A Study on Factors Influencing Encoder Market in India - Brief Survey

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ABSTRACT

This Encoder research paper includes the key factors which are associated with respect to the marketing perspective and starts with brief introduction about the encoders. It states its application, features, and advantages. Theoretical background behind the encoder market is described in this research report.

This research gives the information about the current trends in encoder industry and their key features and applications in various end user industries. According to the classification the encoder's end user industry, the competitor analysis is done. For that smart guide is prepared for encoder products. This research also deals with the major challenges in front of encoder industry which affect its market growth. Why these challenges are occurred is also explained in this research report.

Keywords

Encoders, Market Research, Competitors, Encoder Application Sector, Absolute, Incremental, Magnetic, Optical,

1. INTRODUCTION

1.1 Encoder

An encoder is a device, circuit, transducer, software program, algorithm or person that converts information from one format or code to another, for the purposes of standardization, speed or compression. Encoders are sensors that can capture position information of various pieces of equipment and relay the data to other devices. Industrial encoders can determine the position, velocity, and direction of a mechanical equipment or motion and assist in the precise control of industrial applications.

By type, industrial encoders can be divided into rotary encoders and linear encoders. The rotary encoder reads the angle of an object in a circular motion, while the linear encoder detects the position of an object through linear motion. The encoder market research report investigates the international Major Market players in detail. This report provides key statistics on the market status of the Encoder Manufacturers and is a valuable source of guidance and direction for companies and individuals interested in the Encoder Industry.

1.2 Features of Encoder

- High Resolution
- High Accuracy
- High Repeatability
- Robust to all types of environment
- Long duration
- Compatible to various communication protocols

1.3 Application area of encoders

- Aerospace and Defense
- Automotive
- Renewable Energy
- Scientific, research and analysis
- Electronics and Semiconductor
- Heavy industry
- Medical and healthcare
- Metrology
- Oil and Gas
- Machine Tools
- Factory Automation
- Steel and Metal Industry
- Printing and Textile Industry
- Lifts and elevators
- Packaging
- Construction and Infrastructure
- Environment and Safety
- Food Industry
- Mobile Automation
- Motor and Drives
- Wood and Stone Working

1.4 Advantages of Encoder

- Highly reliable and accurate
- Low-cost feedback
- Integrated electronics

- Fuses optical and digital technology
- Can be incorporated into existing applications
- Compact size

1.5 Current Trends in encoder market

- Interface Standardization
- Displaying the status of a system through LED
- Highly accurate magnetic encoder (Accuracy close to optical encoder)
- Installation space optimization
- Bearing less encoders
- Analog interfaces replaced by digital interfaces
- Single cable solutions in motor feedback area
- Intervention of IIOT in Encoder industry

1.6 Industry Experts Thought-process

Encoder market is expected to witness double digit growth over the coming years, growing at more than 10%, in value terms within next 10 years. The growth in the global encoder market can be attributed to the emerging need for accuracy, precision and control in the industrial sector. The increasing penetration of sophisticated automation equipment in industries such as automotive, electronics, etc. is accelerating the sales of encoder at a rapid rate across developed as well as developing nations. In addition to this, the ability of encoders to provide real-time data is aiding the industry experts to bring accuracy in workflow, enhance operational speed and ease process control. Consequently, the high productivity solutions offered by encoders are propelling the growth of global Encoders market through 2023.

2. OBJECTIVE OF RESEARCH

- To study and analyze the encoder market based on various parameters.
- To study the existing encoder market.
- To identify the factors affecting the encoder market.
- To identify target customer list for encoders.
- To evaluate different competitors on various aspects.
- To forecast the future market size of the encoder industry.

3. RESEARCH DESIGN

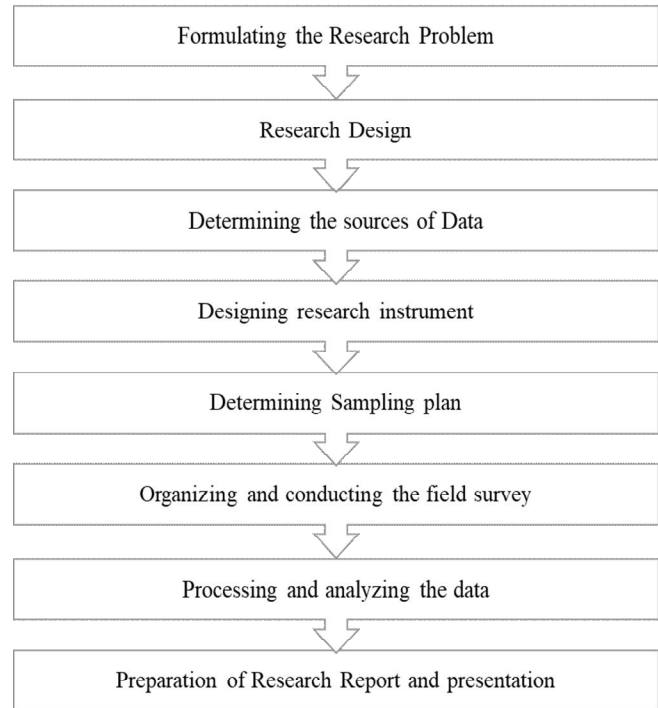The whole process is divided into following steps:

Figure 1: Research Design Process

3.1 Model – Graphical Model

Below shown graphical model is designed as per the requirement for growth of encoder market in India. This encoder market growth is mainly depend upon 4 major key aspects.
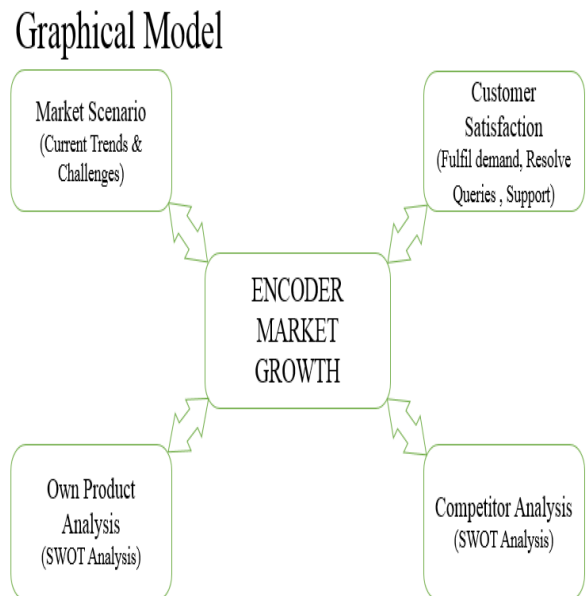

Figure 2: Graphical Model for Research

3.1.1 Current Market Scenario

This includes the current market trends, activities which are going on for the development of encoder industry.

3.1.2 Customer Satisfaction

Customer review for the product is more essential for the market growth. For encoder market customers are from manufacturing industries, Healthcare equipment industry, Printing and textile industry,

3.1.3 Company's product analysis

This company's product analysis is nothing but the SWOT analysis of company's own product. It includes the product strengths, It's application area, Performance of product in different applications which may be good or poor. Future opportunities for the product to expand. And threats which affects the products performance and its industrial growth.

3.1.4 Competitor analysis

To sustain in the market with good ranking company has to take its competitors performance into company's decision process. Company must track its competitors to develop the business in different application sectors. Company must try to know the strengths and weaknesses of their competitors.

3.2 Qualitative Research Applied for Encoder Market Survey

According to its technical specifications, types, and technology it is used in different application sectors. So it is required to compare encoder product with its similar products from competitor companies. By comparing its use, technical specifications, repeatability, accuracy this research study should be used to plan the marketing strategy of encoder in industry.

Also, according to need and requirements of customer Research study should be able to give an idea to customer about the suitable encoder product from among the various encoder product which are manufactured by company. While comparing competitor's encoder product we have to be specific about technical specification, and features of all encoder products. Also, in pricing issues researcher should have to study the price ranges, or discount if competitors are providing to their customers. According to that company is able to decide the pricing of the encoder considering their profit margin. Therefore, this information is specific which may not be get very easily by researcher. That's why information from the company's people, information through magazines published by company, information from their exhibitions held at different locations, will be required for the market survey of encoders. Hence choosing qualitative research for encoder market survey is better.
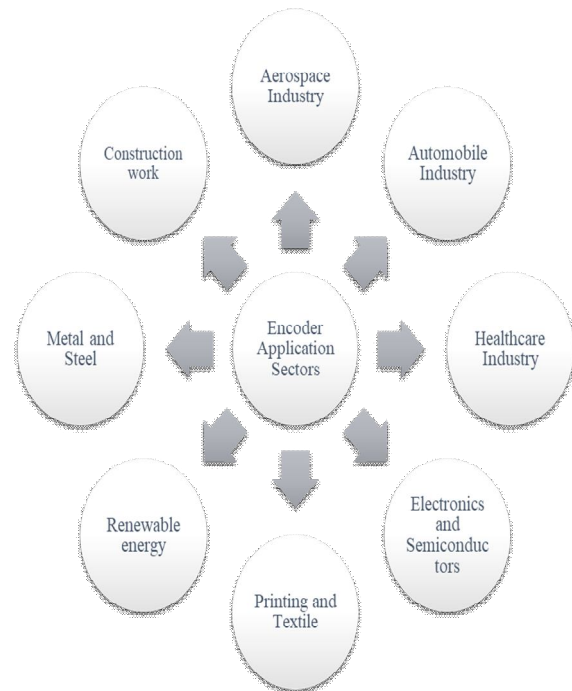
3.3 Research Population

Figure 3: Research Population

For the encoder product, the population considered for research study is encoder's application sectors. As given in the figure Encoder product has various application sectors in the industry. Among those some major sectors are considered here for research population. Application wise features and specifications may be different for each encoder product.

3.4 Sampling Tools and Techniques used for Research

Sampling methods used for the research study is No probability sampling. Non-probability sampling includes following methods

- Convenience Sampling
- Quota Sampling
- Judgments Sampling
- Snowball Sampling

Out of above sampling tools, in the research study, Judgments Sampling, and Snowball Sampling is used.

3.4.1 Judgments Sampling

It is also known as selective, or subjective, sampling; this technique relies on the judgment of the researcher when choosing who to ask to participate. This approach is often used by the media when canvassing the public for opinions and in qualitative research. Judgment sampling used in this research design because of its population present in the application sector. From various number of application sectors of encoders, major application sectors are covered in the research study. Types of encoders used in selected application sectors, their technological requirements to

the applications, and efficiency of the encoders in those applications are studied in the research.

3.4.2 Snowball Sampling

This method is commonly used in social sciences when investigating hard-to-reach groups. Existing subjects are asked to nominate further subjects known to them, so the sample increases in size like a rolling snowball.

Snowball sampling can be effective when a sampling frame is difficult to identify. Snowball sampling used in this research because major applications when further extracted or classified, the new applications were occurred, where these encoders are used. For example, when we talk about Encoders application-Renewable energy industries, this further extracted as

- Oil and Gas industries
- Wind turbine industries
- Solar equipment manufacturers

So as the number of companies in sub-application areas is combined together it seems to be increasing in the number of companies under the application area as Renewable energy. So, the numbers of companies who are using, or may be planning to use the encoders for those particular applications, were also increasing.

3.5 Data Collection Methods

Table 1: Data Collection Methods

Primary Sources	Secondary Sources

• Interview/Surveys through Telephone, emails
  o Industry Experts
  o End User Customers
  o Competitor's Survey
  o Channel Partners
• Observations
• Experiments
  o Lab Trials
  o Field Trials
	• Internal
	  o CRM System
	  o Data Mining
	  o Computerized Database
	  o Product manual
	• External
	  o Magazines, Directories, Publications
	  o Websites, Blogs
	  o Product manual (Competitor)
	  o Industry Sources
	  o Company Annual report

Above table shows the data collection method for the research study of encoder market survey. From above methods maximum data collected mainly from secondary sources. Primary sources are used for limited purpose.

4. DATA ANALYSIS & INTERPRETATION
4.1 Encoder Market

Encoders are sensors that can capture position information of various pieces of equipment and relay the data to other devices. Industrial encoders can determine the position, velocity, and direction of a mechanical equipment or motion and assist in the precise control of industrial applications. By type, industrial encoders can be divided into rotary encoders and linear encoders. The rotary encoder reads the angle of an object in a circular motion, while the linear encoder detects the position of an object through linear motion.

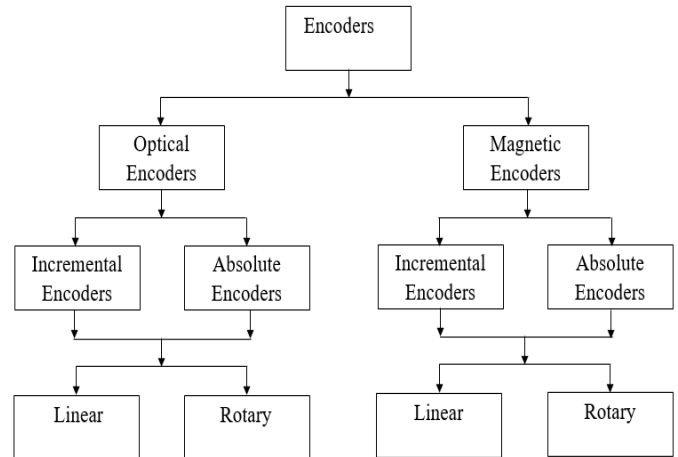## 4.2 Classification of Encoders

Figure 4: Classification of Encoders

4.3 Major Encoder Manufacturers in Industry

Below table shows the list of Encoder manufacturers. Worldwide there are number of encoder manufacturers are present. Among those major 50 companies are chosen for research who have high market share and also provides the services in India.

Table 2: List of Major Encoder Manufacturers

1	Acu-Rite	28	Jayashree Encoders
2	AK Industries	29	Koyo
3	AMS	30	Kubler
4	ASM	31	Leine And Linde
5	Atek	32	Lenord+Bauer
6	Autonics	33	Maxon Motors
7	Avago Technologies	34	Mitutoyo
8	Balluff	35	Nemicon
9	Baumer	36	Noris
10	BEI Sensors	37	Omron
11	Bourns	38	Opkon
12	Datalogic	39	Pepperl+Fuchs
13	Dunkermotoren	40	PositalFraba

14	Dynapar	41	Precizika Metrology
15	Electronica	42	Red Lion
16	Elgo Electronic	43	Renishaw
17	Exxelia	44	Rockwell Automation
18	Fagor	45	RsfElektronics
19	Faulhaber	46	Scancon
20	Gefran	47	Sensata
21	GiviMisure	48	Sick
22	GPI	49	Siko
23	Hangstler	50	Tamagawa
24	Heidenhain	51	TR Electronic
25	Honeywell	52	Turck Holding
26	Hubner	53	US Digital
27	IFM Electronics		

4.4 Major Key Application Sectors of Encoders

Below table shows various application sectors where Encoders are used as per applicability.

Table 3: List of Key Application Sectors of Encoders

Aerospace and Defense	Factory Automation
Automotive	Steel and Metal Industry
Renewable Energy	Printing and Textile Industry
Scientific, research and analysis	Lifts and elevators
Electronics and Semiconductor	Packaging
Heavy industry	Construction and Infrastructure
Medical and healthcare	Food Industry
Metrology	Communication
Machine Tools	Wood and Stone Working

4.5 Factors Affecting the Growth of Encoder Market

- **Methodology**
  - Using social media for data collection and analysis
  - Response rates:
  - Privacy and security issues
- **Clientele**
  - Customers expect insights far too quickly
  - Customers have dwindling budgets for Market Research
  - Customers need to be re-educated but are resistant

- **Outcomes**
  - Lack of actionable insights
  - Lack of timeliness
  - Lack of honest/integrity by data insights providers
- **Quality**
  - Samples are not representative
  - Respondents are dishonest or unthoughtful
  - Leads to incomplete, careless, and dubious responses
  - Statistical assurances are not provided
  - Can't afford the good data
- **Internal Talent**
  - Lack of experience and expertise
  - Lack of critical thinking
  - A transition from quality to quantity
  - Customers don't value MR expertise and insights

4.6 Frequency of Companies in Various Application Sector

Below figure shows the graphical representation of frequency of companies in various application sectors. This horizontal bar chart represents number of companies which are present in each application sectors. For the analysis major application areas are covered in research.
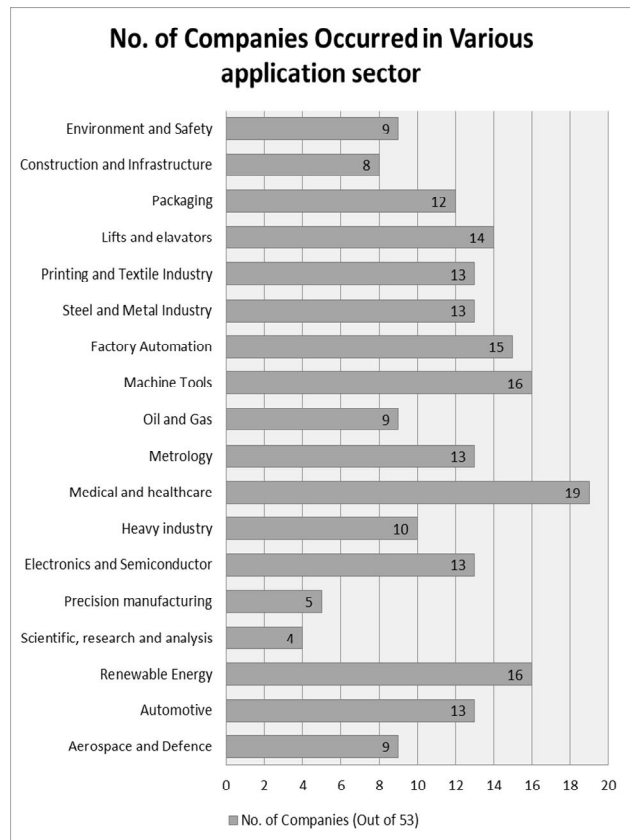

Figure 5: Frequency of Companies in Various Application Sectors

From the above bar-chart it is clear that maximum use of encoders are occurred in Medical and healthcare industries. i.e maximum companies are focuses on medical healthcare industry market for the sale of encoders. Out of 50 companies maximum 19 companies are providing encoders and related services to healthcare industry. Besides healthcare industry, encoder manufacturers are focusing more on Machine tools industry (16), Factory automation sector (15), Renewable energy companies (16), lift or elevator manufacturer companies (14), Packaging companies (12), In Printing and textile industry, Steel and Metal Industry, Metrology, Automotive, and Electronics industry 13 companies each, provides the encoder products. In Comparison with above industry below industries shows the less applications of encoders. In Construction companies, Heavy Industries, and aerospace & defense field moderately less companies are providing services related to encoders. But in scientific research field (4) and precision manufacturing industry (5), very few companies are there who provides encoders to them. From above analysis there is scope to increase the sale of encoders in scientific research field, precision manufacturing, construction companies, and heavy industries.

4.7 Analysis and Interpretation

Data is collected from the telephonic and e-mail survey. The information from this survey describes the buying behavior of respondents while purchasing the encoders for their applications.

As mentioned previously, research population for this survey, are the different customers from major application industries where this encoder product is used. Total 150 companies out of 400; have given their responses on e-mail and telephonic survey.

Sample frame: Major application industries where encoders are mainly used.

Sample Size: 150 respondents

Sample element: Line engineers, Quality Head

Table 4: No of Respondents from different application sector

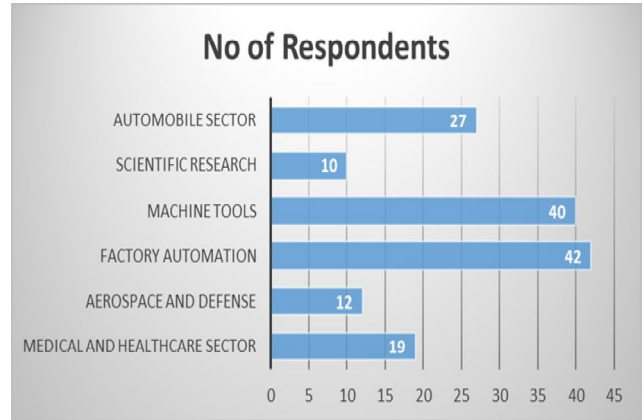| Application sectors	No of respondents
Medical and Healthcare Sector	19
Aerospace and defense	12
Factory Automation	42
Machine tools	40
Scientific research	10
Automobile sector	27
Total	150

Figure 6: Comparisons between numbers of respondents

The survey conducted for encoder market, maximum 42 respondents from factory automation sector had given the response. From automobile sector, scientific research, machine tool manufacturers, aerospace and defense sector and medical & healthcare sector, 27, 10,40,12,19 respondents had given the response respectively.

Table 5: Usage of electronic devices for linear or angular position measurement in respondent's machinery

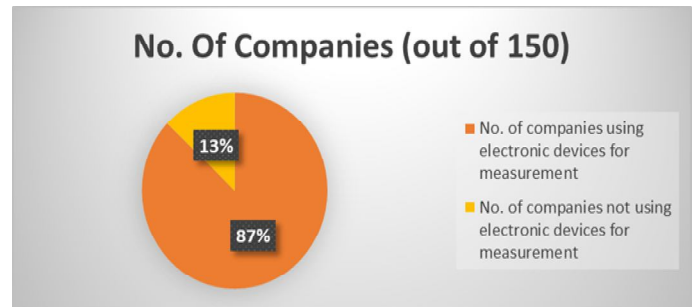|	No of companies	Percentage
No. of companies using electronic devices for measurement	131	87%
No. of companies not using electronic devices for measurement	19	13%
Total	150	100%

Figure 7: Comparisons between numbers of companies

87% companies are using electronic devices for position measurement, while 13% companies are not using this for position measurement

Table 6: Organization's encoder preference for position measurement

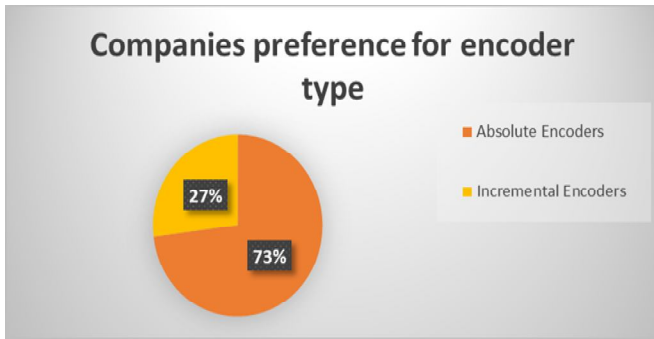| organization's encoder preference for position measurement	Percentage	No. of Companies
Absolute Encoders	73%	109
Incremental Encoders	27.00%	41
	100	150

Figure 8: Encoder type companies preferences

Maximum 73% companies give preference to absolute encoder while other companies are using incremental encoders.

Table 7: As per company's application encoder's usage in companies

Encoder Usage by application	Percentage	No. of Companies
Shaft Encoders	42%	63
Linear Encoders	21%	31
Rotary Encoders	37%	56
Total	100%	150
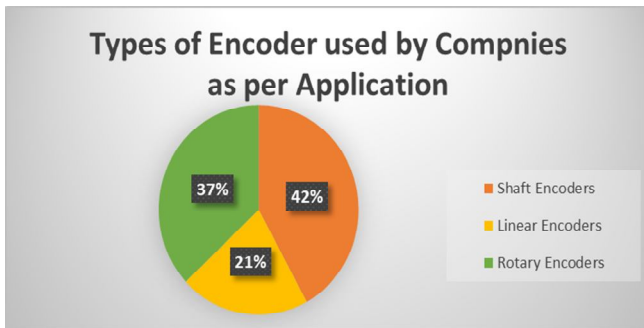
Figure 9: Type of encoder used by companies

As per application 42% respondents are using shaft encoder in their companies. 37% & 21% companies are using Rotary encoders and linear encoders respectively.

Table 8: Company's preference for encoder technology

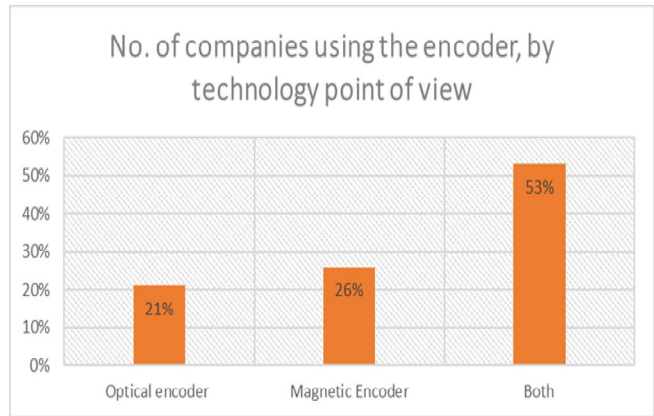| Encoder technology Preference	Percentage	No. of companies
Optical encoder	21%	31
Magnetic Encoder	26%	39
Both	53%	80
	100%	150

Figure 10: No. of companies using encoder

Table 9: Selection parameters while selecting encoders

Selection Parameter	No. of companies
High resolution	43
Accuracy	36
Repeatability	28
Connectivity to communication protocols	22
Robustness	21
Total	150
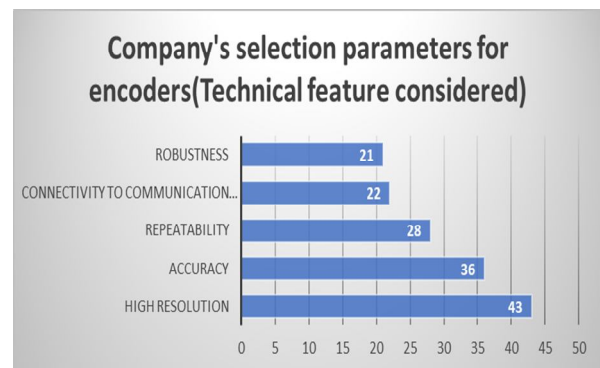
Figure 11: Company selection parameters

From above chart it is understood that companies are selecting their encoder product mainly on its resolution (43%) and accuracy (36%).

Table 10: Selection factor while selecting encoders

Selection Factor	No of companies
Quality	71
Durability	14
Price	7
All	58
Total	150

71 companies mainly give importance to quality, irrespective of its price. While 7 companies are mainly concerned with price of encoder. But 58 companies are looking towards all the aspect while selecting the encoder for their application.

Table 11: Reason behind change/replacement of encoders

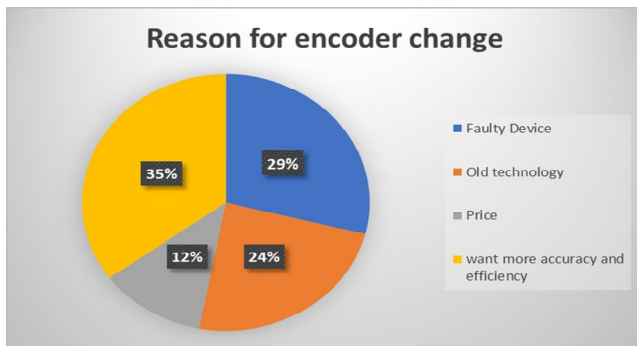| Reason for change	Percentage
Faulty Device	29%
Old technology	24%
Price	12%
want more accuracy and efficiency	35%
	100%

Figure 12: Reason for encoder changes

Reason behind change in encoder product is, companies want more accuracy in position measurement, for efficient working of their application. Almost 35% companies fall in this category.
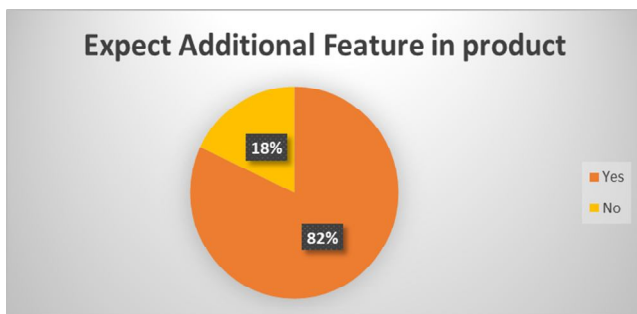

Figure 12: Expectation of additional features in encoders for better productivity

82% companies think that more additional features should be invented in encoder product for better productivity.
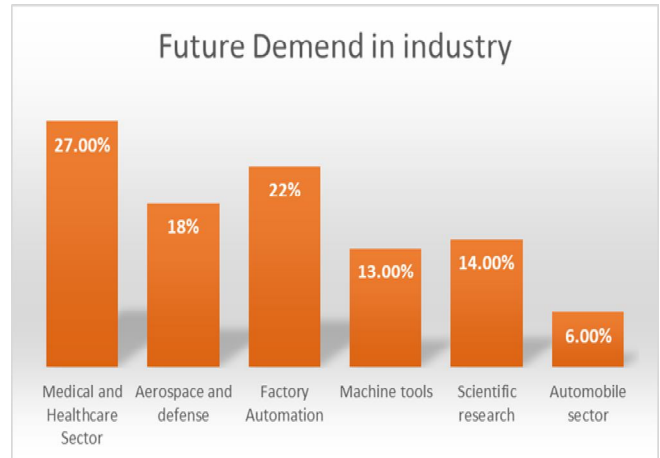

Figure 14: Prediction about the future demand in various industries

According to the 27% respondents in medical and healthcare sector there will be more demand in future. While 22% respondents gave preference to factory automation sector for future expansion of encoder business. Reason behind asking this question to respondent is, these respondents are mainly line managers and quality head. So, they have almost 15 to 20+ experiences in different industries. Therefore, point of view is also essential while looking for expansion of encoder market.

5. FINDINGS AND CONCLUSION
5.1 By Application Sector Perspective
- Through this research it is known that encoder market has tremendous scope to grow in India, as Encoders are useful in various application sector.
- Encoder Industry is leading in mechanical and metrology field, so it will gain more importance to grow the encoder market in India.
- In Automotive sector, as well as in Medical and Healthcare sector encoders are used in wide range.
- Also in Machine Tools industry, Electronics industry, Renewable energy, Factory automation encoders are used due to its property of high accuracy, high repeatability, and accurate precision. As in those industries, accuracy is more important.
- In Aerospace industry and heavy industries Encoders are also useful. But in scientific research field and precision manufacturing industry, there is less usage of encoders, which should be increase for better result in research area.

5.2 By Major Key companies Perspective
- From the competitor analysis it is understood that 50% of encoder market in India is captured by only 6 companies out of 50, and rest market is shared by remaining industries.
- This analysis is done by inspecting the frequency of occurrence of companies in different application sectors.

5.3 By Technical features perspective
- Encoders manufactured are in different types. These encoders are used to find the linear as well as angular

position. So, by its usability it is classified as Linear Encoder and Rotary Encoders.

- By technology It is further classified as Magnetic encoder and Optical encoder. It is observed that in Industry most of the encoders used are magnetic encoder.
- Also, in motor application encoders are used widely, therefore Rotary (Shaft) encoders are used widely.

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