extremely important. The health care industry normally places high degree of importance to the product quality and standards. The current impediments to quality control normally occur due to inadequate quality of raw material and inconsistent forging and milling. The cluster is highly reliant on the vendors with outsourcing typically varying between 30-70%. It is extremely difficult to ensure that quality is maintained at all the production stages especially those to be performed by the vendors. The overall wastage as a result of quality issues is 5% along the value chain. Large and medium firms have put in place quality check points and also have designated specialized quality control personnel to monitor their production. In micro and small firms, the owners itself ensure the quality according to specifications and drawing pattern of the instruments.

Corporate Social Responsibility (CSR) is among the weakest areas as very few companies are aware about the concept of CSR and its importance, most of the companies showed interest in implementing CSR provided it is demanded by the customer. Most of the surgical instrument manufacturers and almost all of their vendors in the supply chain are facing the issue of compliance with Corporate Social Responsibility Standards. The process of manufacturing surgical instruments involves heat and use of hazardous chemicals creating hazardous environment, which makes it hard to achieve CSR compliant environment. Only few companies can claim to be totally compliant. The larger problem lies with the vendor segment that brings a bad reputation for the entire industry.

It is also relevant to mention here that UNIDO, under TRTA-II Programme, involved some surgical cluster companies in order to implement Process Control and CSR approaches to improve productivity, quality and working conditions in the selected companies. The labor productivity in these companies was from 30-40% and defect rate more than 10%. Mostly the working conditions in the polishing and grinding sections were not conducive.

There exists a huge potential to improve quality and productivity in the surgical cluster companies through better production management practices and part of these gains realized can then be diverted to improve the working conditions in the aforesaid sections of the factory. In this way, there will be no additional financial burden on the companies to tackle the chronicle problem related to CSR.

An appreciable effort on the part of SIMAP in the form of development of model polishing workshops is underway. This can provide the industry with the bench mark polishing practices, which then can be replicated by the companies to improve their in-house grinding and polishing sections.

During our interaction with more than 40 firms including large firms to vendors, no instance of child labor has been observed.

### 3.12 Competitors & Competition

In Sialkot, the surgical instrument industry is highly labor intensive. The competitive advantage of Pakistan's industry is the low wage rates. The competitors can be classified into two segments, i) local competitors, and ii) international competitors.

At the local level, almost all the interviewed firms shared that their main competitors are located within Sialkot city. There is a unique mindset in this cluster that majority of producers do not feel any significant pressure from producers all around the world and think that they have no competitors. Local competition strengthens regional clusters but in case of the Sialkot surgical cluster, the local competition has an adverse impact on the cluster companies because there exists a price war among the cluster companies that has led to cut-throat competition hence affecting the business of companies badly.

Internationally, India and China are the closest locations with similar labor conditions and somewhat relevant expertise in the industry. Other international players are in USA and Europe, which are the leading buyers of surgical instruments, but they have much higher labor costs and are currently positioned as the centers of quality medical instruments in the world. Upon interviewing the cluster firms, it has been revealed that a majority of the cluster firms think that India and China are the emerging competitors in the surgical instruments industry and are gaining the market share with a very fast pace. Some of the cluster firms mentioned Vietnam, Brazil, Korea, Taiwan and Thailand as their competitors.

The cluster firms believe that the competitiveness of Sialkot's surgical cluster can be enhanced both locally and internationally by reducing the cost of production, introducing new product families, improving quality and fixation of minimum price of the respective instrument in joint consensus.

### 3.13 Cluster Governance

There is only one association named 'Surgical Instruments Manufacturers Association of Pakistan' (SIMAP) that exists in Sialkot for the surgical cluster, actively engaged to safeguard the interest of cluster firms. All the export oriented firms are registered with SIMAP. It is also the requirement to get the firm registered with SIMAP to export surgical instruments. SIMAP is very active in promoting the surgical cluster, facilitating cluster firms to participate in international exhibitions & trade fairs, and raise their voice on their behalf at the national and international level. SIMAP has also allotted space to SIMTEL and PCSIR to establish material testing lab and common facility centres in order to facilitate cluster firms. In SIMTEL, material tests are conducted on subsidized rates.

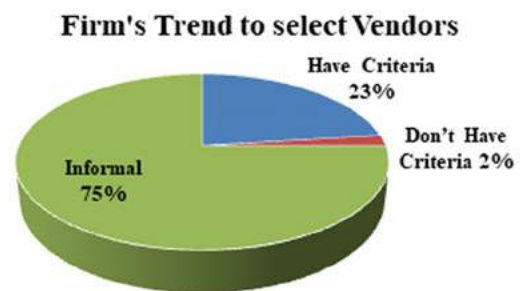


Figure 3.12

The surgical cluster Sialkot is a vendor based industry. As described earlier, a majority of the firms outsource their production processes through vendors. There are no uniform criteria followed by cluster firms to select the vendors. Around 23% firms responded that they select vendors on the basis of certain criteria, 2% firms shared that they don't follow any criteria and they select the vendors as per their choice, and 75% firms shared that they have not prepared any selection criteria but they select vendors through informal way such as previous history, personal relations, etc. (Figure – 3.12). None of the firms has any vendor development program. Generally, firms provide forged material along with drawing and specifications for further making finished instruments. However, they provide financial support to the vendors as and when needed. All the firms have stable relationship with their vendors.

While talking on supply chain issues, almost all the firms shared that there is no issue on logistics; logistics service providers are available in Sialkot and they are providing satisfactory services. On quality assurance, firms highlighted that they have to monitor it strictly, because vendors don't know about the sensitivity of the order in terms of quality and building long term relationships with international buyers. Therefore, they keep guiding the vendors about the required quality of the instruments.

### 3.14 Compliance and Certifications

Global buyers of surgical instruments demand compliance with ISO 9000 and ISO 13485. Compliance with CE Marking is a pre-requisite for accessing the European market and GMP is required by some buyers in North America and Europe. According to the survey results, surgical instruments exporters are well-informed about the requirements and processes of these certifications. Awareness about environmental and CSR certifications like ISO 14001 and SA 8000 is present to some extent. The awareness about compliance and certification requirements is extremely high in this cluster. 100% of the firms interviewed responded that they are compliant with CE Marking, GMP, ISO 9001 and ISO 13485.

Around 40% firms reported that compliance is merely achieved in terms of paper work and actual implementation of compliance requirements is weak. This scenario also reflects a tug of war among the certification bodies to increase their clientele at the cost of weaker compliance to certification requirements. The cluster companies still feel that more information and awareness is required to meet certification challenges. More than 90% of the firms stated that they would require technical assistance / training to implement in letter and spirit the certification / compliance requirements.

### 3.15 Operations Management

Among firms interviewed, only 17% firms have developed KPIs in operations management, 54% firms didn't develop KPIs and 29% informally developed performance management tools in their units (Figure – 3.13). There is little or no data collection on the part of SMEs to monitor their performance in terms of quality and productivity Key Performance Indicators. Due to the absence of statistical thinking and performance measurement, no vigilant linking of processes of a production system exists for taking into consideration the inevitability and concentration of variation.

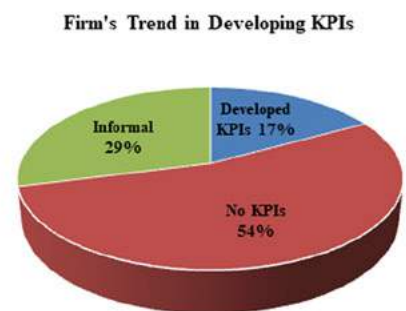


Figure 3.13

None of the cluster firms are applying modern production techniques such as lean manufacturing, total quality management, etc. More than 60% of the firms interviewed desired support / capacity building in production management (26% on productivity and 34% on grinding & polishing).

## 4. Analytical Tools Applied

### 4.1 PESTEL Analysis

In order to comprehend the macro environment factors, Political, Economic, Social, Technological, Environmental and Legal (PESTEL) Analysis is a helpful tool. The analysis carried out using the PESTEL tool can be used by organizations to understand the existing external market/business environment in order to formulate effective strategies. In addition, PESTEL analysis provides key inputs to perform the SWOT analysis.

Table – 4.1 shows some critical macroeconomic indicators for Pakistan.

<b>Indicator</b>	<b>Figure</b>	<b>Ranking</b>
<b>GDP</b>	USD 283,659.9807 Million (2016)	26 <sup>th</sup>
<b>PPP</b>	USD 1,014,180.70 Million (2016)	25 <sup>th</sup>
<b>Population</b>	193,203,476 (2016)	6 <sup>th</sup>
<b>GDP Per Capita</b>	USD1,468.19 (2016)	176 <sup>th</sup>
<b>Industrial Growth Rate</b>	5% (2017)	-
<b>GDP Contribution by Industry</b>	20% (2017)	-
<b>Labor Participation Rate</b>	53% (2014)	-
<b>Human Development Index</b>	0.55 (2015)	147 <sup>th</sup>
<b>Expected Years of Schooling</b>	8.1 years (2015)	-
<b>Primary School Dropout Rate</b>	20.4% (2015)	-
<b>Employment Rate</b>	51% (2015)	179 <sup>th</sup>
<b>Gender Inequality Index</b>	0.54 (2015)	130 <sup>th</sup>
<b>Environmental Performance Index</b>	34.58 (2014)	148 <sup>th</sup>
<b>Ease of Doing Business</b>	147 out of 190 (2017)	147 <sup>th</sup>
<b>Global Competitiveness Index</b>	115 out of 137 (2017)	115 <sup>th</sup>

#### 4.1.1 Political Factors

Since its founding in 1947, Pakistan has been one of the few countries in the developing world that have experienced an average annual growth rate of more than 5 per cent over the past 60 years. According to World Bank data in 2015, Pakistan's economic growth rate was 5.5%; GDP was 269.97 Billion US dollars, ranking 39<sup>th</sup> in the world; per capita GDP was 1429 US Dollars, ranking 153<sup>rd</sup> in the world, still belonging to the group of low-income countries. Although there are still gaps compared to other developing countries, the large economic aggregates and fast economic growth rate of Pakistan show a promising development prospects.



Pakistan is a heavily populated country in which internal political instability, phases of military dictatorship and inefficient, corrupt governmental rule have taken a toll as much as the costly confrontation with neighboring India ever since partition in 1947. The economy is dominated by services, but agriculture still plays an important role. Pakistan's most important industry is textiles, which alone represents about 60 percent of the country's exports. Since the late 1980s, Pakistan has pursued a program of market-oriented economic adjustment, reform and development. With the support of international financial institutions mainly the International Monetary Fund (IMF) and bilateral donors this program is aimed at enhancing macroeconomic stability, promoting the private sector and export-led industrial development, and reversing past neglect of key social sectors such as health, education and population planning. Specifically, the government has sought to reduce monetary and external imbalances, reduce trade barriers, modernize the financial sector, privatize state-owned industries and offer specific incentives to attract foreign investment.

Surgical cluster is one of the priority clusters due to its export potential, as mentioned in the Strategic Trade Policy Framework (STPF) 2015-18; in this regard the following incentives have been announced by the Government:

- ✓ To facilitate the “Brand & Certification Development Support” in surgical instruments, the Government will provide a matching grant to facilitate the branding and certification for faster growth of the SME and export sector in Pakistan’s economy through Intellectual Property Registration (including trade and service marks), Certification and Accreditation.
- ✓ Drawback of Local Taxes and Levies: To reduce the cost of doing business and increase the competitiveness of the value-added sectors including surgical, draw-back for local taxes and levies will be given to exporters on free on board (FOB) values of their enhanced exports if increased by 10% and beyond (over last year’s exports) at the rate of 4% on the increase. This is an ongoing initiative announced in the Budget 2014-15 which will be continued for STPF 2015-18.

#### 4.1.2 Economic Factors

An economic transformation from agriculture to higher-productivity industry and services has not occurred<sup>17</sup>. Between 1990 and 2014, the share of both agriculture and industry in output declined by about 5 percentage points each, with a corresponding increase in services<sup>18</sup>. In fiscal year (FY) 2014, agriculture accounted for 21.2% of Gross Domestic Product (GDP) and 44% of employment<sup>19</sup>; livestock accounts for over half of agricultural production. In FY 2014, manufacturing accounted for 13.4% of GDP and 14% of employment, comprising mainly textiles, as well as agro-processing, cement and chemicals. The services sector accounts for 58.4% of GDP, led by wholesale and retail trade, transport, storage and communications. The informal economy is large<sup>20</sup>.

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<sup>17</sup>ADB. 2013. Key Indicators: Asia’s Economic Transformation: Where to, How, and How Fast? Manila, and R. Amjad. 2013. Economic Management under Musharraf and Coalition Rule: Key Lessons for Sustainable Growth, in R. Amjad and S. Burki, eds. 2013. Pakistan: Moving the Economy Forward. Lahore: Lahore School of Economics.

<sup>18</sup>In FY2014, the composition of industry was manufacturing (13.4% of GDP), mining (2.9%), electricity & gas (1.7%), and construction (2.4%).

<sup>19</sup>Ministry of Finance. 2014. Pakistan Economic Survey 2013-14. Islamabad.

<sup>20</sup>Estimates of the size of the informal economy in Pakistan range from 35% to 90% of the formal economy in the 2000s.M. Arby, M. Malik, and M. Hanif. 2010. The Size of the Informal Economy in Pakistan. Karachi: State Bank of Pakistan Working Paper; and M. Kemal and A. Qasim. Undated.Precise Estimates of the Informal Economy. Islamabad: Pakistan Institute of Development Economics.

Exports are concentrated in textiles (accounting for 54% of export receipts in FY 2014) and primary agricultural products (17%)<sup>21</sup>. The country is a major exporter of rice and cotton. It has significant potential to produce and export other agricultural products (such as fruit, vegetables, and livestock), minerals (including copper, gold, lead, zinc, coal, industrial stones and quality gemstones), manufactured goods (including agro-processing, higher-value textiles, sporting goods, and surgical instruments) and services (such as information technology). The country is heavily dependent on hydrocarbon imports—oil accounts for over one third of total imports—exposing the country to periodic oil price spikes. Workers' remittances rose to \$15.8 Billion (6.5% of GDP) in FY 2014, double the level in FY 2009 and are a key source of foreign exchange earnings.

The fiscal deficit was recorded at 5.8 percent of GDP in FY 17, against the target of 3.8 percent and 4.6 percent recorded in FY 16. The primary deficit, which excludes interest payments, increased to 1.6 percent of GDP from 0.3 percent in FY 16. The revenue deficit, which excludes development expenditure, was 0.8 percent of GDP in FY 17, the same as in FY 16.

The consolidated development expenditures maintained the momentum observed during the last three years. Within these, provincial development expenditures increased sharply, likely reflecting efforts by provinces to complete various social and infrastructure uplift projects before the upcoming elections. The capital spending by the federal government was already high because of ongoing work on a number of infrastructure projects under CPEC.

### 4.1.3 Social Factors

According to the report of Asian Development Bank, Pakistan's overall poverty declined by 12.1 percentage points during FY 2001– FY 2006. Interim estimates indicate a decline of another 9.9 percentage points during FY 2006– FY 2011.

Poverty estimates in 2005 purchasing power parity prices also indicate that the proportion of population living below \$1.25 per day declined from 17.2% in 2008 to 12.7% in 2011. Cross-country comparison of poverty data during this period indicates that Pakistan performed better than India, Bangladesh and Indonesia in overall poverty reduction, but falls short of the success achieved by other regional economies (including the People's Republic of China), for which the pace of poverty reduction was faster during the initial years of reduction in poverty levels. The proportion of the population living on less than \$2/day (at 2005 purchasing power parity) declined from 88.2% in 1991 to 50.7% in 2011<sup>22</sup>. This suggests that a large number of people are clustered around the poverty line and are vulnerable to negative economic shocks<sup>23</sup>.

Pakistan ranks 146th out of 187 countries on the gender inequality index, as a result of slow progress in improving literacy levels and access to economic opportunities, a high maternal mortality rate and weak enforcement of laws and policies to protect women<sup>24</sup>. Gender disparities between regional, urban and rural areas are pronounced.

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<sup>21</sup>The country's share of world exports fell from 0.16% in 1990 to 0.13% in 2014; in comparison, during the same period, India's share more than tripled and Bangladesh's quadrupled. World Trade Organization database. <http://stat.wto.org/CountryProfile/WSDBCountryPFHome.aspx>; H. Ahmed et al. 2013. Exports: Lessons from the Past and the Way Forward in R. Amjad and S. Burki, eds. (footnote 2, above); and Planning Commission. 2011. Pakistan: Framework for Economic Growth. Islamabad.

<sup>22</sup>World Bank. 2014. World Development Indicators. <http://data.worldbank.org/data-catalog/world-development-indicators>

<sup>23</sup><https://www.adb.org/sites/default/files/linked-documents/cps-pak-2015-2019-pa.pdf>

<sup>24</sup>United Nations Development Programme. 2014. Human Development Report, Sustaining Human Progress: Reducing Vulnerabilities and Building Resilience. New York.

The overall labor force participation rate for women is only 24%, much lower than that for men (81%)<sup>25</sup>. In Pakistan, around 75% of women are engaged in the agriculture sector and just 33% of men<sup>26</sup>. These are largely unskilled or semi-skilled family workers, who are unpaid or underpaid, with long working hours. This implies that women's share of the informal economy is increasing. Women's share of nonagricultural wage employment is 10.6%, below the MDG target of 14%<sup>27</sup>.

In view of the above, the surgical cluster is also facing challenges to engage and retain the labor force. Especially the women participation in the cluster is almost negligible. The cluster, after elimination of the child labor and due absence of Corporate Social Responsibility principles especially for its most labor-intensive operations such as grinding and polishing has now started feeling heat of labor shortage. In addition, structural unemployment due to the absence of coherent strategy between industry and skill development institutions is likely to exacerbate the situation in the medium to long term run.

#### 4.1.4 Technological Factors

The lack of structural transformation in Pakistan is indicative of the manufacturing sector's unsatisfactory growth performance. The manufacturing sector grew by an average 10.61% during the period 1998-2007. The growth rate in the manufacturing sector deteriorated from 14.0% in 2004 to 8.2% in 2007 and further to 5.4% in 2008. This decline in growth can be attributed to the fact that this sector continues to be heavily concentrated in low value-added consumer products such as food, beverages and textile. The industrial sector in Pakistan has failed to move into more sophisticated products such as capital goods and continues to be dominated by resource based and low technology activities. The lack of production of capital goods and an absence of upstream ancillary industries such as chemicals and engineering limits the growth potential of the industry.

The competitiveness of an economy is closely associated with the productivity of its industry, particularly at the firm level. Strong growth in productivity is essential for maintaining export share in an increasingly competitive world market. Pakistan, however, faces difficulty competing with its competitors owing to either lower factor productivity or higher worker wages. Pakistan has about the same factor productivity as Bangladesh but its wages are almost 50% higher. On the other hand, wages in Pakistan are less than China and similar to India, but factor productivity is much lower. For instance, Pakistan's labor productivity is very low in the region, only 1.21, as compared to China's 3.21 and India's 2. The labor productivity growth rate in Pakistan is also not very promising, averaging 1.25% for the period 2009 to 2013 as compared to China's 8.11% and India's 6% for the same period.

Over the past two decades, the share of low technology manufactured products increased from 54% to 76% of total exports where as that of medium technology products increased from 7.8% to 8.4%. However, high technology products remained an insignificant 0.6% of total exports. This shows that the technological sophistication in manufacturing in Pakistan continues to be low resulting in the country's exports being dominated by low technology manufactures.

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<sup>25</sup>Pakistan Bureau of Statistics. Pakistan Employment Trends 2013. <http://www.pbs.gov.pk/content/pakistanemployment-trends-2013>.

<sup>26</sup>Aga Khan University, Pakistan Medical Research Council, Pakistan Ministry of Health. 2011. National Nutrition Survey Report 2011. Karachi.

<sup>27</sup>United Nations Development Programme. 2012. Pakistan MDG Status. <http://www.pk.undp.org/content/pakistan/en/home/library/mdg/infographic---pakistan-mdgs-status-2012.html>.



Government of Pakistan in STPF 2015-18 has announced for surgical sector matching grant up to a maximum of Rs. 5 (five) Million for specified plant and machinery or specified items to improve product design and encourage innovation. In addition, Development of a Common Facility Center for surgical sector for "Product Development" has also been announced in the STPF.

#### 4.1.5 Environmental Factors

Pakistan has one of the six great ecosystems in the world, which includes permanent snow bound mountains, glaciers, and forests in the north, tropical and subtropical swamps and dry steppe land elsewhere. The Arabian Sea has been receiving biological waste brought down by the Indus river system for millennia. The whole ecosystem and its diversity is under threat from human activity.

There are major threats to Pakistan's fresh water. World-wide nearly 70 percent of all available freshwater is used for agriculture, as against 90 percent in Pakistan. This is mostly responsible for the deteriorating quality of freshwater through agrochemicals (fertilizer and pesticides). Industrial pollution, too is unchecked and will get worse as economic activity accelerates further.

Another sign of deteriorating habitat is air pollution, which is endemic because of massive surge in automobiles and insufficient emission standards. This is further exacerbated in winter by heavy smog rolling in from India's coal-fired power plants.

Sustaining Pakistan's ecological environment and biodiversity is now an important agenda of Pakistani society. Inability to do so now will result in extremely high costs in future. Cleaning up water sources, retrieving land and planting forests are three critical elements of the strategy. This will be achieved, first, by greater awareness, especially among children and women in rural areas. Secondly, it will come about through massive pressure exerted by civil society at large to ensure that laws in place already are enforced through legal and industrial punitive actions<sup>28</sup>.

Pakistan is among the World's Top 10 in terms of vulnerability to the impacts of climate change<sup>29</sup>. The cost for Pakistan to adapt to climate change has been estimated at \$10.7 Billion per year for the next 40-50 years. This investment is needed in natural resource management and planning, implementation of incentive-based regulatory policy regimes and support for voluntary environmental protection initiatives by industries.

#### 4.1.6 Legal Factors

The legal system in Pakistan is based on the English common law system. The main government agencies involved in the regulation of companies in Pakistan are: a) the Securities and Exchange Commission of Pakistan (SECP), which was set up following the 1997 Securities and Exchange Commission of Pakistan Act and has responsibility for the incorporation and registration of companies; and b) the Board of Investment (BOI), which promotes investment opportunities in all sectors of the economy and provides investment facilitation services to local and foreign investors. Another agency, The Pakistan Standards and Quality Control Authority has responsibility for standards and quality requirements<sup>30</sup>.

<sup>28</sup>Pakistan in the 21st Century Vision 2030

<sup>29</sup>Climate Change Vulnerability Index (2010). <http://maplecroft.com/about/news/ccvi.html>.

<sup>30</sup>Guidance - Doing business in Pakistan: Pakistan trade and export guide, Department for International Trade of the government of UK, <https://www.gov.uk/government/publications/exporting-to-pakistan/doing-business-in-pakistan-pakistan-trade-and-export-guide>

Investments in Pakistan are governed by the Investment Policy of 2013, Foreign Private Investment Act of 1976 and the Economic Reforms Act of 1992. Under the Investment Policy of 2013, Pakistan has one of the most liberal investment policy regimes and public-private partnership frameworks in the entire South Asian region. The law also provides incentives including tax exemptions, reduced customs tariffs and investor facilitation services. All sectors, except those prohibited by the Government of Pakistan (GoP) due to national security concerns including arms and ammunition, explosives, radioactive substances, currency minting operations and alcoholic beverages are open to foreign investors. In reality, the arbitrary implementation of regulations governing investment laws makes it difficult for many foreign investors to become established in Pakistan.

## 4.2 Value Chain Analysis of 5.5 Inch Forceps

Value Chain Analysis (VCA) is a tool to identify the value distribution in a given value chain. The tool helps to identify value capturing points in a value chain to facilitate adoption of corresponding appropriate strategies to increase the value for interested players. Table - 4.2 shows value chain analysis exercise for a 5.5 inch Forceps manufactured in Sialkot using imported steel.

Table - 4.2									
Value Chain Analysis of 5.5 Inch Forceps									
Sr. No.	Process		Unit Value (PKR)	Cum Unit Value (PKR)	Unit Value Share	Cum Unit Value Share	Average Order Size (Nos.)	Incremental Value (PKR)	Cum Incremental Value (PKR)
1	Supplier	Raw Material	65	65	9%	9%	500	32,500	32,500
2		Packaging Materials	11	76	1%	10%	500	5,500	38,000
3	Producer	Forging & Shaping	7	83	1%	11%	500	3,500	41,500
4		Milling & Machining	18	101	2%	13%	500	9,000	50,500
5		Filing, Tampering & Rough Grinding	24	125	3%	17%	500	12,000	62,500
6		Final Grinding, Polishing & Fitting	50	175	7%	23%	500	25,000	87,500
7		Overheads & Packing	25	200	3%	27%	500	12,500	100,000
8	Factory Margin	100	300	13%	40%	500	50,000	150,000	
9	Importer	Importer's Margin	450	750	60%	100%	500	225,000	375,000
<b>End Consumer Unit Price</b>			<b>750</b>		<b>100%</b>			<b>375,000</b>	

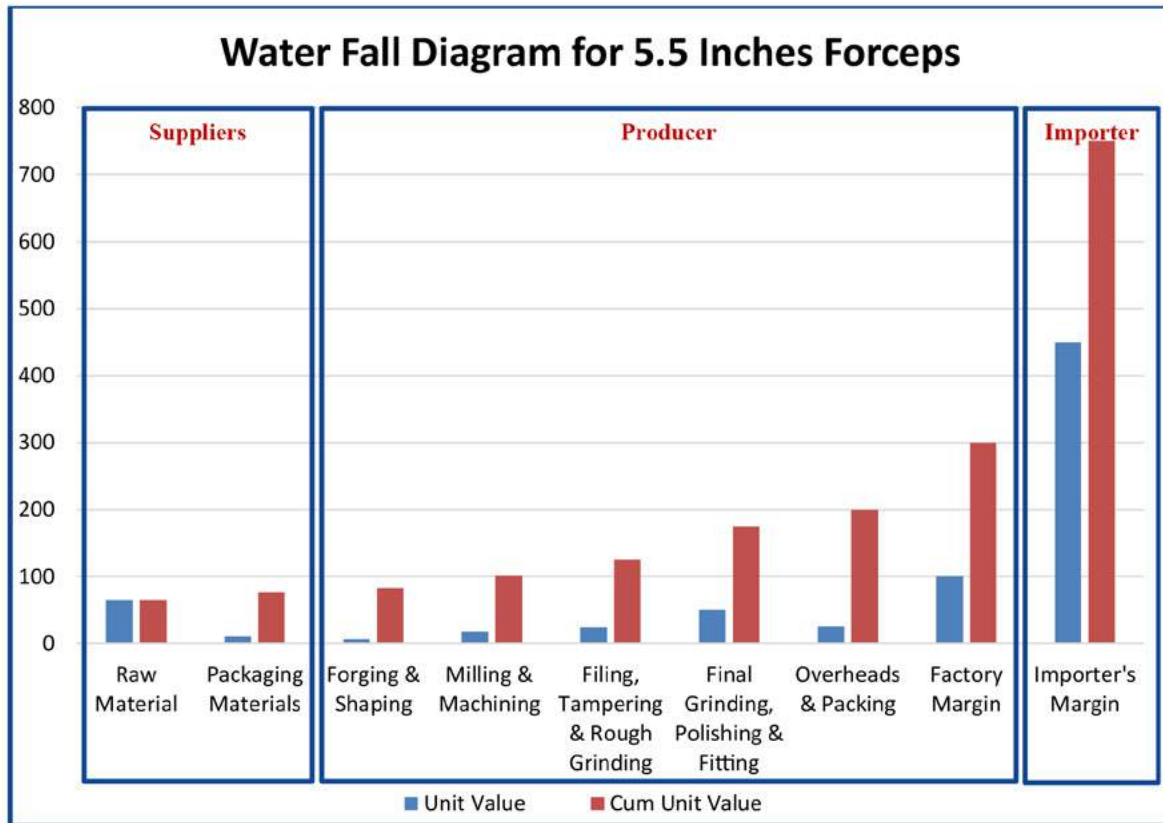


Figure 4.1

It is important to note from the water fall diagram (Figure - 4.1) of the forceps that value captured by the raw materials providers is around 10% of the total value of the forceps. The value added during the production processes is only 16% of the total value of the forceps. The producer margin is only 13% of the total product value. Maximum value, 60% in this case, has been captured by the brand/importer. This implies that the surgical cluster companies are only serving to fulfill suppliers package rather than original brands manufacturers.

This in turn entails that the value chain is being dominated by the international brands and at the same time highlights the weakness on part of surgical manufacturers by not having been able to develop their brands. Another aspect needs attention here is that if the manufacturers want to increase the profit margin they have to concert efforts on productivity improvement. By improving productivity they can reduce the cost of production and will be able to relaise higher profit margins.

A PARETO analysis for value capturing points in forceps value chain has been developed to shed light on this very aspect (Figure - 4.2).



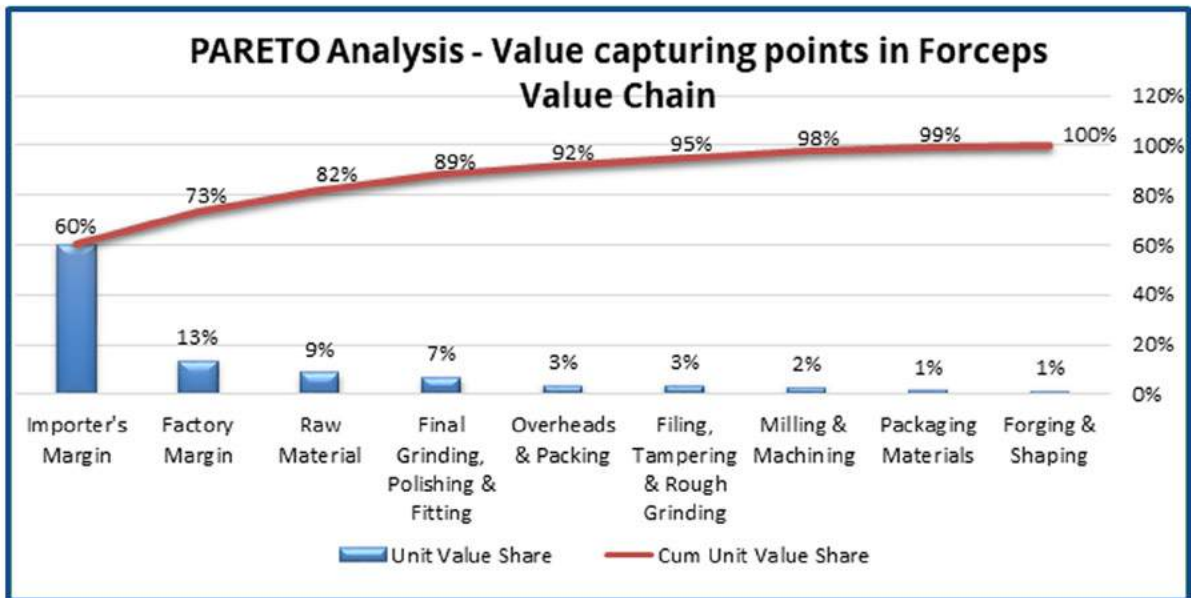


Figure 4.2

### 4.3 Porter's Five Forces Model (5F)

Porter's Five Forces Model (5F) is an analysis tool that uses five industry forces such as bargaining power of buyer, bargaining power of supplier, industry rivalry, threat of new entrants and threat of substitutes to determine the intensity of competition in an industry and its profitability.

The model has been applied on surgical cluster, Sialkot for input suppliers and Principal Firms by evaluating the factors associated with these forces and assigning them scores from 1 as very low, 2 as low, 3 as moderate, 4 as high and 5 as very high. The average points have been calculated by taking average of scores of the factors for respective force (**Table – 4.3**). These points are then plotted on a web chart (**Figure – 4.3 & Figure – 4.4**) that represents each force as low or high.

Five Forces (5F)	Input Suppliers	Principal Firms
Bargaining Power of Buyer	3.1	3.9
Bargaining Power of Supplier	3	3.2
Industry Rivalry	3	4.2
Threat of New Entrants	2.6	2.4
Threat of Substitutes	3	2.7
<b>Average</b>	<b>2.94</b>	<b>3.28</b>

### 4.3.1 Five Forces Analysis for Input Suppliers

**Bargaining Power of Buyers** for the surgical inputs suppliers is moderate to high. As surgical cluster is competing in terms of cost leadership and is highly sensitive to the raw material prices therefore the buyer frequently changes the suppliers based on price offers. In addition, as there are a number of suppliers providing local and imported materials, therefore the cost of substituting a supplier is very low. However, as most of the surgical companies are small in size therefore they place orders of low quantities to the suppliers turning price negotiations in favor of the suppliers.

**Bargaining Power of Suppliers** for the surgical inputs suppliers is moderate. As there are large number of scrap suppliers in the market with huge business sizes resulting high competition to gain business in the market which lowers the bargaining power of the suppliers. However, it is important to note from the demand perspective that the surgical manufacturers are mainly using a few steel variants including local and imported steels to produce conventional instruments coupled with steady growth rate of surgical instruments resulting in reduced likelihood of switching to alternate materials by the input suppliers, in this case the furnaces, and this in turn strengthen the position of scrap suppliers to milk profits on sale of bulk quantities of scrap to the furnaces.

**Industry Rivalry** for the input suppliers is moderate. Since the surgical industry growth rate is low with limited product differentiation, therefore, the attractiveness to enter as supplier for surgical is low. In addition as the existing number of suppliers is high as compared to the industry size of surgical, therefore, the suppliers market has reached to saturation point. Moreover, to retain the current customer base in an environment of continuous price fluctuation has been becoming increasingly difficult. The above factors are continuously increasing the rivalry among the suppliers of surgical cluster.

**Threat of New Entrants** in the suppliers market is low to moderate. Since the capital requirement to establish a steel furnace is high along with the difficulties to introduce and penetrate into the market and to maximise utilization of the installed capacity reaching economies of scale lower the entry threat. On the other hand, weaker legislation, absence of brand consciousness, lower product differentiation and lower govt. regulations are the factors encouraging new entrants thereby creating threat of new entrants.

**Threat of substitutes** for the surgical inputs suppliers should be analysed considering the current advancement trends in the local industry as well as international market requirements. From the local industry perspective the threat of substitutes is low as the final product, surgical instruments in this case is not competing in the local market. However, this threat is high in the international market where the new materials such as plastic and composites are being experimented to replace the conventional steel made instruments. Furthermore, from the local industry perspective this threat is very low as cost of changing to the alternative material will require a change in technology, skills and access to the alternative input materials along the supply chain. In contrast, threat of substitutes for the international market is very high as new materials, technology and skills are being tried to replace the conventional instruments. If new products succeed in replacing the conventional instruments the impact on the surgical supply chain of Sialkot cluster including the input material suppliers will be adverse.



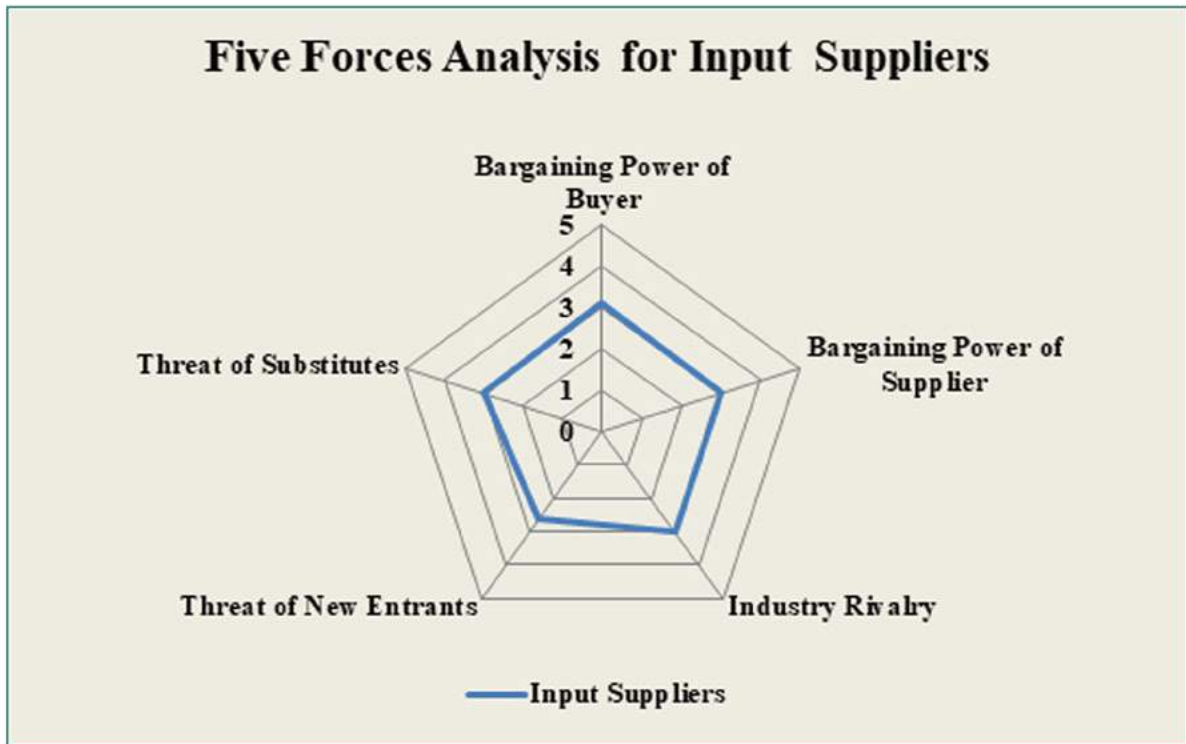


Figure 4.3

### 4.3.2 Five Forces Analysis for Principal Firms

**Bargaining Power of Buyers** for the surgical manufacturers is high. As the buyers are mainly renowned international brands having huge organizational sizes and global operations along with lower switching costs from one supplier to the other for surgical cluster companies in Sialkot. This coupled with the presence of many substitutes has been vesting very high powers to the buyers of surgical products. However, as the process requirements to produce surgical demand high level of compliance on part of the manufacturers as well as availability of highly skilled labour are the major factors limiting backward integration of the buyers.

**Bargaining Power of Suppliers** is low to moderate for the surgical companies. Since there exist a number of suppliers of all sizes both for imported and local materials. The availability of material is abundant and easily accessible. In addition, the material quality in terms of grades and size is same, therefore, the main factor to retain a supplier is based on the price of the material or the credit line extended to the buyers (principal firms). Therefore the switching cost of supplier is very low. On the other hand, threat from supplier side to produce surgical instruments is moderate as far as forging and heat treatment processes are concerned. However this trend is lower for the polishing and export activities.

**Industry Rivalry** in the surgical is high to very high. Major reasons for this high level of rivalry include a high number of competitors, lower level of product differentiation and low customer loyalty. More than 90% companies are small sized, and there are low to moderate costs of exit. In addition, low market diversification and penetration have been generating cut throat competition among the competitors. This analysis also highlights why the companies are involved in an unhealthy competition such as indenting other companies customers at lower prices instead of exploiting new markets and new customers.

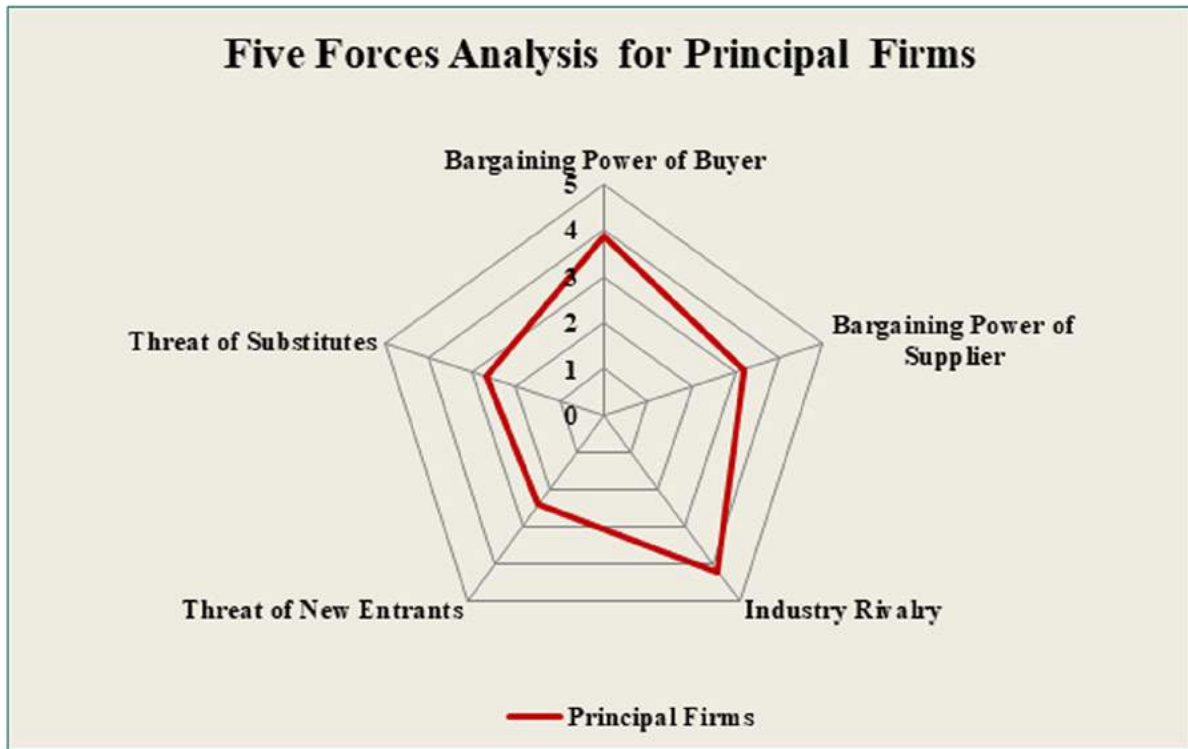


Figure 4.4

**Threat of New Entrants** is moderate to high for the surgical manufacturers. Since the companies are operating in a market place where legal barriers to establish a firm are low, products are largely the same, access to suppliers and distributors is very easy, economies of scale are quite low and business friendly. These factors contribute to easily establishing a surgical exporting unit thereby leading to higher threat of new entrants. This is the very reason that SIMAP claims membership of more than 3600 surgical companies.

**Threat of substitutes** in short run for the surgical manufacturers in the export market is low to moderate, however, this threat is substantial in the long term. Surgical instruments with new material are being developed, especially for the single piece instruments as these types of instruments don't require assembly process and can be produced using advanced technologies like 3D printing and additive manufacturing. Also, German Tuttlingen cluster has been marketing their products based on environmental advantages. They are claiming that multiple useable instruments are less damaging to the environment as compared to the single use. In this case high quality steel is required. Germany has a competitive advantage as the quality of German steel is very high as compared to the Pakistani steel.

#### 4.4 Porter's Diamond Model

Porter's diamond model helps to understand the competitive advantage by taking into account firm strategy, structure and rivalry, related and supporting industries, factors and demand conditions prevailing in the cluster. It also considers the role of government and its impact on the four factors mentioned above. Following is the diamond model constructed to assess the competitive advantages for the surgical cluster (Figure 4.5).

- Limited legislative interventions from Government related to product quality and standards
- Weaker public-private dialogue limiting long term planning to fulfill future labor, technology and R&D requirements
- Duplication of resources (SIMTEL, PCSIR labs)
- Non-availability of accredited product certification labs
- Facilitation by TDAP to support export marketing activities
- Provision of rebates for technology purchase for the surgical cluster companies

- Majority of the cluster firms are created using family owned resources
- Mainly the companies are managed using “Command and Control” style
- Corporate culture has not been promoted
- Cluster companies are competing for the same markets with similar products creating higher rivalry levels
- Low level of innovation to create product differentiation

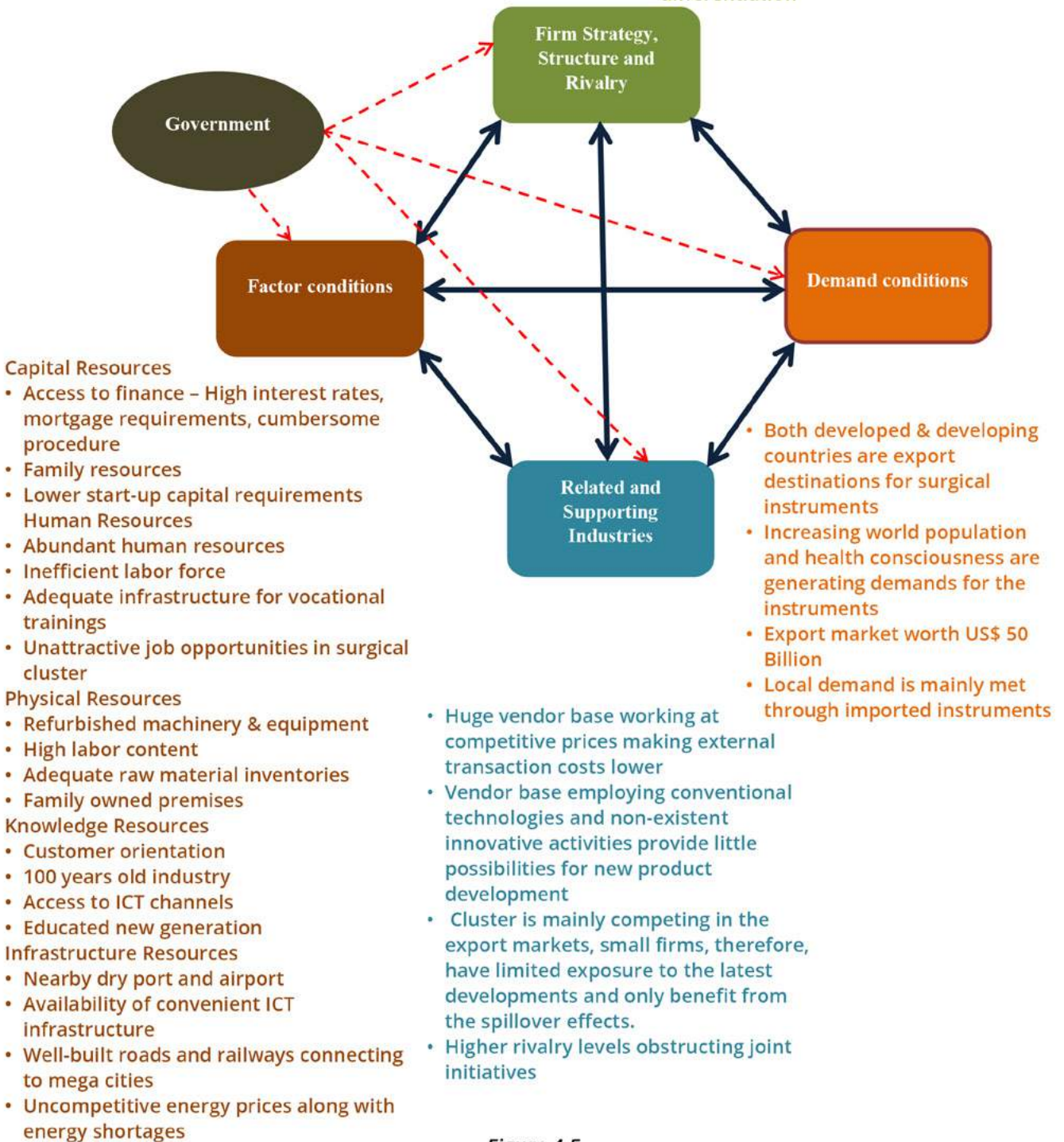
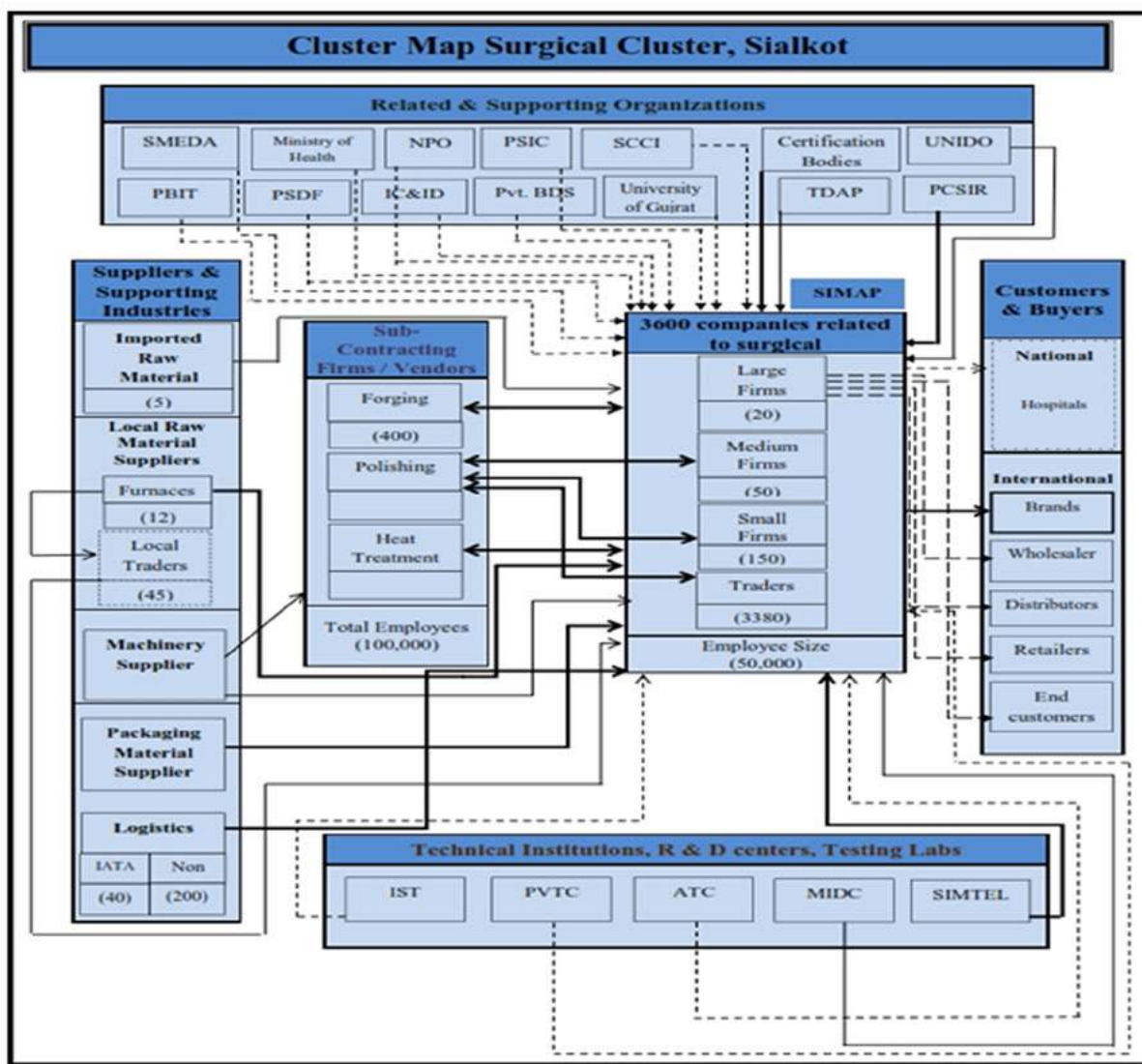


Figure 4.5

Surgical companies have not been able to transform from conventional factor based producers to innovative enterprises thus reaching a saturation point in terms of products and markets. This in turn has elevated rivalry levels among the cluster companies and generated a culture of malpractices and morbid business ethics. These problems then led to trust deficit among the cluster companies thereby impeding opportunities for joint initiatives to resolve common problems of the cluster.

The cluster companies neither could adopt the corporate culture nor the transformational leadership styles necessary to create long term vision for the growth of their respective enterprises. Generally, the cluster companies are operating with adhoc strategies for short term gains and have been compromising long-term sustainability; the manifestation of this fact can be found in all dimensions related to cluster growth, from R&D infrastructure, training & development, joint marketing, joint procurements of raw materials, collaboration with the support institutions and provision of decent working conditions to the labor force. As a result, the cluster share in the international market remained stagnant at 0.3% during the last decade and is not likely to improve in the future.

### 4.5 Current Cluster Map of Surgical Cluster, Sialkot



A thin-bordered rectangular box for a group of stakeholders	
A thick/dotted-bordered rectangular box for showing a well/poorly functioning network of inter-related stakeholders	
A thick, thin and dotted one-sided arrow to show a well, moderate and under developed linkage between two stakeholders	
A thick/thin two-sided arrow to show a well/moderate linkage between two stakeholders that have a subcontracting relationship	
Parenthesis to show the number of stakeholders in a group/network	( )

Figure 4.6



## 4.6 Cooperation Matrix

Cooperation Matrix																								
Name	IC&SD	PTC	PSDF	SI&EDA	NPO	EDS	IDAP	PCSUR	PSQCA	FBR	NAVTC	PBT	PSIC	TEVTA	SDAP	SOCI	Govt. Universities	Pvt. Universities	Pvt. BOSP	Bank & Financial Institutions	Raw Material Suppliers	Certifications Agencies	Donor Agencies	Tool
IC&SD	X	1	4	2	0	0	0	0	0	0	0	0	3	5	3	3	1	3	3	3	1	0	3	40
PTC	1	X	1	1	0	0	0	0	0	0	0	0	0	2	1	4	1	1	3	2	2	1	3	26
PSDF	4	1	X	1	0	1	1	1	1	0	1	0	2	2	1	2	1	1	4	3	1	1	5	34
SI&EDA	2	1	1	X	3	2	2	2	1	0	1	1	2	1	2	4	3	2	2	2	1	1	4	41
NPO	0	0	0	3	X	2	2	2	2	0	1	1	1	1	2	2	2	2	3	1	1	1	4	34
EDS	0	0	1	2	2	X	1	2	3	0	1	0	0	1	1	2	2	2	1	1	1	1	3	27
IDAP	0	0	1	2	2	1	X	1	1	1	1	1	1	1	4	4	2	2	2	1	1	0	3	32
PCSUR	0	0	1	2	2	2	1	X	2	0	1	1	1	1	4	3	3	2	2	1	1	2	3	35
PSQCA	0	0	1	1	2	3	1	2	X	1	1	1	1	1	2	2	2	2	3	1	1	1	3	33
FBR	0	0	0	0	0	0	1	0	1	X	0	1	0	0	3	3	0	0	1	4	2	1	3	20
NAVTC	0	0	1	1	1	1	1	1	1	0	X	1	0	2	2	2	1	1	2	1	0	0	3	22
PBT	3	0	0	1	1	0	1	1	1	1	1	X	2	1	1	2	1	2	2	3	0	1	3	28
PSIC	5	2	2	2	1	0	1	1	1	0	0	2	X	2	4	4	2	2	2	3	0	0	3	30
TEVTA	5	1	2	1	1	1	1	1	1	0	2	1	2	X	2	3	1	0	1	0	0	0	3	29
SDAP	3	3	1	2	2	1	4	4	2	3	2	1	4	2	X	4	0	0	2	3	4	4	2	53
SOCI	3	4	2	4	2	2	4	3	2	3	2	2	4	3	4	X	2	2	2	3	4	4	3	64
Govt. Universities	1	1	1	3	2	2	2	3	2	0	1	1	2	1	0	2	X	1	1	1	0	0	1	28
Pvt. Universities	3	1	1	3	2	2	2	2	2	0	1	2	2	0	0	2	1	X	2	1	0	0	2	31
Pvt. BOSP	3	3	4	2	3	1	2	2	3	1	2	2	2	1	2	2	1	2	X	1	0	2	1	42
Bank & Financial Institutions	3	2	3	2	1	1	1	1	1	4	1	3	3	0	3	3	1	1	1	X	3	1	1	40
Raw Material Suppliers	1	2	1	1	1	1	0	1	1	2	0	0	0	0	4	4	0	0	0	3	X	1	0	23
Certification Agencies	0	1	1	1	2	1	1	2	2	1	0	1	0	0	4	4	0	0	2	1	1	X	1	26
Foreign Donor / NGO	3	3	5	4	4	3	3	3	3	3	3	3	3	3	2	3	1	2	1	1	0	1	X	57
<b>Total</b>	<b>40</b>	<b>26</b>	<b>34</b>	<b>41</b>	<b>34</b>	<b>27</b>	<b>32</b>	<b>35</b>	<b>33</b>	<b>20</b>	<b>22</b>	<b>28</b>	<b>39</b>	<b>29</b>	<b>53</b>	<b>64</b>	<b>28</b>	<b>31</b>	<b>42</b>	<b>40</b>	<b>23</b>	<b>26</b>	<b>57</b>	<b>X</b>

0	No Cooperation	3	Good
1	Weak	4	Very Good
2	Fair	5	Excellent

Table 4.4

A number of relevant public and private institutions exist in the cluster or its vicinity. This is because Sialkot is a very important industrial city of Punjab and has a diversity of export oriented industrial subsectors such as surgical, sportswear, ready-made garments, leather garments and protective gear.

However, when we look at the health of relationship among these departments, a number of weaknesses can be identified. In the view of earlier analysis, it is important to shed some light on the institutes important for the cluster and there existing and potential roles for the growth of the cluster.

Public and private sector universities and PCSIR are related to R&D. PCSIR has established a testing lab in the premises of SIMAP and is also implementing a programme related to certifications incentive scheme for SMEs. However, no public-sector university is involved to carry out R&D for developing new products for the surgical cluster. One major reason for this deficiency is due to the fact that no campus of any reputed engineering university has been established at Sialkot. Some private sector universities have intervened into the cluster to conduct research studies. No major intervention for new product development has been witnessed afterwards on the part of private sector universities.

PSDF, PVTC and TEVTA are the institutes responsible for developing the workforce for surgical cluster. PSDF has recently conducted a study for the surgical cluster to find out the skill requirements in the cluster. Unfortunately, based on this study there has been no strategy formulation at the cluster level to find out the demand and supply requirements for the cluster in different traits and addressing it.

The NPO is responsible for taking up initiatives related to productivity improvement for the cluster. The labor productivity level of the cluster is at 30-40% against the international benchmark value of 85%, but there have been no cluster specific initiatives on the part of NPO in collaboration with SIMAP to create awareness among the cluster companies and implementing productivity improvement initiatives subsequently. NPO has no regional office in Sialkot that also limits frequency of interaction of cluster association with NPO.

BDSPs for productivity, quality, marketing and standardization are very weak in the cluster. Individual consultants providing services related to certifications are easily available but there is a dearth of professional companies related to the services mentioned above.

PSQCA and PCSIR are responsible for improving the quality infrastructure for the cluster. This may include availability of accredited labs providing end to end testing services for the surgical products. Also, an approved lab from the EU notified body can reduce burden from the cluster companies for sending materials out of country at higher transportation costs and greater testing lead times.

SMEDA is responsible for the development of SMEs. In the absence of BDSPs in the cluster this role might be bridged by SMEDA. However, no worth mentioning initiative has been taken up so far by SMEDA for this cluster. SMEDA has a regional office in Sialkot, which needs to strengthen its relationship with SIMAP drawing strategies for the support of the cluster companies.

## 4.7 SWOT Analysis

SWOT Analysis of surgical cluster, Sialkot is shown in Table – 4.5.

<b>Table – 4.5</b>	
<b>SWOT Analysis</b>	
<b>Market</b>	
<b>Strength</b>	<ul style="list-style-type: none"> <li>• Access to international market especially in high income markets like USA, Germany and France</li> <li>• Have reasonable product quality at low price</li> <li>• Products incorporating high manual skills</li> <li>• Well organized export sales channels</li> <li>• Substantial experience related to export markets</li> </ul>
<b>Weakness</b>	<ul style="list-style-type: none"> <li>• Absence of branding</li> <li>• Lacking product and market diversification</li> <li>• Strong price competition among the cluster companies</li> <li>• Growing malpractices and unhealthy rivalry among the cluster companies</li> <li>• Poor marketing strategies</li> <li>• No direct selling to end consumers</li> </ul>
<b>Opportunity</b>	<ul style="list-style-type: none"> <li>• Enhanced access to Regional and Far East Countries markets through CPEC</li> <li>• Import substitution for HS Code 9018 in health sector</li> <li>• Potential competitive market for new high value products for Pakistan</li> <li>• Market penetration and diversification by adopting appropriate marketing plans and strategies</li> <li>• Improve market presence by adopting e-commerce tools for promotion of surgical products</li> </ul>
<b>Threat</b>	<ul style="list-style-type: none"> <li>• Increased global competition especially from Germany, USA, China and India</li> <li>• Increasing stringent legislation and compliance requirements in the existing and potential export destinations</li> <li>• Losing market share due to lower market &amp; product diversifications and lack in adoption of latest technology</li> <li>• Lacking preparation to tap new markets through CPEC</li> </ul>
<b>Technology</b>	
<b>Strength</b>	<ul style="list-style-type: none"> <li>• Availability of imported new/re-refurbished machinery &amp; equipment</li> <li>• Availability of reverse engineering facilities in allied cities</li> <li>• Availability of Common Facility Centers having latest machinery and equipment</li> <li>• Increasing awareness among the large firms regarding sources of technology</li> </ul>
<b>Weakness</b>	<ul style="list-style-type: none"> <li>• Majority of the industry is still using conventional refurbished machinery and equipment for production</li> <li>• Lacking indigenous production of capital goods (machinery and equipment)</li> <li>• Due to usage of obsolete technology, high in line rejection rates and defects</li> <li>• Lacking awareness and access to new technologies among the SMEs</li> <li>• The current CFC is not providing end to end technological solution to the cluster companies</li> <li>• No technology acquisition mechanism</li> <li>• Poor production practices leading to lower productivity and poor-quality products</li> <li>• Lack of support services to improve production efficiencies of the cluster companies</li> <li>• Low awareness among SMEs related to technology acquisition incentives</li> <li>• High defect rates due to process variations utilizing outdated technologies</li> </ul>



<b>Opportunity</b>	<ul style="list-style-type: none"> <li>Existing infrastructure available for reverse engineering of machinery like Pakistan Machine Tool Factory, Karachi, etc.</li> <li>Advancement in ICT provides better networking and access to information related technology</li> <li>Availability of latest machinery at affordable price from nearby countries like China</li> <li>Duty rebates on purchase of technology up to PKR 5 Million</li> </ul>
<b>Threat</b>	<ul style="list-style-type: none"> <li>Reliance on the conventional manufacturing methods and technologies</li> <li>Emergence of 3d printing and additive manufacturing to fulfill low quantity orders with substitute materials especially for single use instruments</li> <li>Emerging regional competitors with latest technological adoption</li> <li>Low capacity in development of indigenous technologies</li> <li>Weak government policies implementation regarding refunding of rebate claims related to technology acquisition</li> </ul>
<b>Innovation and R&amp;D</b>	
<b>Strength</b>	<ul style="list-style-type: none"> <li>Capability of large and medium size surgical manufacturers to reverse engineer customer requirements</li> <li>Existence of Universities and presence of limited R&amp;D Institutions in the cluster vicinity</li> <li>Increasing awareness among cluster companies to construct purpose built factories</li> </ul>
<b>Weakness</b>	<ul style="list-style-type: none"> <li>Non-existence of industry oriented R&amp;D by academia</li> <li>Lacking collaboration between industry and R&amp;D Institutions</li> <li>Poor quality infrastructure (testing and accreditation)</li> <li>Dependency on international brands for Innovation &amp; R&amp;D</li> <li>Top management of cluster companies lacks capacity to perceive innovation &amp; R&amp;D strategies</li> <li>Absence of testing and accreditation facilities</li> </ul>
<b>Opportunity</b>	<ul style="list-style-type: none"> <li>Universities and R&amp;D institutions exist, which is an opportunity for the industry to collaborate</li> <li>Bringing industry, academia and government together for R&amp;D initiatives</li> <li>knowledge transfer through international collaboration with international R&amp;D institutes</li> <li>Collaborative innovation and R&amp;D with international brands in the wake of CPEC</li> <li>Evidence based support policies through industry oriented research</li> <li>Industry 4.0 provides an opportunity to facilitate and promote product diversification</li> </ul>
<b>Threat</b>	<ul style="list-style-type: none"> <li>Inefficient system of innovation curtailing overall competitiveness of the cluster</li> <li>No provision of incentives and weak Intellectual Property Rights</li> <li>Huge investment in R&amp;D budget by regional competitors such as China and India</li> <li>Limited innovation capacity impedes improvement of processes thereby increasing cost of production</li> </ul>
<b>Inputs Availability</b>	
<b>Strength</b>	<ul style="list-style-type: none"> <li>Access and availability of local and imported raw materials</li> <li>Availability of local raw materials for production of single use instruments</li> <li>Auxiliary items/machine tools are adequately available in the cluster</li> <li>Presence of large number of suppliers</li> </ul>
<b>Weakness</b>	<ul style="list-style-type: none"> <li>High price of good quality raw materials with required gauges</li> <li>High duties and taxes on imported raw materials</li> <li>Inadequate supply and high energy costs for the industry (PKR 16/KW)</li> <li>Fluctuating prices of imported raw materials</li> <li>Lack of material certificates for local materials</li> </ul>





<b>Opportunity</b>	<ul style="list-style-type: none"> <li>Development of input suppliers producing all the steel variants and required gauges and grades to generate comparative advantage</li> <li>Opportunity to reduce dependence on one type of material and support product diversification using substitute materials</li> </ul>
<b>Threat</b>	<ul style="list-style-type: none"> <li>Substitute materials such as plastics, fibers are replacing the conventional.</li> <li>Comparative advantage in terms of cheaper and high quality raw material of regional competitors can suppress the surgical cluster growth</li> <li>Availability and low cost of energy of regional competitors (Rs. 7/KW in India)</li> </ul>
<b>Skills</b>	
<b>Strength</b>	<ul style="list-style-type: none"> <li>60% of population consist of young people</li> <li>Availability of workforce at lower/competitive wages with respect to global/regional competitors</li> <li>Availability of vocational training infrastructure to develop semi-skilled workforce</li> <li>International Donors like GIZ, JICA and public organizations like TEVTA, PVTC, PSDF have collaborated for enhancement and promotion of Technical Education &amp; Vocational Training</li> </ul>
<b>Weakness</b>	<ul style="list-style-type: none"> <li>Low rate of induction of semi-skilled workforce trained through vocational institutions due to un competitive wages</li> <li>Structural unemployment due to skills mismatch between potential employees and the employer</li> <li>Weak in-house training and development of the existing workforce</li> <li>Management perceives training and development as expense rather than investment</li> <li>Non-conducive working environment to attract the workforce</li> <li>Lower labor productivity level due to organizational weaknesses</li> </ul>
<b>Opportunity</b>	<ul style="list-style-type: none"> <li>Structural mismatch can be reduced by strengthening cooperation between the support institution and the industry</li> <li>Engaging rural young population through employable skills from in-efficient economic sector like agriculture to manufacturing sectors such as surgical</li> <li>Surgical cluster companies can reduce the labor turnover rate and enhance skills retention by employing better HR practices</li> <li>Government youth internships schemes can be coupled for compensation of manufacturing workforce partly</li> <li>Labor productivity can be substantially increased by adopting latest operations management tools and techniques</li> </ul>
<b>Threat</b>	<ul style="list-style-type: none"> <li>Availability of alternate and better job opportunities for the potential workforce</li> <li>Global/Regional competitors have comparative advantage due to efficient labor force due to better skill development strategies along with better compensation and better working environment.</li> <li>Adoption of best manufacturing practices by regional competitors gives them a comparative advantage</li> <li>Knowledge workers (industry 4.0) are replacing conventional workforce due to increased automation</li> <li>Critical skills are not transferring to the next generation due to unattractive employment opportunities.</li> <li>Diminishing polishing and grinding workforce due to weakened <i>Ustad-Shagird</i> system.</li> </ul>
<b>Business Environment</b>	
<b>Strength</b>	<ul style="list-style-type: none"> <li>Lower external transaction costs as vendor base working at competitive prices for conventional instruments</li> <li>Lower entry barriers coupled with lower bargaining power of suppliers</li> <li>Improved ICT infrastructure leading to lower lead times and enhanced networking and product marketing</li> </ul>



	<ul style="list-style-type: none"><li>• Stable macroeconomic conditions and huge government spending in infrastructure development projects</li><li>• Availability of dry port/airport near to the cluster</li><li>• Pakistan's time bound programme for elimination of child labor improved the business practices and image of the cluster.</li></ul>
<b>Weakness</b>	<ul style="list-style-type: none"><li>• Fragile political environment</li><li>• Weak R&amp;D infrastructure</li><li>• Trust deficit between industry and relevant government institutes hinders cluster growth</li><li>• High rivalry levels among cluster players competing for the low-cost instruments deteriorates healthy competition</li><li>• Inadequate and uncompetitive supplies of utilities (Gas and Electricity)</li><li>• Issues in availing access to finance facilities due to mortgage requirements, high interest rates and cumbersome documentation.</li><li>• Weak industry support services</li></ul>
<b>Opportunity</b>	<ul style="list-style-type: none"><li>• Industry can upgrade in terms of innovation, R&amp;D and management by collaborating with academic and R&amp;D institutes</li><li>• Development of new economic zones under CPEC</li><li>• Provision of common facility services can improve access to services at competitive prices and capital goods manufacturers (machinery and equipment) can help in development and dissemination of indigenous technology</li><li>• Promotion and support for productivity and quality enhancement</li><li>• Enhance public-private dialogue to promote locally produced surgical instruments</li><li>• Stronger collaboration with TVET institutes to bridge the gap of structural unemployment</li><li>• Opportunities for JVs in the wake of CPEC</li></ul>
<b>Threat</b>	<ul style="list-style-type: none"><li>• Introduction of increasing number compliance related requirements</li><li>• Stringent legislations and cumbersome registration requirements in the countries of export</li><li>• Weaker collaboration between industry-academia-R&amp;D institutions</li><li>• Flooding of Chinese instruments in the wake of CPEC</li><li>• Changing government policies regarding taxation and duties</li></ul>

## 5. Recommendations

In view of the analysis presented in the previous chapters of this study, a number of issues at macro, meso and micro level have been underpinned. These issues can further be categorized into short term, medium term and long term depending upon the scope and resource requirements pertaining to each issue identified. In the following pages, we will provide a description of each issue, its underlying causes and recommendation(s) to address these issues.

- Improving innovation support system through collaborative actions and mechanisms with existing academic and R&D institutions
- Establishment of Public Sector Engineering University or Center for Excellence

**Innovation**



- Shifting from fully supply package providers to original design manufacturers
- Strategies for market penetration and diversification
- Development of networks and export consortia

**Marketing and Branding**



- Strategies to assess supply and demand of labor force
- Adoption of new technologies
- Implementation of CSR principles to improve shop floor working conditions
- Better remuneration to attract workforce

**Diminishing skilled workforce**



- Awareness raising among the top management of cluster companies
- Identification of network of companies
- Capacity building of BDSPs and SMEs on productivity improvement

**Performance management systems and labor productivity**



- Bringing public and private sector to formulate import substitution strategy
- Bridging gap between Health institutions and cluster companies
- Sharing of local market intelligence with the cluster companies

**Import substitution**



- Information collection and dissemination
- Access to finance
- Joint procurement of raw materials
- Establishment of EU notified lab
- Registration of surgical instruments
- Improving image of SIMAP

**Others**



### 5.1 Innovation

The world market share is stagnant at 0.3% for the surgical cluster of Sialkot over the last ten years. The surgical cluster has not been able to diversify its product range thereby increasing rivalry among the cluster companies and generating unhealthy practices. This in turn has led to a price war among the cluster companies.

The underlying causes of a lack of innovation in the cluster can be identified as non-existence of industry oriented R&D by academia, lacking collaboration between industry and R&D Institutions, poor quality infrastructure (testing and accreditation), dependency on international brands for Innovation & R&D, and top management of cluster companies lacking the capacity to perceive innovation & R&D.

Since there are more than 10,000 units related to manufacturing sub-sectors such as readymade garments, surgical instruments, sports goods, leather garments and protective gear operating in Sialkot, the business community has been demanding the establishment of a public sector university, especially in engineering and technology. As said earlier, weak R&D infrastructure and the absence of a dedicated research institution

has been identified as one of the major barriers curtailing product diversification, not only for the surgical cluster but also for other clusters operating in Sialkot. In order to address this challenge, there is a dire need to establish a public-sector university or a centre of excellence equipped with latest technology, competent HR and clear objectives to develop high end surgical products. However, for the short to medium term solution, stronger collaboration needs to be forged between the cluster companies and engineering universities / research institutions to uplift innovation support system in the cluster.

## 5.2 Marketing and Branding

The Surgical cluster has not been able to develop brands and effective marketing strategies. Since the cluster is competing in the international market where big players have strong presence with influential marketing strategies, therefore no one off company, keeping in view the size of the cluster companies, has so far been able to develop a brand at par with international giants. This in turn has limited the role of majority of the cluster companies to full supply package providers only. That's why the cluster companies are operating at the low to medium value capturing point in the global value chain of surgical instruments.

There are numerous causes to this weakness including absence of strong innovation support system on buyers for product designing, focus of cluster companies on production as their core strength, growing malpractices and unhealthy rivalry among the cluster companies, poor marketing strategies, no direct selling to end consumers and most of the cluster companies consider sales promotion anonymous to marketing.

Interventions related to marketing & branding can improve the market penetration and diversification for the surgical cluster relieving price war competition among the cluster companies in the short to medium term.

Through joint marketing strategies and by developing export consortia the cluster companies will improve the trust level that can further open up new opportunities for collaboration and growth. Through such intervention, once the institutional capacities on marketing and branding have been developed, the process can be replicated creating a snowball rolling effect.

## 5.3 Diminishing Skilled Workforce

The surgical instruments manufacturing processes require skilled labor force for their completion. To attract and retain the labor force, cluster companies are competing with other manufacturing sectors such as readymade garments, protective gear, sports goods and leather garments vis-à-vis the growing service sector in Sialkot. Since working conditions in terms of health and safety are better in other clusters as compared to grinding and polishing sections of surgical cluster companies, therefore, the surgical cluster companies have now started facing issues related to availability of skilled labor force.

There are a number of dimensions to this problem such as low rate of induction of semi-skilled workforce due to un-competitive wages, structural unemployment due to skills mismatch between potential employees and the employer, weak in-house training and development of the existing workforce, management's perception of training and development as expense rather than investment, non-conducive working environment to attract the workforce and lower labor productivity level due to organizational weaknesses.

SIMAP needs to design a strategy in collaboration with existing TVETs in Sialkot assessing needs of the cluster in terms of supply and demand for the surgical related technical traits.

In addition, cluster companies will have to adopt improved technologies and provide better working conditions in compliance with the CSR principles along with better remunerations to attract the workforce.

## 5.4 Performance Management Systems and Labor Productivity

The surgical cluster is operating at lower labor productivity level and has not been able to comprehend the production wastages incurring due to absence of effective performance management systems. Most of the companies are being operated by the owners having neither the competency to envision this aspect nor the desire to engage professionals to overcome this challenge. Therefore, presence of professional managers in the cluster companies is rare. In addition, the technical know how about a manufacturing process can't be perceived as a substitute to the performance management system. This anomaly has resulted in poor labor productivity levels of merely 30-40% thereby deteriorating all the Key Performance Indicators at the firm level in terms of Cost, Quality and Delivery (CQD). Since the cluster is competing on a price basis, there exists a significant potential to reduce the cost of production by eliminating non-value-added activities in the surgical instruments production supply chain.

Embarking on productivity improvement, however, will require a change of mind set on the part of top management of the cluster companies. There is a dire need and urgency to create awareness among the cluster companies on productivity and performance management systems. Productivity improvement intervention in a network of companies from the surgical cluster, using comprehensive evaluation and selection criteria, needs to be implemented. Personnel from the stakeholders of relevance as well as BDSPs should be involved to develop their capacities on productivity improvement approaches and to ensure the sustainability of this intervention after completion of the project duration. As a result of implementation of productivity improvement intervention, the before-after impact of project can be measured using certain Key Performance Indicators at the enterprise and network levels. The public private stakeholders can be supported in dissemination of these success stories at the sector and national level.

## 5.5 Import Substitution

As shown in Figure – 1.6, Pakistan's import under HS Code 9018 increased from USD 158 Million in 2012 to USD 268 Million in 2016. There is an increase of over USD 100 Million in imports whereas the increase in exports is only USD 38 Million during the same period. Since the comparison here is made only for the HS code 9018, therefore it is important to consider the factors causing this trend thereby providing an opportunity to explore for import substitution.

However, the cluster companies are not willing to sell locally especially to the public hospitals due to cumbersome bidding procedures and delay in payments, along with lack of transparency in awarding the tenders.

In order to realize this opportunity, the concerned government department needs to engage SIMAP to formulate a strategy acceptable to all the stakeholders. This strategy can bridge the gap between the health authorities and cluster companies. Furthermore, liaison with the local hospitals for obtaining market intelligence and furnishing this information to the cluster can help in product diversification.

## 5.6 Others

In addition to the aforesaid recommendations, there are other areas where the cluster companies can join hands and reap benefits. These potential areas of collaboration are mentioned hereunder:



- ✓ **Information collection and dissemination:** During the survey most of the companies including active members of SIMAP were not aware of the policy incentives from Government such as duty incentives on purchase of technology. SIMAP needs to collaborate with the Ministry of Commerce to obtain such information on regular basis subsequently disseminating to all cluster companies.
- ✓ **Access to finance:** Access to finance can be improved for the cluster companies by improving collaboration with the financial institutions both at the policy level and with the commercial banks. This collaboration can reduce the prevailing hurdles concerning access to finance for the cluster companies in terms of interest rates, procedural hurdles and mortgage requirements.
- ✓ **Joint procurement of raw materials:** Since the cluster companies are producing similar products using same type of raw materials therefore the companies can create networks for joint purchase of raw materials. This activity can significantly reduce proportion of raw material cost in the overall cost of production..
- ✓ **Establishment of EU notified lab:** As surgical is an export oriented cluster and is facing stringent export market compliance especially related to CE marking. The companies have to send materials abroad for testing from the EU notified labs. If the PSQCA/PSIC can take initiative by establishing an EU notified lab for the surgical cluster, it will reduce lead times, compliance costs and will improve awareness due to convenient interaction with the lab.
- ✓ **Registration of surgical instruments:** The export markets are increasingly implementing health related registration regulations that require registration of potential exporters with the health authorities in the countries of export. This is posing significant challenges for the cluster companies willing to sell to end customers in these countries. SIMAP should take lead and collaborate with relevant public institutions like TDAP and health department to carry out this task.
- ✓ **Improving image of SIMAP:** Finally, SIMAP needs to bring its lesser satisfied members into the active circle of association. This will improve the image of SIMAP and will help other agencies to collaborate with larger number of companies from the platform of SIMAP. SIMAP needs to enhance its business development service portfolio to a larger audience of its members so as to add more value to its member companies.