Project report on

Consumer purchase intention on electro active polymers

A Summer Internship Project Report

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POST GRADUATE DIPLOMA In MANAGEMENT

By

Patnala Sivasree

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ACKNOWLEDGEMENT

A summer project is a vital platform for learning many new things and self-development. I am taking this opportunity to express my sincere gratitude to everyone who supported me throughout the course of this internship project.

I wish to express my indebted gratitude and special thanks to my organizational mentor "**Mr. Abhijit Reddy Shettap, head speciality chemicals**" and "**Mr. V S Rao, Head marketing**" who in spite being so busy with their responsibilities, took time to guide me on the correct path and for taking part in useful decisions and giving necessary advices and guidance.

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I also express my deepest sense of gratitude to all the employees of **Therapiva pvt limited** who helped me with their valuable suggestions and extended full cooperation during interviews.

Lastly, I would like to extend my gratitude to all the people who took part in my research and provided valuable responses to my questionnaire. Without you all, this research would not have been possible.

STUDENT'S UNDERTAKING

I, Patnala Sivasree bearing Institute Roll No 18PGDM-BHU050, declare that the summer project titled "**Identification of potential customers of the new product in the market"** is my original work and completed under the supervisions of **Mr. Abhijit Reddy** and **Prof. Suprithi Mishra** of IMI Bhubaneswar. Further, I also declare that the report being submitted herewith is free of any textual plagiarism.

Signature:

Date:

Place: IMI Bhubaneswar

therapiva

To Whom It May Concern

This is to certify that Mr./Ms. **PATNALA SIVASREE** Roll number **PGDM18-BHU050**, a student of IMI, has successfully completed his/her Summer Internship Program project titled **FINDING POTENTIAL CUSTOMERS FOR NEW PRODUCT IN THE MARKET**
Under my guidance during **April - June 2018** and his/her summer training project is found to be Exceptional/ Very Good/ Good/ Satisfactory/ Unsatisfactory.

Organizational Guide

Signature with Seal: Abji

THERAPIVA PRIVATE LIMITED * Hyderabad

Name of Executive: Sheltap Abijith Reddy

Designation: Senior Manager

APPROVAL OF THE FACULTY GUIDE

Recommended that the Summer Internship Report titled……...

……

……..……..…..prepared by Mr……...…… under my/ our supervision and guidance be accepted as fulfilling this part of the requirements for the award of Post Graduate Diploma in Management. To the best of my/ our knowledge, the contents of this report did not form a basis for the award of any previous degree/ diploma to anybody else.

Date:

Signature:

Name of the Guide

EXECUTIVE SUMMARY

Through report, I would like to about electro active polymers, their applications, substitutes and the purchase intention of the customers of the existing customer base and give relevant suggestions about the product.

This report is based on the study of the market and the Industry dynamics which I studied during my Summer internship at **Therapiva pvt limited, Hyderabad** which is basically a pharmaceutical company which deals with the manufacturing and the development of new APIs and intermediates to pharma companies.

This report will help us to analyse the market conditions of electro chemicals not only in the country but also the market conditions of the world electro chemical market.

This report also includes the competitor analysis of the organization I worked with and the substitute product knowledge I gained during the work there and then the usage statics of different compounds as substitute to our organization product.

There was a qualitative and quantitative research done which was included in the report to get idea about the factors that are affecting the dependent variables.

Finally, recommendations that I gave to the company with my research through the data I analysis to help them to boost the sales of the product.

INTRODUCTION

With the new advancements in the electronics the need for efficient materials are required to increase the durability and performance of the devices. Among these there are devices which require heat resistance and highly electrically susceptible materials which have edge on others. Which these materials being the base idea companies are producing different materials in the combinations of metals and polymers.

From last decade electronic producers are using **Indium Tin Oxide** in different aspects of the electronics. As, Indium is a rare earth metal it's very hard to find in natural mines and hard to produce such materials with this reason companies have invested in the development of metal based conductors like **silver nano wires** and **graphite tubes** these materials exhibit same properties as of **ITO** but they lack cost efficiency for production which gives the manufacturer increase in cost. After some successful attempts by different European and east Asian companies they found out there are some polymers which exhibit similar properties and they started investing these but the problem for the manufacturers is that the manufacturing based on ITO must be replaced by polymer-based manufacturing.

To overcome this problem, they started to replace the smaller manufacturing sectors to look for the cost efficiency which was well reciprocated over time and gave better results. This motivated the companies to change the manufacturing process now. Form last 3 to 4 years the companies are shifting to manufacture polymer-based manufacturing process to reduce the cost of production. Relatively the production of these polymers is easier than the production of the other alternatives we have in the market.

In search of a new electro polymers many companies invested and the ended up with different types of polymers with different chemicals with a high range of the properties they wanted but most of them lacked the stability when used for these purposes, in 1960 polyaniline was found suitable for these types of electrical and thermal resistance for different applications in electronics.

As the 70's came manufactures are into transparent electronics but the polyaniline has a greenish tint which was evident to the manufactures and customers during the dispersion of the polymer, so the hunt for the new materials was intense then they found a chemical which was having blueish tint which was not as evident as the polyaniline that chemical is **PEDOT:PSS** (poly(3,4-ethylenedioxythiophene) polystyrene sulfonate). But the problem of the production of the chemicals is scarcely availability of the raw materials for the production so, this was left out of the commercialization at the time.

In the recent times when the trend shifted to the flexible electronics PEDOT: PSS was bought back for its extreme good flexible properties. And the china was indulged in the production of the raw materials to produce PEDOT: PSS. THERAPIVA took this as an opportunity to capture the niche market in India.

In India there are only 2 producers who produce this kind of materials where Therapiva is relatively new to the market other is already established for last 2 years with a finite customer base. Now getting customers for Therapiva is the real deal with relatively no experience to the industry.

This was my task given to me to map different potential customers and get in touch with them other than that in this project I had done different industry analysis and company analysis to get results and be useful for the company.

OBJECTIVES OF THE STUDY

To find the customer purchase intention on the polymers and to understand the market for the same in India and the world. I was guided in Therapiva to do following:

1. To find out the people who are relatively in this business.
2. Industry analysis of the polymer chemical industry.
3. Competitor analysis of the company.
4. Company analysis.
5. Worldwide study on the customers purchase intention on the polymers through the questionnaire and cold calling.

ABOUT THE COMPANY

Therapiva pvt limited is a joint venture by a Dubai based pharmaceutical manufacturing company called **Neopharma** and a chemical R&D company based in Hyderabad called **Laxai Life Sciences** started in 2018 as a subsidiary for Neopharma with both R&D and manufacturing of APIs (Active Pharma Ingredient).

Vision: To provide high quality and relatively faster recovery for the people and to provide reliable medicine to the population at the very reach of the people.

Mission: To be the first company to bring out the generic medicine to all the parts of the world and be the market leader in the field of API manufacturing and provide innovations in the field of APIs.

Therapiva is a leading generics pharmaceutical company backed by a strong and innovative R&D facility and a world-class API manufacturing facility. It has a robust product portfolio spread across various therapeutic areas, capable of handling new, complex and hazardous reactions. Therapiva supplies NCEs, cGMP intermediates and KSMs to global innovators. It is equipped with flexible, versatile and advanced infrastructure, tailored to fit any complex chemistry molecules churning out of Innovator's development pipelines.

The manufacturing facilities complies with all regulatory guidelines and requirements of current Good Manufacturing Practices (cGMP) and are successfully inspected/approved by health and regulatory agencies.

Therapiva has a world-class API manufacturing facility in the city of Hyderabad, capable of handling new, complex and hazardous reactions. Therapiva supplies NCEs, cGMP intermediates and KSMs to global innovators. It is equipped with flexible, versatile and advanced infrastructure, tailored to fit any complex chemistry molecules churning out of Innovator's development pipelines.

Therapiva has a strong product portfolio over a range of therapeutic areas and has developed several API's and intermediates that includes Key Starting materials, which are used by other API manufacturers and fully integrated pharma companies. These intermediates are available at competitive price adhering to the global standards including quality, GMP and documentation.

Therapiva pvt limited has 7 APIs, 33 intermediaries, 16 APIs in the developing. They are now into the electro active polymer market now with 2 intermediaries in the production of PEDOT: PSS.

Electro Active Polymers

SNO	Chemicalname	CASNO	Type	Therapeutic category
1	3,4-Ethylenedioxythiophene (EDOT)	126213-50-1	Electro Active Monomer	Performance/ Specialty Chemical
2	2-butyl-2,3-dihydrothieno[3,4-b]-1,4-dioxin (Butyl-EDOT)	552857-06-4	Electro Active Monomer	Performance/ Specialty Chemical

Source @ http://therapiva.net/products/

These speciality chemicals are the raw materials for the productions of PEDOT: PSS.

Services provided by the company:

Therapiva provides services like

1. Outsource manufacturer for different manufacturing companies.
2. Developer of new APIs and intermediaries.
3. Supplier of APIs to different major manufacturers (formulators).
4. Exporters to internal subsidiaries in japan, Dubai, and Saudi Arabia.

Brief History of Electro Polymers

Electroactive polymers, or **EAPs**, are polymers that exhibit a change in size or shape when stimulated by an electric field. The most common applications of this type of material are in actuators and sensors. A typical characteristic property of an EAP is that they will undergo a large amount of deformation while sustaining large forces.

The majority of historic actuators are made of ceramic piezoelectric materials. While these materials can withstand large forces, they commonly will only deform a fraction of a percent. In the late 1990s, it has been demonstrated that some EAPs can exhibit up to a 380% strain, which is much more than any ceramic actuator. One of the most common applications for EAPs is in the field of robotics in the development of artificial muscles; thus, an electroactive polymer is often referred to as an artificial muscle.

The field of EAPs emerged back in 1880, when Wilhelm Röntgen designed an experiment in which he tested the effect of an electrostatic field on the mechanical properties of a stripe of natural rubber.[4] The rubber stripe was fixed at one end and was attached to a mass at the other. Electric charges were then sprayed onto the rubber, and it was observed that the length changed. It was in 1925 that the first piezoelectric polymer was discovered (Electret). Electret was formed by combining carnauba wax, rosin and beeswax, and then cooling the solution while it is subject to an applied DC electrical bias. The mixture would then solidify into a polymeric material that exhibited a piezoelectric effect.

Polymers that respond to environmental conditions, other than an applied electric current, have also been a large part of this area of study. In 1949 Katchalsky *et al.* demonstrated that when collagen filaments are dipped in acid or alkali solutions, they would respond with a change in volume.[5] The collagen filaments were found to expand in an acidic solution and contract in an alkali solution. Although other stimuli (such as pH) have been investigated, due to its ease and practicality most research has been devoted to developing polymers that respond to electrical stimuli in order to mimic biological systems.

In the early 1990s, ionic polymer-metal composites (IPMCs) were developed and shown to exhibit electroactive properties far superior to previous EAPs. The major advantage of IPMCs was that they were able to show activation (deformation) at voltages as low as 1 or 2 volts.[5] This is orders of magnitude less than any previous EAP. Not only was the activation energy for these materials much lower, but they could also undergo much larger deformations. IPMCs were shown to exhibit anywhere up to 380% strain, orders of magnitude larger than previously developed EAPs. In 1999, Yoseph Bar-Cohen proposed the Arm wrestling Match of EAP Robotic Arm Against Human Challenge.[5] This was a challenge in which research groups around the world competed to design a robotic arm consisting of EAP muscles that could defeat a human in an arm wrestling match. The first challenge was held at the Electroactive Polymer Actuators and Devices Conference in 2005.[5] Another major milestone of the field is that the first commercially developed device including EAPs as an artificial muscle was produced in 2002 by Eamex in Japan.[1] This device was a fish that was able to swim on its own, moving its tail using an EAP muscle. But the progress in practical development has not been satisfactory. DARPA-funded research in the 1990s at SRI International and led by Ron Pelrine developed an electroactive polymer using silicone and acrylic polymers; the technology was spun off into the company Artificial Muscle in 2003, with industrial production beginning in 2008. In 2010, Artificial Muscle became a subsidiary of Bayer Material Science.

Types of electro active polymers: These electro active polymers are divided into different types based on the hetero atom and the shape taken

Types based on shape

- Aromatic shape
- Double bonds
- Aromatic and double bonds

Types based on hetero atom

- No heteroatom
- Nitrogen hetero atom
- Sulphur hetero atom

The main chain contains	Heteroatoms present		
	No heteroatom	Nitrogen-containing	Sulfur-containing
Aromatic cycles	• *Poly(fluorene)s* • *polyphenylenes* • *polypyrenes* • *polyazulenes* • *polynaphthalenes*	The N is in the aromatic cycle: • **poly(pyrrole)s (PPY)** • *polycarbazoles* • *polyindoles* • *polyazepines* The N is outside the aromatic cycle: • **polyanilines (PANI)**	The S is in the aromatic cycle: • **poly(thiophene)s (PT)** • **poly(3,4-ethylenedioxythiophene) (PEDOT)** The S is outside the aromatic cycle: • **poly(p-phenylene sulfide) (PPS)**
Double bonds	• **Poly(acetylene)s (PAC)**		
Aromatic cycles and double bonds	• **Poly(p-phenylene vinylene) (PPV)**		

Out of all the above-mentioned electro active polymers poly pyrroles, poly anilines, poly thiophenes are mostly used in electronic devices.

In polythiophenes PEDOT is mostly used in the electronic devices.

ABOUT THE PRODUCT

Product I was working on was EDOT which is intermediaries to produce the final product of PEDOT: PSS. 3,4-Ethylenedioxythiophene (EDOT) is the organosulfur compound with the formula C2H4O2C4H2S. The molecule consists of thiophene, substituted at the 3 and 4 positions with an ethylene glycolyl unit. It is a colorless viscous liquid. EDOT is the precursor to the polymer PEDOT, which is found in electrochromic displays, photovoltaics, electroluminescent displays, printed wiring, and sensors.

EDOT is often prepared from C4 precursors such as butanediol and butadiene via routes that produce the thiophene and dioxane rings in separate steps. Representative is the reaction of 2,3-butanedione, trimethyl orthoformate, and ethylene glycol to form the dioxane. Sulfurization with elemental sulfur gives the bicyclic target.

EDOT is converted into the conducting polymer PEDOT by oxidation. The mechanism for this conversion begins with production of the radical cation [EDOT]+, which attacks a neutral EDOT molecule followed by deprotonation. Further similar steps result in the de-hydro polymerization. The idealized conversion using peroxydisulfate is shown

$$n\ C_2H_4O_2C_4H_2S + n\ (OSO_3)_2^{2-} \rightarrow [C_2H_4O_2C_4S]_n + 2n\ HOSO_3^-$$

The most remarkable EDOT reactions are its oxidation reactions, typically resulting in conductive oligomeric to polymeric materials in the presence of charge balancing, so-called doping counterions (anions).

There are several other reaction pathways not leading to conductive polythiophenes, which will be in the focus of this chapter. Nevertheless, a lot of them are closely related to the essential EDOT chemistry, that is, the tendency to form electrically active oligomers and polymers. A simple, but mechanistically important feature is the ability of EDOT and a limited number of derivatives to be protonated in α-position of the thiophene ring by strong acids. The protonation—for example, performed by sulfuric acid or organic sulfonic acids, and more efficiently by trifluoro acetic acid—results in the formation of an active, electrophilic [EDOT-H] + intermediate. Hydrochloric acid leads to additional side reactions; trichloro acetic acid is far less active than the fluoro analog. The [EDOT-H] + is able to reversibly add to the basic C-2 of another EDOT molecule. The now formed intermediate may deprotonate to a dimeric structure, a 1,4-dihydro-thiophene derivative.

Properties of PEDOT:

PEDOT is used in electronic devices because of following properties:

- Highly flexible and can be bent up to 105 degrees and doesn't develop any cracks.
- Highly resistant to temperature the devices made of PEDOT are highly resistance to temperatures and can resist up to 260 degrees Celsius and work at several hours at range of 125- 150 degrees Celsius.
- Highly susceptible to UV exposure, these electrical devices naturally decay under UV radiation but with minimum protection devices made of PEDOT can withstand the UV decay better than any other polymers.
- PEDOT is hydro absorbent, once the dispersion is done on a surface the PEDOT absorbs the surrounding moisture and gives a swollen layer which helps in the durability and give the devices a better flexibility.

- PEDOT is the only polymer which can be synthesized as thin films which help in easy dispersion of the materials.

Applications of PEDOT:

PEDOT has numerous applications in the field of electronics. Few of them are:

1. Used as an electrolyte in the manufacturing of the solid-state electrolytic capacitors.
2. As coating for printed circuit board.
3. As new material substitute for Indium Tin Oxide (ITO).
4. As antistatic coating during manufacturing of electronic devices.
5. Used as a Hole transmission layer in OLEDs.
6. Used as a conductive ink by dispersion on electronic circuits.
7. Used as Hole Emission layer in smart windows.

INDUSTRY ANALYSIS

Industry analysis is made through PESTLE analysis, porters 5 force model and Competitor Analysis:

PESTLE ANALYSIS

According to PESTLE there are 6 factors which affect the industry externally they are as follows:

P: Political:

Political factors which effect the trade of this product are:

- Frequent change in the Trade regulations of polymer chemicals in China and japan.
- Opposition from Activist investors.
- Frequent change in the prices of Raw materials.

E: Economic:

Economic factors which effect the industry are:

- Fluctuations in currency markets.
- Rapid change in the economic conditions of the country.
- Highly unstable exchange rates.

S: Social:

Social factors which effect the industry are:

- Product safety and inspection
- Customization of product according to different customers to meet there needs and specifications.

T: Technology:

The technological advancements also play a major role in impacting the industry:

- Digitalization of supply chain in the different levels of the supply chain.
- Rise in sustainable Technology for manufacturing, logistics and different ways to be cost effective.

L: Legal:

Legally industry also faces the challenges in the industry

- IPRs and patents held by different organizations for particular method of production and dispersion will be major blow for other player in the industry.
- Environmental and pollution regulations also have an effect in the production.

E: Environmental:

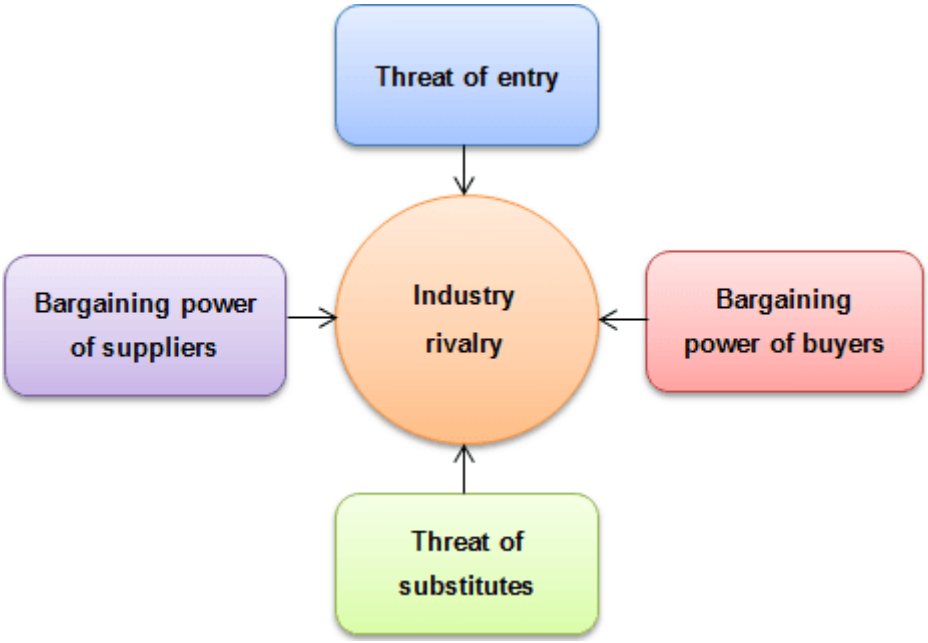
Environmental challenges faced by the industry are:

- Growing concern about the environmental effects by the production of these polymers.
- Reducing wastage and conversion into new resource building.
- Rise of environmental activist all over the globe to oppose the manufacturing.

Porters Five Force Model

Porters 5 force model describes the industry internal factors which affect the industry. Porters 5 force model has 5 major forces which decide the industry.

- Suppliers
- Buyers (customers)
- Substitutes
- New entrants
- Industry Rivalry.



Bargaining power of the suppliers

Bargaining power of the suppliers is high because

- Limited suppliers of the raw materials for the Conductive Polymers all over the globe.
- Technically niche market for the suppliers so they can bargain with the manufactures all over the world due to the scarce resources available all over the country and the world.

Threat of new entry:

Threat of new entry is low because

- Heavy capital investments required for establishing plants.
- Unavailability of distribution channels for the products.
- Very uncertain markets of Conductive polymers.

Bargaining power of buyers:

Bargaining power of the buyers is low because:

- No many manufacturers for these kinds of products.
- No other alternative for the buyers other than those manufacturers.
- Shifting technology towards conductive polymers has locked the legs of the buyers to buy from existing and the proven manufacturers
- Less availability of these types of materials all over the world.

Threat of substitute products:

Threat of substitute products are high because

- No extended knowledge of conductive polymers at present.
- Easily available substitutes like CNTs, Silver nano wires etc.

Industry Rivalry:

At present we can say that the industry rivalry in India is low to zero because of no available manufactures in India and the is a growing knowledge about the conductive polymers and most of the real competitors are present in the far east that is in Korea, China, Thailand and others in European countries, mainly in Germany. So, we can say that there is a moderate industry rivalry from outside of India.

COMPETITOR ANALYSIS

Competitor analysis we did was categorized into 6 different points:

1. Categorizing the competitors.
2. Examining the competitor's market and positioning.
3. Identifying our company market position.
4. Observing prices.
5. Shipping problems.
6. Social media reviews.

After studying all the above points, the competitor analysis is as follows:

As most of the competition is from outside of India the potential biggest competitors are

- QQ-chem works china.
- Wuhan chem works Thailand.
- Shenzhen feiming sciences China
- Hearus Germany
- Beili chemicals Korea

Most of the market is also spread across the far east and the European countries like Germany, Netherlands and Portugal. These companies have no problem in shipping because the manufacturing is done in the neighboring countries itself and the transportation cost is also less as they don't use standard US dollar for good exchange.

Our company has targeted OLED manufactures and capacitor manufacturers all over the globe where 80% are present in China, Taiwan and Korea. There is a trade shipping problem for Therapiva in case of shipping and these chemicals are toxic in raw form they are to have specific type of packing and careful shipping.

Coming to the pricing of the product the standard pricing the of the product is the 15,300 rupees i.e. converted to 220$ Marked including transporting and taxes so, pour company has very low production cost but the shipping costs of Therapiva are high due to very limited distribution channels available to the company through the far east they can make business.

Along with the price, the lead time has most affect on the business Therapiva has a delivery system that can deliver the good to the consumer in 5-7 business days. Others have 3-6 days delivery system because of the low transportation distances.

As per social media Reviews above mentioned companies are the one of the largest suppliers and bulk suppliers in east Asia and few companies in Europe.

From the above analysis I can summarize the competitor analysis the industry is pretty niche in India but outside of India the market has very high potential in growing in coming future.

COMPANY ANALYSIS

Company analysis was done through the SWOT analysis. SWOT analysis helps us in finding different aspects of the company can target and improve to become better in future.

SWOT stands for

- S- Strengths
- W- Weakness
- O- Opportunities
- T- Threats

Strengths:

- Main strength of Therapiva is well established pharmaceutical industry which is well funded by Neopharma.
- Having both R&B and manufacturing unlike others having separate units or manufacture only on contract bases.
- Good International presences of Neopharma helps to find different potential customers.
- Strong R&D with excellent innovation researchers.
- Highly equipped manufacturing based in India.

Weakness:

- No potential market in India to create a better and trusted business.
- Shipping problem to customers because of the different trade regulations.
- Weak tie-ups with different distributors for conductive polymers in the far east.
- No adequate evidence for the stable market in coming future.

Opportunities:

- Replacement of ITO in electronics industry.
- Increasing awareness of conductive polymers in the manufacturing of the electronic devices.
- Shift of companies for low cost products.
- Ban on production of these raw materials in china, the sole suppliers for global PEDOT manufacturers.
- Search of suppliers for the raw materials by the manufactures to trade all over the globe.

Threats:

- Obtaining new logistic providers in china and japan for the business.
- Exchange rate fluctuations in currency markets
- Gaining competitive advantage over Songwon (Gujarat based PEDOT manufacturer and has a good base in japan and Taiwan).
- Hardly available raw material provider from East Asia or from west.
- Heavy taxations for these chemicals in China and Korea.

From the SWOT analysis there is a good capability for the company to work on this market which may not instantly give you high profit margins but to build a base and work on maintaining the relationship with the suppliers and the buyers to have good competitive advantage over other companies and this technology will be at its peak in 4 to 5 years and which will give a edge over other companies.

RESEARCH METHODOLOGY

Research process Before putting light on the details of research methodology and techniques, it will be appropriate to present a brief overview of research process. Research process consists of a series of steps necessary to effectively carry out research. The following order is the various steps that provide a useful procedural guideline regarding the research process:

- Formulating the research problem.
- Defining Research objective.
- Development of working hypothesis.
- Preparing the research design.
- Determining sample size.
- Collecting the data
- Execution of the project.
- Analysis of data.
- Generalization and interpretation.
- Preparation of the report or the thesis.

Defining the process: A combination of both qualitative and quantitative research methodology was used in this project.

Step I: Qualitative Research Firstly a qualitative research was conducted which has given a better insight about the subject. The method has helped to understand the common factors as well as the brand popularity in the city and reasons behind it.

Step II: Quantitative Research Based on the feedback by the officer, customers, staff and the factors identified during the qualitative research, a quantitative research was conducted by designing a formalized questionnaire and the same was distributed to the target customers who visit the outlet regularly.

DATA COLLECTION METHODS

Data collection methods can be in two ways:

- *Primary data collection* – This can be collected from the observations made while conducting survey or the first-hand information. Primary data can be obtained through survey, questionnaires, interview of the focus group and so on. In this project, the source of primary data is a combination of interviews and questionnaires.
- *Secondary data collection* – Secondary data refers to those data which has already been collected by someone before who has already conducted a study in this subject. The sources of secondary data are from newspapers, journals, articles, websites, thesis and so the scholarly papers of various researchers and the newspaper articles have helped in understanding the strategies used by various companies to reach the target market.

I followed both collected the information of the market and the factors by secondary research by reading and analyzing different research papers on the basis of customers purchase intentions and the then the different company website which helps me to know about the product which effect the purchase intention.

Then from above secondary research I formulated a questionnaire with some help from the Marketing Head of Therapiva Mr. VS Rao and did float it through out the potential customers through repeated mailing through which I collected my primary data.

LITERATURE REVIEW

After carefully studying few research papers on purchase intention I have formulated a research model. Research papers I studied are:

1. Factors influencing purchase intention for luxury products by Brand M. Bruno in April 2018.
2. Purchase intention of customers towards consumer durables by Ms. Rimpy Goyal April 2014
3. Analysis factors affecting consumer purchase by Mr. Rashid Shafiq, Mr Irfan Raza November 2010

In the worst competitive market, the consumer products manufacturing industries pay attention on customer purchase intention for maintain their repute in market and enhanced their goodwill. Because loyal customer is good source for create revenue. This study learns and contributes the factors that affect customer purchase intention. The purpose of this study is to observe the effect of independent variable (customer knowledge purchase intention, celebrity endorsement and perceived value) on dependent variable (purchase intention). The study describes that the relation between dependent variable have significant relationship with purchase intention. This is quantitative study and sample size of this study is 47. And questionnaires were used for collection of data. The results of this study show that perceived value, customer knowledge, celebrity endorsement have significant relationship with purchase intention.

This research helps to categorize that among these aspects which factors have significant effect on the purchase intention of the patrons. In this wondrous world where penetration in the market in the presence of competitors is very problematic and challenging, it is very much important to determine the exact features, which the consumer wants. It will help the marketers to focus on the features of the product that are significant and are positively correlated with purchase intentions of the customers. The customer driven approach is applied to find out the perception of users to have an exact idea about preference and desires. Moreover, marketing managers are interested in consumer purchase intentions in order to forecast sales of existing and/or new products and services. Purchase intentions data can assist managers in their marketing decisions related top product demand (new and existing products), market segmentation and promotional strategies.

QUESTIONNAIRE DESIGN

The questionnaire is the structured technique for the collection of primary data in the marketing survey. This research employs a quantitative technique that is a questionnaire to collect the necessary data and information regarding the study. Questionnaires help to gauge the user perception and expectation to a large extent. Design of the questionnaire is based on literature research and individual interviews, combined with the specific circumstances of the study. The questionnaire is only an instrument for data collection and further analysis of the data is required to get accurate results from the data collected. Based on information's collected various variables were identified and to measure the variables, each variable is converted to a specific question. For the collection of responses, Likert Scale is used. Various research suggests that five is the most reliable scale (for example Excellent, Good, Average, Bad and Very Bad the corresponding assignment for the 5, 4, 3, 2,1) is used to rate the performance of the outlet directly. Design of the questionnaire, including two sections: The first part is basic information of the respondent. The second part is the performance survey indicator

SAMPLING DESIGN

1) *Target Population:* The target population of this research is the COO of different potential customers to Therapiva.
2) Sampling Elements: The respondents for the survey are primarily the customers who has very good knowledge of the industry and the products similar to that.
3) Sampling Technique: In this research, non-probability sampling is practiced. Under non-probability Sampling, convenience sampling is used in conducting the research. The Customers whose responses have been taken were selected because they have knowledge about the similar product or the original product
4) Sampling Size: In this research 47 responses were collected from different organization contact points manufacturing heads.

Management problem and research problem

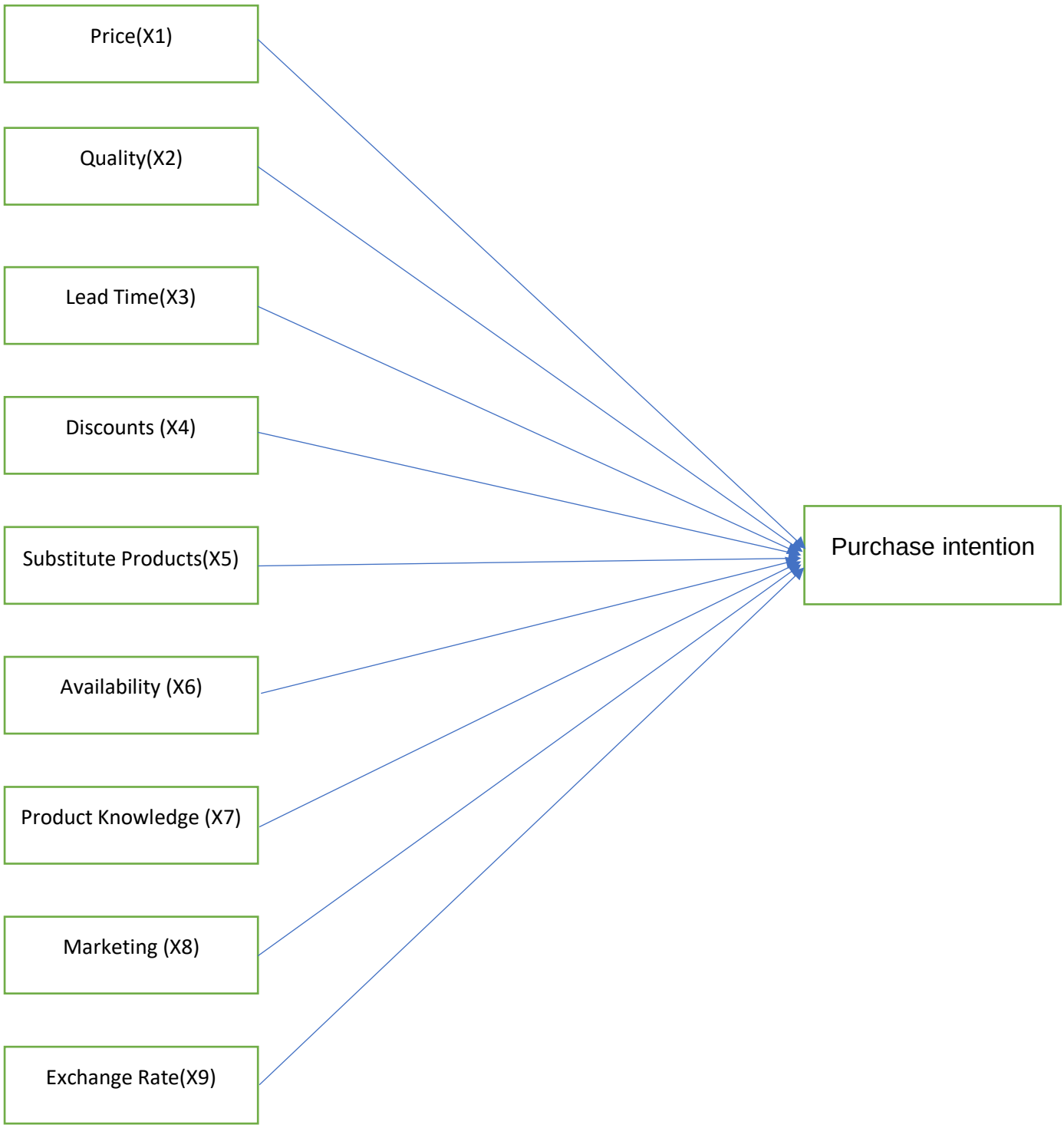
Management problem:
As the company are new to the market, they arent enough buyers for them to get into business my responsibility was to identify potential customers for new products.

1. So, management problem was to acquire costumers for conductive polymers.

Research problem:

2. What factors effect the purchase intention of the customers towards the conductive polymers?

RESEARCH MODEL



Variables:

Independent variables:

Every independent variable has underlying factors which explain them, so my independent variables are given as

- Price (product price, competitor price)
- Quality (efficiency, durability, impurity)
- Lead time
- Discount (offers, similar product offers)
- Substitute product (features, available)
- Product knowledge (experience, expertise, familiarity)
- Availability (online presence, offline presence)
- Exchange rate.
- Marketing website (website content, supplier website marketing)

Dependent variable:

My dependent variable is their purchase intention to buy my product.

HYPOTHESIS

Depending on the research model I formulated my hypothesis for each variable and collectively.

Null hypothesis (H0):

The purchase intention of the customers is not affected by the independent variables.

Alternate hypothesis (H1):

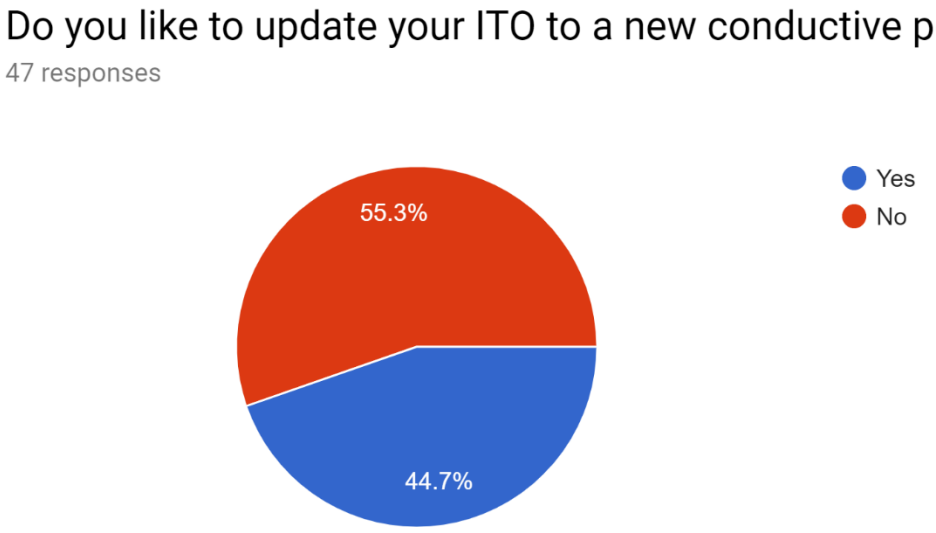
The purchase intention of the customers is affected by the independent variables.

Column1	Null Hypothesis(H0)	Alternate Hypothesis(H1)
price	price does not affect the purchase intention of customer	price do affect the purchase intention of the customer
quality	Quality does not affect the purchase intention of customer	Quality do affect the purchase intention of the customer
lead time	Lead time does not affect the purchase intention of customer	Lead time do affect the purchase intention of the customer
substitutes products	Substitutes does not affect the purchase intention of customer	Substitutes do affect the purchase intention of the customer
marketing	Marketing does not affect the purchase intention of customer	Marketing do affect the purchase intention of the customer
product knowledge	Product knowledge does not affect the purchase intention of customer	Product knowledge do affect the purchase intention of the customer
exchange rate	Exchange rate does not affect the purchase intention of customer	Exchange do affect the purchase intention of the customer
availability	Availability does not affect the purchase intention of customer	Availability do affect the purchase intention of the customer
offers	Offers does not affect the purchase intention of customer	Offers do affect the purchase intention of the customer

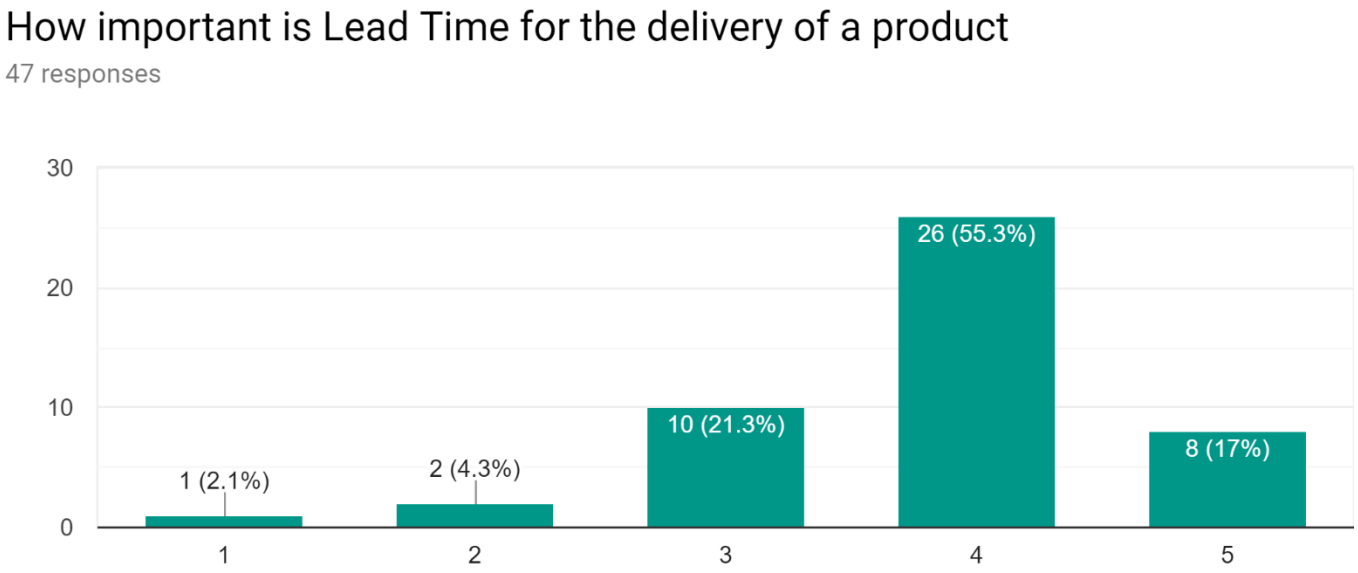
CHARACTERISTICS OF THE RESPONDENTS

Survey resulted in 47 responses as mostly each response represents an organization and I repeatedly mailed the emails I found out in different websites, LinkedIn and different service websites.

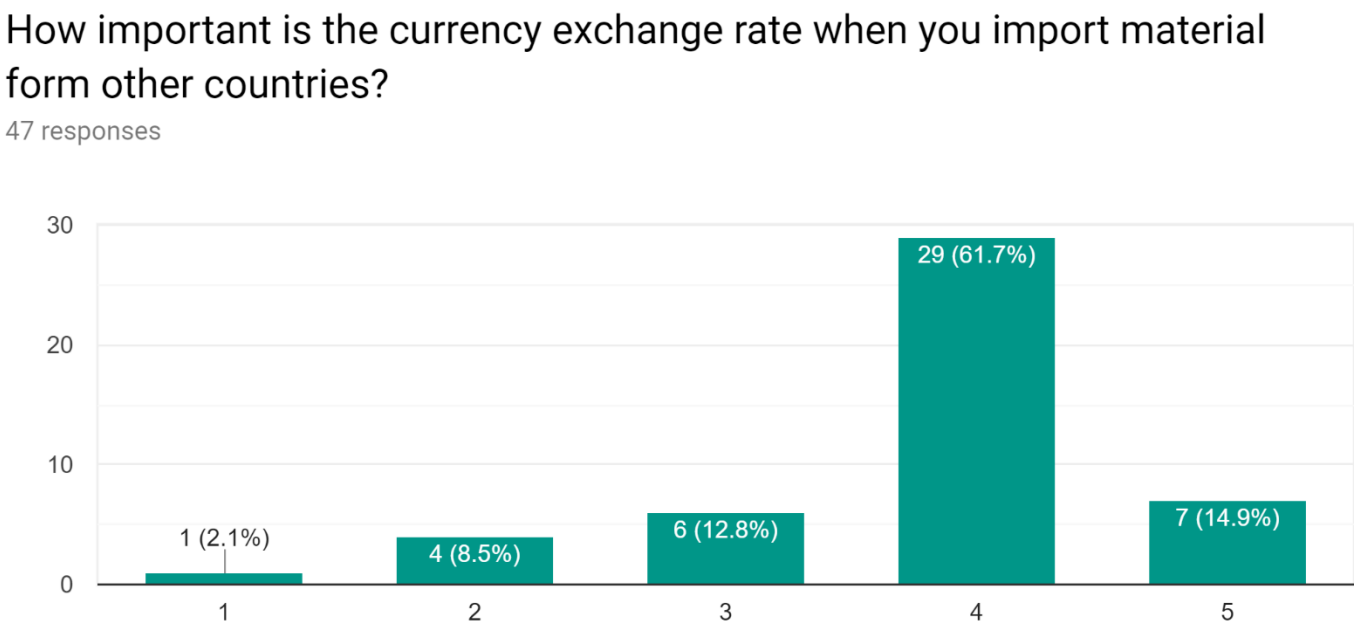
Each response is of the survey was done by the technical head or the operations officer of an organization who has the knowledge of the product or similar product and good take on the industry.



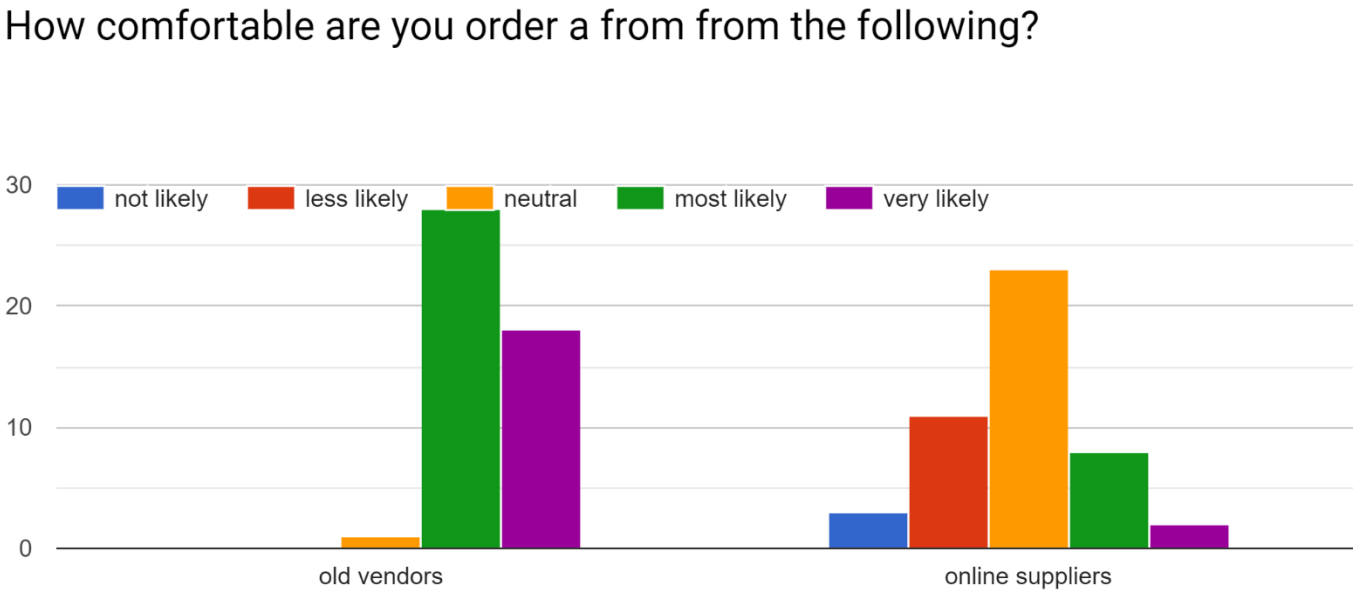
Most of the officers I interacted were keen on not to update there old ITO to newer PEDOT:PSS wherein I had to further investigate the reasons for not being interested in purchasing the new product available in the market.



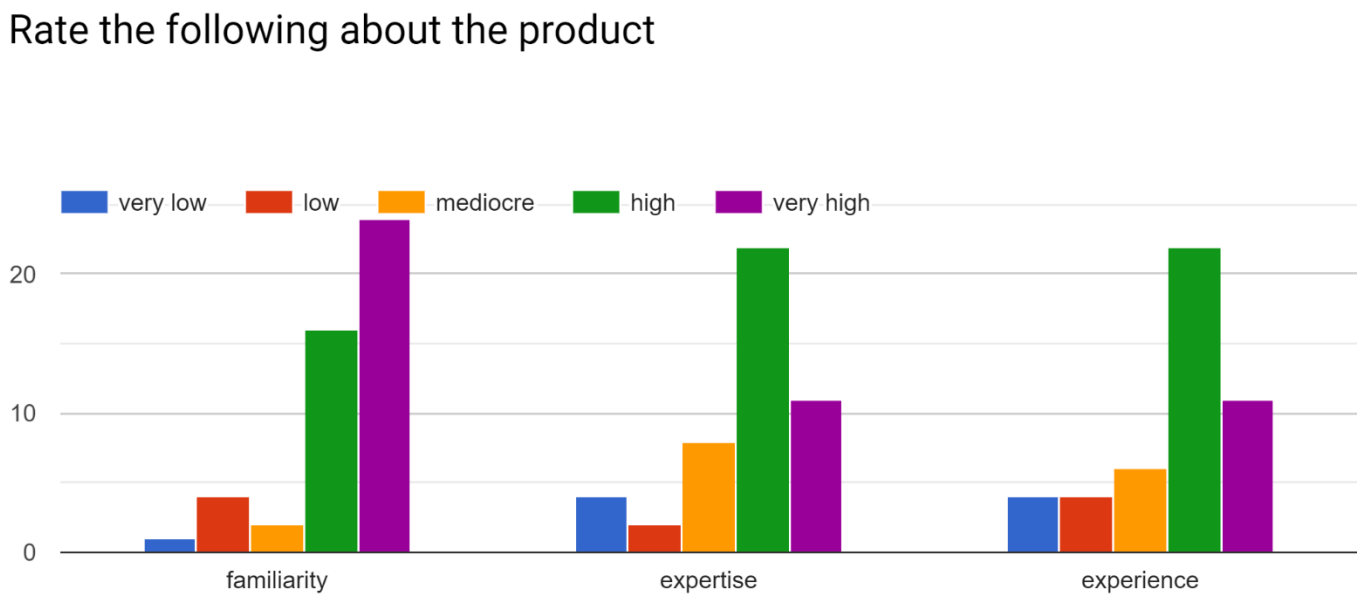
According to the survey lead time is important to the almost 72% of the people.



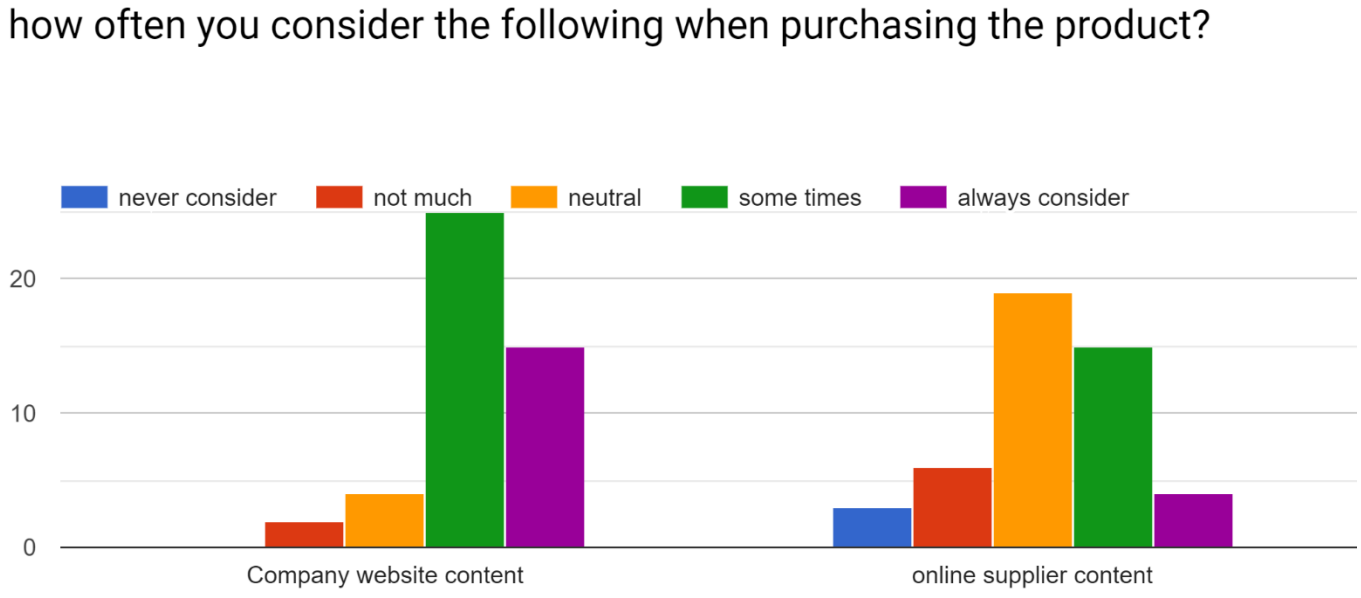
According to the survey 76% of the population voted that the exchange of the currency also plays a major role during the purchase of the product as it may bring down the production cost for the manufacturers when the buy the product when their currency is strong.



According to the survey most of the customers are tend to buy their supplies for the already existing suppliers and reluctant to change their vendors because it may hamper their relation with the old vendors and customers also have a very high resistance to ordering their supplies from the online suppliers or websites.



In conductive polymer market in the product knowledge, familiarity is voted highest and then the expertise and the experience is relatively voted to be moderately high which tells us if the product is familiar to the customer then there is a high chance of the customers inclined to purchase the product and there is also good chance of the product purchase intention is high.



In the marketing section the company website has most importance in the purchase behavior and the it will also improve the product knowledge of the customer and gives them the edge to sale more by giving more knowledge to them more inclined to purchase the product.

DATA ANALYSIS AND RESULTS DISCUSSION

Regression analysis And Correlation Analysis:

The term regression was first used as a statistical concept in 1877 by Sir Francis Galton He designed the word regression as a name of general process of predicting one variable (the height of children) from another (the height of the parent). Later, statisticians coined the term multiple regression to describe the process by which several variables are used to predict another.

Regression and Correlation Analyses show us how to determine both the nature and the strength of a relationship between two variables. Regression Analysis is a method of determine and establish a linear relationship between Independent and dependent variables. It shows the movement of the dependent variable along with the movement of the independent variable. Regression analysis is carried out on a function of the independent variable called as the regression function. Regression analysis is widely in use for prediction and forecasting. Regression analysis is also most of the times administered to determine the casual relationships between the variables provided data should be in matric form. Regression analysis can be parametric or non-parametric.

The accuracy of the regression analysis carried out is highly dependent on the accuracy of data used for analysis. The regression model consists of the following variables –

- Independent variable X
- Dependent Variable Y
- Unknown factors (Beta)

Regression can mainly be of two types. Simple linear regression and non-linear regression (also called multiple regression). This is based on the data that is acted upon for regression. When the regression is not linear, then the sum of squares must be minimized using an iterative function. The sample size for a regression model can vary according to the needs of the researcher.

Correlation Analysis:

Correlation Analysis is a method of statistical evaluation used to study the strength of a relationship between two, numerically measured, continuous variables (e.g. height and weight). This analysis is useful when a researcher wants to establish if there are possible connections between variables. It is often misunderstood that correlation analysis determines cause and effect; however, this is not the case because other variables that are not present in the research may have impacted on the results.

If correlation is found between two variables it means that when there is a systematic change in one variable, there is also a systematic change in the other; the variables alter together over a certain period of time. If there is correlation found, depending upon the numerical values measured, this can be either positive or negative.

From the correlation analysis we can interpret the relation between 2 variables and find out the dependency to which extend they have. The correlation of all the independent and dependent variables are shown in the figure below.

The level of correlation is divided into different levels as follows

- More than 0.5 – highly correlated
- Between 0.3 and 0.49 – moderately correlated
- Below 0.3 – low correlation.

Correlations

		purchase intention	price	quality	lead time	offers	substitutes	product knowledge	avaliability	exchange rate	marketing
purchase intention	Pearson Correlation	1	-.250	.585**	-.073	-.004	-.309*	.620**	-.027	.116	.180
	Sig. (2-tailed)		.083	.000	.618	.977	.031	.000	.856	.427	.216
	N	49	49	49	49	49	49	49	49	49	49
price	Pearson Correlation	-.250	1	-.126	.222	.359*	.376**	-.200	.197	.138	-.156
	Sig. (2-tailed)	.083		.390	.125	.011	.008	.169	.174	.346	.286
	N	49	49	49	49	49	49	49	49	49	49
quality	Pearson Correlation	.585**	-.126	1	.243	.077	-.269	.436**	.079	-.053	.363*
	Sig. (2-tailed)	.000	.390		.092	.601	.062	.002	.591	.719	.010
	N	49	49	49	49	49	49	49	49	49	49
lead time	Pearson Correlation	-.073	.222	.243	1	.174	.184	.227	.424**	.458**	.455**
	Sig. (2-tailed)	.618	.125	.092		.232	.204	.117	.002	.001	.001
	N	49	49	49	49	49	49	49	49	49	49
offers	Pearson Correlation	-.004	.359*	.077	.174	1	.352*	.106	.288*	.086	-.057
	Sig. (2-tailed)	.977	.011	.601	.232		.013	.470	.045	.558	.697
	N	49	49	49	49	49	49	49	49	49	49
substitutes	Pearson Correlation	-.309*	.376**	-.269	.184	.352*	1	-.278	.414**	.172	-.382**
	Sig. (2-tailed)	.031	.008	.062	.204	.013		.053	.003	.238	.007
	N	49	49	49	49	49	49	49	49	49	49
product knowledge	Pearson Correlation	.620**	-.200	.436**	.227	.106	-.278	1	.240	.294*	.209
	Sig. (2-tailed)	.000	.169	.002	.117	.470	.053		.097	.040	.150
	N	49	49	49	49	49	49	49	49	49	49
avaliability	Pearson Correlation	-.027	.197	.079	.424**	.288*	.414**	.240	1	.368**	.030
	Sig. (2-tailed)	.856	.174	.591	.002	.045	.003	.097		.009	.839
	N	49	49	49	49	49	49	49	49	49	49
exchange rate	Pearson Correlation	.116	.138	-.053	.458**	.086	.172	.294*	.368**	1	.231
	Sig. (2-tailed)	.427	.346	.719	.001	.558	.238	.040	.009		.110
	N	49	49	49	49	49	49	49	49	49	49
marketing	Pearson Correlation	.180	-.156	.363*	.455**	-.057	-.382**	.209	.030	.231	1
	Sig. (2-tailed)	.216	.286	.010	.001	.697	.007	.150	.839	.110	
	N	49	49	49	49	49	49	49	49	49	49

Form the correlation table we can say that

1. Purchase intention is highly correlated with Quality, product knowledge positively at significance level of 0.01 and negatively correlated moderately with the substitutes.
2. Price is moderately correlated to substitutes at 0.01 significance level and moderately with the offers they have at 0.05 significance level.
3. Quality is positively correlated with the product knowledge with 0.01 significance level
4. Lead time is correlated highly with the purchase intention and moderately with availability, exchange rates and marketing of the product.
5. Offers is positively correlated to the price and substitutes of the products at the 0.01 significance level.
6. Substitutes are moderately correlated to availability at 0.01 significance level.
7. Product knowledge is highly correlated purchase intention and moderately correlated to quality at 0.01 significance level.
8. Availability id moderately correlated with the lead time and exchange rate at 0.01 significance level.
9. Marketing is positively correlated to lead time and negatively substitutes.

All the variables which are correlated are related in such a way that the if one increases by one unit others will increase or decrease the by percentage of the correlated value depending on the sign before the correlation value.

Regression Analysis:

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.788[a]	.621	.534	.712	.621	7.105	9	39	.000

a. Predictors: (Constant), marketing, availability_X7, price_X1, Quality_X2, discounts_X4, exchange_rate_X8, product_knowledge_X6, Leadtime_X3, substitutes_X5

b. Dependent Variable: If a new product is launched how likely are you interested in buying?(Y)

From the regression summary we can see that the R^2 value of the model is 0.621 that can be interpreted as 62.1% of the variance in the dependent variable is explained by the independent variables.

Adjusted R^2 is 0.534 which tells us that the 53.4% of the variance is of the dependent variable is explained by the including independent variables i.e. the independent variables that have effect on the dependent variables.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.765[a]	.586	.558	.693	.586	21.196	3	45	.000

a. Predictors: (Constant), product_knowledge_X6, Leadtime_X3, Quality_X2

b. Dependent Variable: If a new product is launched how likely are you interested in buying?(Y)

The regression summary of the model when only affecting variable values are take and regression is performed and there is a change in the R^2 and the adjusted by minimal level but there is no significant change between the R^2 and adjusted R^2.

R^2 value before 0.621, R^2 value after 0.586

Adjusted R^2 before 0.534, R^2 value after 0.558

Anova test:

We can use a statistical technique which can compare these three treatment samples and depict how different these samples are from one another. Such a technique, which compares the samples on the basis of their means, is called ANOVA.

Analysis of variance (ANOVA) is a statistical technique that is used to check if the means of two or more groups are significantly different from each other. ANOVA checks the impact of one or more factors by comparing the means of different samples.

Another measure to compare the samples is called a t-test. When we have only two samples, t-test and ANOVA give the same results. However, using a t-test would not be reliable in cases where there are more than 2 samples. If we conduct multiple t-tests for comparing more than two samples, it will have a compounded effect on the error rate of the result.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	32.377	9	3.597	7.105	.000[a]
	Residual	19.745	39	.506		
	Total	52.122	48			

a. Predictors: (Constant), marketing, availability_X7, price_X1, Quality_X2, discounts_X4, exchange_rate_X8, product_knowledge_X6, Leadtime_X3, substitutes_X5

b. Dependent Variable: If a new product is launched how likely are you interested in buying?(Y)

From the ANOVA table we can see that the F value is 7.105 and the corresponding significance value or the P- value is 0.00 i.e. less than 0.05 we can say that the model is fit and we can rely on the results.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.562	1.259		-.447	.658
	price_X1	-.045	.172	-.031	-.262	.794
	Quality_X2	.902	.226	.489	3.994	.000
	Leadtime_X3	-.455	.176	-.364	-2.590	.013
	discounts_X4	-.035	.177	-.023	-.197	.845
	substitutes_X5	.076	.157	.070	.480	.634
	product_knowledge_X6	.462	.132	.465	3.494	.001
	availability_X7	-.203	.228	-.112	-.891	.378
	exchange_rate_X8	.233	.149	.195	1.569	.125
	marketing	.068	.186	.050	.365	.717

a. Dependent Variable: If a new product is launched how likely are you interested in buying?(Y)

From the coefficients table we can say that the if significance level is less than 0.05, they have effect on the dependent variable so in those cases the null hypothesis is rejected, and the Alternate Hypothesis is accepted i.e. the independent variables whose significance value or the P-value is less than 0.05 the has effect on the purchase intention.

Independent variables which have effect are:

1. Quality P-value (0.00)
2. Lead Time P- value (0.013)
3. Product Knowledge P-value (0.001)

For better understanding I ran regression test with only these 3 factors to see their effect that results are as follows:

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.315	.793		-.398	.693
	Quality_X2	.813	.200	.440	4.071	.000
	Leadtime_X3	-.365	.125	-.292	-2.926	.005
	product_knowledge_X6	.492	.107	.495	4.594	.000

a. Dependent Variable: If a new product is launched how likely are you interested in buying?(Y)

After performing the regression analysis, the on the 3 independent variables the all the factors have sig value less than 0.05 and all have rejected the null hypothesis and accepted the alternate hypothesis.

So, the regression equation for all the independent variables is given as:

Purchase intention = -0.562- 0.045(Price) + 0.902(Quality) - 0.455(Lead times) - 0.035(Discounts) + 0.76 (Substitutes) + 0.465 (Product Knowledge) – 0.203 (Availability) + 0.233(Exchange Rate) +0.68 (Marketing).

Regression equation when I ran the test only with the 3 independent variables which influences the purchase intention.

Purchase Intention = -0.315 + 0.813 (Quality) – 0.365 (Lead Time) + 0.492 (Product Knowledge)

Interpretation:

- With the increase in the one unit of quality the purchase intention of customer is increasing by 0.813.
- If the lead time increases by one unit the purchase intention decreases by 0.365.
- With the increase in the product knowledge the purchase intention can increase the purchase intention by 0.492.

Recommendations:

From the analysis I can recommend that the purchase intention for the conductive polymers are affected majorly by **product knowledge**, **Quality** and **Lead time.**

Therapiva has resources to improve the above-mentioned variables as follows:

- By maintaining the Market leader **Hearus Germany** standard quality who are the pioneer in the production of the conductive polymer **EDOT**.
- By investing in acquiring better logistics suppliers in china and Korea to reduce the lead time form present 10 days to less than 7 days to become more responsive and get in track with their supplier for Raw materials.
- Designing their catalogue of materials in their websites as there is a good chance to improve the product knowledge and listing there websites online with the definite amount of the product description to get the customers attracted to the product.
- Have healthy relation with the existing customers and make their supply chain visible to other companies in the business.

Limitations of the study:

Limitations of the study are:

- Very low availability of the resource knowledge to the companies.
- No presence internationally for the company in this market which hampered the communication between me and many manufacturers.
- Very low number of manufacturers all over the world, around 102 which we tapped for responses which they turned out to be 47 responses.
- Lack of product knowledge to the manufactures as this technology is still in building its own foundation.
- Not enough background evidence to study deeper about the product.

Scope for Improvements in the future:

As far as my knowledge about this product, this has a high potential market in the future because the market of electronics is shifting itself towards the transparent and flexible electronics and our product will be a very essential part of those devices.

From 4 to 5 years from now I can see the product reigning in the market at high demand so, there is a definite competitive advantage for Therapiva if they are starting the product market by now there may be new markets entries if Therapiva can improve the above factor and can fight with Songwon I can they will be market leaders by then.

Questionnaire Appendix

Research to find out what factors affect the purchase intentions of customers about new product in a market

This questionnaire is made to find out what are the factors that affect the purchase intentions of customers about new product launched in the market and find out the major attributes that mostly contribute to the success of the product. In this research Questionnaire Substitute products are ITO, silver nano ink and carbon nano tubes. New product is PEDOT:PSS (conductive polymer). we tend to find out the effective measures which will lead the product to get success in the market.

1. Organization name *

Your answer

2. Do you like to update your ITO to a new conductive polymer PEDOT: PSS

1.Yes

2 No

3. If a new product is launched with similar properties of your compound how likely are you interested in buying? *

Not Likely
1
2
3
4
5
Very Likely

4. How important is the price when you buy a product? *

	least important	not important	neutral	important	very important
Price					

5. How much do you give importance to substitute product price when buying a product?

least important
1
2
3
4
5
very important

6. Mark the following with respect to importance while buying a product

	least important	not important	neutral	important	very important
durability					
purity level					
efficiency					

7. How important is Lead Time for the delivery of a product

least important
1
2
3
4
5
very important

8. How do following effect your purchase behaviour?

	least effective	not much effective	neutral	somewhat effective	very effective
offers					
substitute discounts					

9. How much substitute product availability effects your buying?

Does not effect
1
2
3
4
5
very much effects

10. Does the substitute product availability attract you to buy the product?

not likely
1
2
3
4
5
most likely

11. Rate the following about the product

	very low	Low	mediocre	high	very high
familiarity					
expertise					
experience					

12. How comfortable are you order a from the following?

	not likely	less likely	neutral	most likely	very likely
old vendors					
online suppliers					

13. How important is the currency exchange rate when you import material from other countries? *

Not important
1
2
3
4
5
Very important

14. How often you consider the following when purchasing the product?

	never consider	not much	neutral	sometimes	always consider
Company website					
online supplier					

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