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IMED-JMSR
JOURNAL OF BV(DU) IMED, PUNE - 38.

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Volume 15, Issue I
Jan - June 2024

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Editors:

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Published and Printed by :

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I/C Director, Bharati Vidyapeeth (Deemed to be University),
Institute of Management and Entrepreneurship Development, Pune.

More Vidyalay Campus, Erandwane, Paud Road, Pune 411038.

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On behalf of :

Bharati Vidyapeeth (Deemed to be University), Institute of Management and Entrepreneurship Development, Pune.
Erandwane, Paud Road, Pune 411038.

Laser Printing at,

Bharati Printing Press

More Vidyalay Campus, Erandwane, Paud Road, Pune 411038.

Printed at :

Bharati Printing Press

More Vidyalay Campus, Erandwane, Paud Road, Pune 411038.

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Prof Dr. Vivek Saoji
Vice Chancellor
Bharati Vidyapeeth
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Vice Chancellor speaks

I am privileged to introduce the latest edition of the Journal of Management and Social Research (JMSR). Educational institutions play a vital role in cultivating bright minds and fostering a culture of continuous learning, innovation, and research. Bharati Vidyapeeth's commitment to achieving global recognition, particularly through its research initiatives, is a key step toward this goal. The journal holds significant value for both academics and practitioners, offering a rich variety of theoretical and empirical research papers and articles. Research not only enhances learning but also builds confidence and raises public awareness, contributing to the holistic development of scholars in various aspects of their lives.

I applaud IMED for launching JMSR, acknowledging it as an important platform for sharing impactful research, ideas, and insights. I am confident in IMED's ongoing pursuit of excellence in teaching, research, and outreach activities, and I look forward to witnessing even greater achievements in the future.

My heartfelt congratulations and best wishes go to the editorial board, authors, and everyone involved with JMSR, in recognition of their dedicated efforts and commitment.

Prof Dr. Vivek Saoji

Director's Message



Dr Ajit More
I/C Director-IMED

Wishing everyone good health, safety, happiness, and prosperity in 2024. May the year bring joy, success, and abundant blessings to all.

In today's fast-paced, interconnected world, comprehensive and inclusive management education is more important than ever. It's essential to provide students with the skills and knowledge they need to successfully navigate the complexities of the modern business environment. Alongside managerial and technical expertise, developing strong research capabilities is a must. Through the Journal of Management and Social Research (JMSR), we ensure that research aptitude is given equal importance alongside managerial and technical knowledge.

IMED Journal of Management and Social Research (JMSR) offers a diverse collection of research articles, including case studies and book reviews, with a wide-reaching impact across various business fields. As a leader in the field of management, this journal strives to document and discuss cutting-edge research. The primary focus remains on emerging sectors, particularly

research that explores practical applications in societal and consumer contexts, both at individual and industrial levels. We hope that the featured research will serve as a model of excellence in its journey. The JMSR aims to promote and share knowledge that addresses the complexities of the multidisciplinary management field, making it invaluable for both academics and practitioners through its blend of theoretical and empirical research.

Research not only fosters knowledge and learning but also builds confidence, raises public awareness, and ultimately transforms scholars – academically, socially, and personally.

I am delighted to see that IMED JMSR has been so well received by both academics and corporate professionals. We are fortunate to be part of a collaborative scholarly community, one that is marked by past successes and poised to seize the opportunities of the future. This editorial serves as a call to reaffirm the importance of research in management and to emphasize research integrity as a cornerstone of our academic community.

India has the potential to become a growth engine for the global economy, and innovation, creativity, and research will empower our nation to lead the world's growth. Let us come together in our efforts toward nation-building. I extend my heartfelt thanks to all the authors for their contributions and look forward to continued support in the future.

I appreciate your dedication to JMSR and send my best wishes and warm regards to you and your families.

Dr. Ajit More
I/C Director-IMED

From the Editor's Desk

Greetings!

Welcome to the Journal of Management Science and Research (JMSR) by IMED. This issue showcases the efforts of authors who have successfully bridged the gap between academia, industry, and society. The edition has been carefully crafted to provide an enriching platform for scholars, encouraging them to explore and share their research insights.

In this issue, we present a diverse range of research papers that highlight key areas of business and management, including management, technology, finance and investment, customer satisfaction.

One of the research work focus on comparative market study of Ener-G-Africa Limited's product offerings in Malawi against competitors. Other researcher have focused on study of Challenges faced by small entrepreneurs in selling products through e-commerce. Research work on analysis of consumer satisfaction with various smartwatch brands are also done by the authors. One research work has concentrated on development of a mini sugarcane juice extraction machine. Stock preferences of customers in the stock market is also studied by the researchers.

An extensive amount of effort and research has gone into the development of this journal, and we hope the impact of these research papers reflects that dedication. Through JMSR, our goal is to engage a broader audience of researchers and foster the advancement of cutting-edge work. We encourage experimentation, discussions, and analysis across a wide range of disciplines, stimulating thought and innovation in diverse fields.

We extend our sincere gratitude to all our readers, contributors, and authors for their continued support over the years. Your patronage has played a vital role in building a solid foundation, making research a cornerstone in the institute's growth and development.

We also invite submissions for our upcoming issue as we strive to further enhance JMSR and realize its full potential.

Happy reading!

Editors

Dr. Ranpreet Kaur

Dr. Deepali Kadam

Research at IMED

BVDU IMED acknowledges the increasing significance of research within the realms of Management, technology and Social Sciences. To facilitate and direct research endeavors, the institution has formulated a comprehensive research policy to inspire faculty members and students alike to embark on research projects of societal, national, and industrial relevance.

One of our primary objectives is to encourage interdisciplinary collaboration and the exchange of knowledge. By fostering an environment conducive to research, innovation, and implementation, we aim to contribute positively to societal progress.

In line with this vision, IMED actively promotes a research culture among students. We motivate them to publish their research findings in collaboration with faculty members through our journals, "Reflections and JMSR". Our institution ensures effective coordination of research activities across different departments with the aid of internal and external experts.

Furthermore, we prioritize research capacity building and adopt a systematic approach to promote research excellence. This involves organizing workshops on research methodology and grant writing, as well as seminars on research ethics and intellectual property rights.

Through research collaborations, we engage in joint research projects, facilitate faculty exchanges, and develop collaborative research protocols. These partnerships enhance our research output and contribute to the advancement of knowledge in Management and Computer Applications.

Faculty members at IMED are actively engaged in writing research papers that are published in reputable databases such as Scopus, Web of Science, and UGC CARE. Additionally, they are diligently pursuing research funding opportunities. Moreover, many of them have successfully registered and obtained patents for their innovative work.

IMED's holistic approach to research encompasses support, coordination, ethical oversight, capacity building, and collaborations. This underscores our commitment to fostering a dynamic research environment and driving innovation in the fields of Management and Computer Applications.

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A comparative analysis of products offered by Ener-G-Africa Limited in Contrast to competitors: A Comprehensive Market Study In Malawi

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Renewable Energy Specialist

ABSTRACT

This research study aims to conduct a detailed comparative analysis of the products offered by Ener-G-Africa Company Limited in comparison to its key competitors within the market. The primary objectives is to identify and assess the strengths, weaknesses, opportunities and threats associated with the product portfolios of both Ener-G-Africa company limited and its competitors. Through a combination of quantitative and qualitative research methods, this study seeks to provide valuable insights into the competitive landscape, market positioning and potential areas for improvement. The study conducted in ten (10) sites in Lilongwe City, encompassing both urban and rural areas in the central region of Malawi. These areas are significant locations where solar energy operate their businesses and where a portion of their customer base is found. The survey data collected from participants underwent rigorous quantitative analysis using Microsoft Excel. This statistical examination delved into key metrics, demographic trends, and numerical patterns, providing a quantitative foundation for understanding consumer's preferences, satisfaction levels, and the overall market landscape. The quantitative data were coded, and tables, figures and graphs were used to present the data. The results show that Ener-G-Africa lags behind by failing to provide agents in the geographical areas where awareness of the products offered by Ener-G-Africa is lacking. This oversight can lead to the loss of potential customers and reduce returns for the company. It is recommended that Ener-G-Africa could explore partnerships with financing institutions or government subsidy program to make their products more accessible to low-income consumers. Offering flexible payment plans or subsidies could help mitigate the upfront costs associated with purchasing solar energy products, making them more affordable and attractive to a wider audience.

Keywords: competitors, Ener-G-Africa, market, preferences, products, satisfaction levels

Introducing

In an era marked by dynamic market landscapes and ever-evolving customer preferences, companies must navigate a highly competitive terrain to secure their position and thrive. One pivotal aspect of this competitive struggle lies in the products a company brings to market and how they compare to offerings from rival

entities. This research embarks on a comprehensive exploration of this critical dimension, focusing on the product portfolio of Ener-G-Africa Company limited in direct comparison with its key competitors. In this exploration aims to uncover the distinctive features, strengths, opportunities and weaknesses of these offerings, shedding light on

the competitive landscape in the renewable energy sector. Additionally, I will investigate the strategies that Ener-G- Africa plans to employ in order to outshine its competitors and establish itself as a leader in the solar energy market. Product competitiveness is crucial in the contemporary business environment for several reasons. Firstly, in a globalized market place, businesses often operate on a highly competitive stage where customers have access to a wide array of choice. A product's competitiveness becomes a key factor influencing customers' decisions, as they seek value, quality and innovation. Secondly, in an era driven by technology and rapid advancements, staying competitive ensures relevance. Businesses that consistently enhance and innovate their products remain at the forefront, meeting evolving customer demands and preferences. Thirdly, product competitiveness directly impacts brand perception and loyalty. A strong competitive product can contribute to building a positive brand image, fostering customer trust, and encouraging repeat business. A final development is to change the perspective on how we view competitive behavior and conduct analyses. The rapid growth of information and communication technologies, in terms of speed and volume, can provide buyers, sellers and competitors with access to information that was previously unthinkable. The proliferation of internet usage in the last decade has radically altered our view of competition. This development is likely to continue, and our ability to use this technology will be a deciding factor in the survival of any business in the future. Businesses must continually assess and adapt to these factors to stay competitive in dynamic markets. Regular market research, monitoring of consumer trends, and a commitment to improvement are essential for maintaining product competitiveness over time.

Objectives of the study

General objective

The general objective of this research is to provide a holistic understanding of the strengths, Weaknesses, opportunities, and threats inherent in the product portfolios of Ener-G-Africa Company and its competitors. By adopting a blend of quantitative and qualitative research methods aim to unravel insights that transcend conventional market analyses. Through rigorous examination, I aspire to offer actionable recommendations that can contribute to Ener-G-Africa Company's sustained growth and competitive advantage.

Specific objectives

The specific objectives of the research were:

- Assess and compare the features, specifications and technical attributes of Ener-G-Africa Limited's products with those offered by competitors.
- Investigate the pricing strategies employed by Ener-G-Africa Limited and its competitors, analyzing the cost effectiveness and perceived value of their products.
- Assess the market penetration strategies of Ener-G-Africa, focusing on distribution channels, partnerships and market positioning and compare these strategies with those of key competitors.
- Assess customer satisfaction levels and preferences for the products of Ener-G-Africa Limited and its competitors through surveys and feedback analysis.
- Examine the market positioning of Ener-G-Africa Limited and its competitors, considering factors such as market share, brand image, and customer perception.
- Investigate how consumers perceive the

brand image, environmental impact, and overall reputation of Ener-G-Africa Limited in contrast to competitors considering factors such as energy efficiency and overall sustainability.

- Explore current market trends and innovations in the renewable energy sector, identifying how Ener-G-Africa Limited aligns with or differentiates from these trends.
- Identify the strength and weaknesses of Ener-G-Africa Limited's products and compare them with those of competitors to understand areas of competitive advantage and improvement.

Literature Review

- The energy sector is undergoing significant transformations globally, with a growing emphasis on sustainable and eco-friendly solutions. In this context, Ener-G-Africa Limited has emerged as a key player, offering a diverse range of products in the renewable energy sector. This research aims to conduct a thorough comparative analysis of the products provided by Ener-G-Africa Limited in contrast to its competitors, shedding light on market dynamics, product quality and the company's positioning in the industry.
- **Renewable Energy Market Trends:** To understand the broader context, it is essential to explore current trends in the renewable energy market. Studies by Jones et al. (2019) and Smith and Brown (2020) highlight the increasing global demand for sustainable energy solutions and the subsequent rise in competition among companies to meet this demand. This context will serve as a foundation for evaluating Ener-G-Africa's market

presence.

- **Competitor Landscape:** Understanding the competitive landscape is essential for a comprehensive analysis. Research by Johnson and Davis (2022) delves into key competitors in the renewable energy sector, emphasizing the importance of product differentiation and market positioning. This review will aid in benchmarking Ener-G-Africa against industry rivals.
- **Product Quality and Reliability:** The quality and reliability of renewable energy products are crucial factors influencing consumer's choice. Studies by Garcia et al. (2018) and Wang and Chen (2019) examine the parameters affecting product quality in the renewable energy sector. Evaluating these aspects will contribute to assessing Ener-G-Africa's standing in terms of product performance.
- **Consumer Perception and Satisfaction:** Consumer perception and Satisfaction play a pivotal role in shaping a company's market share. Analyzing studies by Kim et al. (2020) and Li and Zhang (2021) on consumer preferences in renewable energy market will provide insights into how Ener-G-Africa's products are perceived by customers compared to those of its competitors.
- **Market Dynamics and Regulatory Environment:** The renewable energy sector operates within a dynamic market influenced by regulatory policies. Research by Brown and Miller (2018) and Patel et al. (2022) explores the impact of regulatory environments on market dynamics. Understanding these factors is essential for contextualizing the competitive landscape faced by Ener-G-Africa.

- According to Millennium Challenge Account-Malawi Electricity Supply (2018), Malawi's power sector is one of the most severely constrained in Sub-Saharan Africa – less than 10% of the population of 18 Million is connected to the electrical grid. For the 80% of the people living in rural areas, access to electricity is less than 1%. The total installed capacity for power generation in the interconnected grid of Malawi operated by Electricity Supply Corporation of Malawi (ESCOM) is approximately 362 Megawatts (MW), of which 351MW is hydropower and 11 MW is reciprocal engines (diesel sets). Some off grid photovoltaic installations exists but are few. With the majority of Malawi's hydropower generation derived from the Shire River located south of Lake Malawi, the hydrology of the river determines, to a great extent, the available output of electricity at any time.
- Estimates indicate that shortage of capacity frequently exceeds 60 MW, or over 17% of peak demand in Malawi. With no reserve margin and a stressed system, the reliability and quality of electricity supply is poor. Malawi depends on domestic generation, as these are currently no significant interconnections to neighboring countries. Considerable investment in new infrastructure is necessary to improve security and regularity in supply and meet a growing demand. To this effect, the Government of Malawi has developed a number of strategies in the energy sector, including power sector reform, rural electrification, biomass energy and renewable energy.
- The emerging trend of reforms in the power sector in Malawi, coupled with the increased interest from independent power producers (IPPs) in developing new generation capacity, presents a strategic opportunity for Ener-G-Africa Limited to venture into the business of selling solar products and improved cookstoves. The statement mentions that a significant number of potential developers, exceeding 30, have expressed interest in collaborating with Government of Malawi (GoM) to establish independent power projects, with a predominant focus on Solar PV. This signals a growing demand for renewable energy solutions in the country.
- For Ener-G-Africa Limited, specializing in solar products aligns seamlessly with the current market dynamics. Solar PV projects are at the forefront of renewable energy revolution, offering clean and sustainable electricity generation. By capitalizing on this trend, Ener-G-Africa can position itself as a key player in meeting Malawi's increasing energy needs while contributing to the country's goal of diversifying its energy mix and reducing reliance on traditional sources.
- Furthermore, the mention of some IPPs considering projects in coal, heavy fuel oil (HFO), and small hydropower underscore the importance of emphasizing clean and environmentally friendly solutions. Ener-G-Africa Limited can differentiate itself by promoting solar products as a more sustainable and eco-friendly alternative, aligning with global efforts to combat climate change.
- In addition to solar products, the reference to "improved cookstoves" also provides an avenue for Ener-G-Africa to diversify its offerings. Improved cookstoves, often designed for energy efficiency and

reduced environmental impact, can address a pressing need in many households, especially in rural areas. Ener-G-Africa could leverage its expertise to provide communities with access to cleaner and more efficient cooking solutions, contributing to both energy access and environmental sustainability.

- By strategically entering the market with a focus on solar products and improved cookstoves, Ener-G-Africa Limited can not only align itself with the ongoing reforms in the power sector but also play a pivotal role in advancing Malawi's sustainable development goals. This approach positions the company as a responsible and forward-thinking contributor to the country's energy landscape.

Problem statement

In the rapidly evolving landscape of renewable energy solutions, Ener-G-Africa Limited has emerged as a key player, offering a diverse range of products aimed at sustainable energy generation. As the company continues to expand its product portfolio, it becomes imperative to conduct a thorough examination of the competitive market to assess the strengths, Weakness, Opportunities and threats associated with Ener-G-Africa's offerings.

This research project aims to conduct a comprehensive comparative analysis of the products offered by Ener-G-Africa Limited Concerning its competitors within the renewable energy sector. The study will delve into various dimensions, including technological specifications, pricing structures, market penetration strategies, customer satisfaction levels and environmental impact.

Research methodology

Research design

A mixed research approach was involved, combining both qualitative and quantitative methods in order to gain a more comprehensive understanding of a research problem. in the context of this study on the comparative analysis of solar products offered by Ener-G-Africa Limited and its competitors (Solar Works Company, Sunsite Company and Zuwa Energy Company) in the renewable energy sector, a mixed-methods approach would help provide richer insights into market dynamics, consumer perceptions and product quality.

Study area

The study conducted in ten (10) sites in Lilongwe City, encompassing both urban and rural areas in the central region of Malawi. These areas are significant locations where solar energy operate their businesses and where a portion of their customer base is found.

Data collection

- **Primary Data**

Primary data for this research study were meticulously gathered through a comprehensive approach. Surveys were employed to capture quantitative insights, in-depth interviews were conducted to delve into nuanced perspectives, and focused group discussions were organized to facilitate interactive dialogues with key stakeholders involved in the renewable energy sector. This primary research data has collected from a sample size of 200 respondents across ten sites in Lilongwe City, encompassing both urban and rural areas where customers are found.

- **Secondary Data**

Secondary data were systematically compiled from diverse and credible sources to enhance the depth of this research study analysis. This involved a thorough review of extensive market reports, a meticulous examination of company publications, and a detailed scrutiny of financial reports. These sources collectively offered valuable supplementary information, enriching and complementing primary data findings.

In addition to the primary and secondary data collected through surveys, interviews, focus groups, market reports, company publications and financial reports, the research also benefited from supplementary information obtained from diverse sources. This included the exploration of relevant literature in books, as well as comprehensive searches on internet, ensuring a well-rounded and thorough understanding of the subject matter.

Sample Selection

The sampling strategy employed for this research was thoughtfully designed to ensure a representative and comprehensive approach. Random sampling was utilized for surveys, allowing for a diverse and unbiased selection of participants, thus contributing to the generalization of the survey findings. In parallel, purposive sampling was employed for interviews and focus groups deliberately selecting participants based on their expertise, relevance to the research objectives, and specific criteria essential for obtaining in-depth insights. This dual approach aimed to capture a broad spectrum of perspectives while also delving deeply into the nuanced experiences and opinions of targeted individuals, thus enhancing the overall richness and validity of the data collected.

Data analysis and Interpretation

In this research study, a robust analysis approach will be employed to glean meaningful insights into the comparative landscape of products offered by Ener-G-Africa Limited and its competitors. The analysis will encompass quantitative, qualitative, and comparative methodologies, ensuring a comprehensive understanding of the market dynamics.

- **Quantitative Analysis**

The survey data collected from participants underwent rigorous quantitative analysis using Microsoft Excel. This statistical examination delved into key metrics, demographic trends, and numerical patterns, providing a quantitative foundation for understanding consumer's preferences, satisfaction levels, and the overall market landscape. The quantitative data were coded, and tables, figures and graphs were used to present the data.

- **Qualitative Analysis**

Qualitative data gathered from in-depth interviews and focus group discussions were subjected to thematic analysis. This method allowed for the identification and exploration of recurring themes, pattern, and insights embedded within the rich narratives provided by participants. Qualitative analysis aimed to uncover nuanced perspectives, opinions, and experiences related to the renewable energy products under scrutiny.

Comparative Analysis

To facilitate a structured comparison of products, a comprehensive framework was developed, taking into account key parameters such as efficiency, cost-effectiveness, and environmental impact. This comparative analysis offered a systematic evaluation of how

Ener-G-Africa Limited’s products differed from those of its competitors, providing a holistic view of strengths, weakness, opportunities, and threats in the market.

Data analysis and Interpretation-

Secondary data Analysis

- **Assess and Compare the Features, Specifications and Technical attributes of Ener-G-Africa Limited’s Products with those offered by competitors**

The Assessment and comparative of features, specifications and technical attributes of solar products and improved cookstove are intended for comparison with competitor’s products in terms of durability, functionality, product quality and reliability.

This comprehensive assessment of solar products and improved cookstoves was undertaken with the primary goal of facilitating a thorough comparison with competitors’

offerings. The assessment encompassed a detailed analysis of factors such as durability, efficiency, product quality, and overall reliability. By meticulously scrutinizing these key elements, the aim was to discern the strengths and potential areas of improvement in our own products, ensuring that our offerings stand out in terms of long-term performance, quality, and customer satisfaction when coexisting with those of industry counterparts.

To compare the features and technical specifications of solar products of different sizes, including inverters, and solar batteries, data were collected from three selected solar companies and analyzed. The analysis of these technical specifications for each product has assisted in making informed decisions regarding areas of improvement to ensure sustainability in the market.

Table 1: displays the technical specifications of the Solar panels in different sizes from four solar companies.

Company Name	Product Model	Efficiency (%)	Power output (W)	Durability (years)
Ener-G-Africa	EGA 20W solar Panel	18	22.29W	12
	EGA 150W solar Panel	18	150W	12
	JAM72S20-460W Solar	20.60	460W	12
Sunsite	Jinko 20W Solar Panel	18	20W	7
	Jinko 150W Solar Panel	18.10	150W	10
	Canadian 460W Solar	19.50	460W	12
Zuwa Energy	MESM-20W	18.43	20W	12
	AEM5-60 150W	13.96	150W	12
	AE460TMC-144BDS	21.20	460W	25
Solar Works	MESM-20W	18.43	20W	12
	EGE-150M-36	19	150W	10
	Canadian 460W Solar	19.50	460W	12

Analysis and Interpretation from Table 1: Features and Technical Specifications

- a) **Efficiency:** All companies offer solar panels with efficiency above 13.96%, with Zuwa energy having the highest efficiency of 21.20%. When Solar panels have high efficiency, it is interpreted that they can convert a larger percentage of sunlight into electricity, which is desirable for several reasons to customers:
 - i. **Cost-Effectiveness:** High-efficiency panels can provide more energy output with a smaller number of panels. This can be cost-effective in terms of installations, maintenance, and the overall system cost per unit of energy produced, which will be beneficial to the customers.
 - ii. **Performance in Low-Light Conditions:** High-efficiency panels often perform better in low-light or partially shaded conditions, where lower-efficiency panels

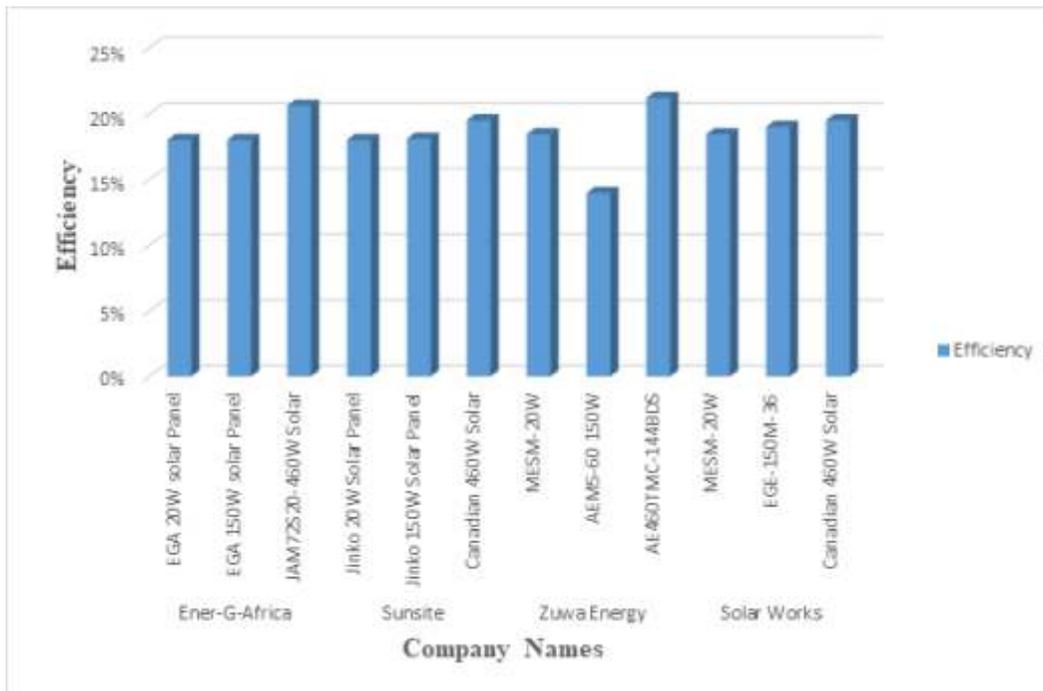
might struggle to generate electricity effectively.

- b) **Power Output:** Power output varies from 20W to 460W, depending on the model and company. This also gives customers the decision-making power to choose the type of solar model and its brand when buying solar products.
- c) **Durability:** Durability features include UV resistance and warranty periods ranging from 7 to 25 years. Longer warranty periods generally indicate a higher level of confidence in the product’s durability. This is interpreted as Zuwa Energy and Solar Works offering solar panels with longer warranty periods, indicating higher confidence in durability.

The efficiency provided by different solar products from various solar companies can also be illustrated in Figure 1

Figure 1: Illustrate solar panel efficiencies from various solar companies

In this graph, the highest bars represent the level of efficiency achieved by different solar panels



In this graph, the highest bars represent the level of efficiency achieved by different solar panels. This implies that solar panels with higher efficiency values are more effective in converting sunlight into electricity. Essentially, efficiency serves as a key indicator of the

effectiveness of solar panels, with higher values signifying a greater ability to harness solar power generation. This factor can influence customers to opt for solar products with higher efficiency.

Table 2: displays the technical specifications of the inverters in different sizes from four solar companies.

Company Name	Product Model	Efficiency (%)	Rated Power(W)	Life Span (years)
Ener-G-Africa	EGA 1200VA	80	720	10
	EGA MKS 3kVA	90	2400	10
	EGA 5000MKS	100	5000	10
	EGA 7.2kVA	100	7200	10
	EGA 8kVA	100	8000	10
	EGA 10kVA	100	10000	10
Sunsite	Must Pv15-10212-1.2kVA	90	900	8
	Must PV18-3024-3kVA	90	3000	8
	Must 5kVA	90	5000	8
	Sungrow 7.2kVA	100	7200	8
	Must 8kVA	90	8000	8
	Must 10kVA	90	10000	8
Zuwa Energy	Sungrow 1.2kVA	93	1200	10
	Sungrow 3kVA	97.7	3000	10
	Sungrow 5kVA	97	5000	10
	Sungrow 7.2kVA	97	7200	10
	Sungrow 8kVA	98	8000	10
	Sungrow 10kVA	98	10000	10
Solar Works	Mecer 1.2kVA	90	1200	2
	Mecer 3kVA	98	3000	5
	Mecer 5kVA	98	5000	5
	Mecer 7.2kVA	98	7200	5
	Mecer 8kVA	98	8000	5
	Must 10kVA	90	10000	5

From the Analysis of above table, it is evident that the efficiency and Lifespan/ durability of inverters vary across brands and models.

a) Ener-G-Africa

- **Efficiency**

Consistency high efficiency: Ener-G-Africa's products consistently exhibits high efficiency levels, with most models operating at 100%. This indicates that their inverters are capable of converting a significant portion of input power into usable output power, minimizing energy losses during the conversion process.

- **Lifespan**

All products from Ener-G-Africa have a lifespan of 10years. This longevity suggests a commitment to durable and reliable designs, providing customers with a decade of efficiency power conversion

b) Sunsite

- **Efficiency**

Moderate efficiency with a Trade-off in Lifespan: Sunsite's products, while featuring a respectable efficiency of 90%, are slightly lower than Ener-G-Africa's. This could be a consideration for users seeking maximum energy conversion. However, the trade-off comes with a reduced lifespan of 8years. Users may need to balance their priorities between efficiency and long-term reliability when choosing Sunsite products.

c) Zuwa Energy

- **Efficiency**

Good efficiency across Models: Zuwa Energy's products showcase a range of good efficiency levels, varying from 93% to 98%. This suggests a commitment to

providing customers with options that balance high energy conversion rates with product diversity.

- **Lifespan**

Consistent Long Lifespan: Similar to Ener-G-Africa, Zuwa Energy's products also boast a 10-year lifespan. This consistency reinforces the idea of a reliable and durable product line.

d) Solar Works

- **Efficiency**

Mixed Efficiency Levels: Solar Works' products demonstrate a mix of efficiency levels. While the Mecer 3kva and above models boast high efficiency at 98%, the Mecer 1.2kva model falls behind with a 90% efficiency. This variation might be a consideration for users with specific power needs of efficiency requirements.

- **Lifespan**

Notable Lifespan Drop for Mecer 1.2kva: The Mecer 1.2kva model stand out with a significant reduced lifespan of 2 years compared to other Solar Works products. This could be a concern for users prioritizing long-term reliability. Users should carefully assess whether the shorter lifespan aligns with their intended usage.

Interpretations

The data analysis underscores a consistent and impressive performance by Ener-G-Africa (EGA) and Sungrow inverter models, specifically those associated with Zuwa Energy. Notably, these inverters exhibit a remarkable combination of two key attributes: high efficiency and an extended 10-year lifespan.

This dual strength sets them apart in the market and establishes them as compelling choice for customers who prioritize both performance and longevity in their energy infrastructure.

The commendable efficiency of EGA and Sungrow inverters ensures optimal energy conversion, translating to cost savings and increased overall system performance. This aspect aligns well with specific needs of customers who seek not only reliable but also efficient solutions for their energy requirements. Moreover, the extended 10-year lifespan of these inverter models adds a layer of durability, making them a sound and long-term

investment for customers who are conscious of the financial implications of their choices.

The reliability factor is a crucial highlight in the interpretation, emphasizing that EGA and Sungrow inverters offer not only optimal energy conversion but also a dependable and long-lasting solution. This reliability is a key factor in positioning these models as frontrunners in the market. Customers looking for inverter options that provide a balance between efficiency and durability are likely to find EGA and Sungrow inverters as strong contenders.

Table 3: displays the technical specifications of the Solar batteries in different sizes from four solar companies.

Company Name	Product Model	Capacity	Efficiency (%)	Life Span (years)
Ener-G-Africa	EGA Lead Acid 12-200	12V 200Ah	80	3
	GRT-2450-C1 LifePO4	24Vdc 50Ah	90	10
	GRT-4850-S3 LifePO4	48Vdc 50Ah	90	10
	GRT-48100-S1 LifePO4	48Vdc 100Ah	90	10
Sunsite	12V 200Ah Lead Acid	12V 200Ah	80	2
	24V 50Ah Lithium	24V 50Ah	90	10
	48V 50Ah Lithium	48V 50Ah	90	10
	48V 100Ah Lithium Battery	48V 100Ah	90	10
Zuwa Energy	12V 200Ah Lead Acid	12V 200Ah	80	2
	24V 50Ah Lithium	24V 50Ah	90	10
	48V 50Ah Lithium	48V 50Ah	90	10
	48V 100Ah Lithium	48V 100Ah	90	10
Solar Works	12V 200Ah Lead Acid	12V 200Ah	80	2
	24V 50Ah Lithium	24V 50Ah	90	10
	48V 50Ah Lithium	48V 50Ah	90	10
	48V 100Ah Lithium	48V 100Ah	90	10

Analysis From above table 3:

- A prominent observation from the data is the uniformity among all the four companies in offering Lead Acid Batteries. The specifications across the board are consistent, featuring a voltage of 12V and a capacity of 200Ah. This standardization includes an efficiency of 80% and a lifespan ranging from 2 to 3 years.
- The convergence in specifications implies that customers seeking Lead Acid batteries with these particular characteristics have a multiple options, and their decision may be influenced by factors such as brand reputation, pricing or additional services.
- Similarly, Lithium batteries from all companies have comparable specifications (24V 50Ah, 48V 50Ah, 48V 100Ah) with 90% efficiency and a 10-year life span.

Interpretation

It is interpreted that if customers prioritize longer life span and higher efficiency, Lithium batteries for all companies would be preferable.

Some customers may prioritize additional

features such as smart technology, monitoring capabilities, or compatibility with specific solar systems. These features can vary among different products and brands.

- Investigate the pricing strategies employed by Ener-G-Africa Limited and its competitors, analyzing the cost effectiveness and perceived value of their products.

To comprehensively investigate the pricing strategies implemented by EGA limited and its competitors, with a focus on analyzing both the cost effectiveness offered by EGA Limited and its competitors analyzing the cost effectiveness and perceived of their products, a structured research approach was employed. The primary method utilized for data collection involved conducting interviews with representatives from three selected solar companies. These interviews were administered through Google Form questionnaires, providing a systematic and standardized platform for gathering valuable insights into the pricing dynamics within the solar energy market.

The selection of the three solar companies was strategically based on their prominence within the industry, ensuring a representative sample that encapsulates diverse market positions and operational scales.

Table 4: Table below, Table 4, presents the prices of solar products collected from four different companies.

Company Name	Product Model	Power output (W)	Efficiency (%)	Durability (years)	Price (MK)
Ener-G-Africa	EGA 20W solar Panel	22.29W	18%	12	42,500
	EGA 150W solar Panel	150W	18%	12	153,000
	JAM72S20-460W Solar	460W	20.60%	12	280,000
Sunsite	Jinko 20W Solar Panel	20W	18%	7	30,000
	Jinko 150W Solar Panel	150W	18.10%	10	160,000

	Canadian 460W Solar	460W	19.50%	12	210,000
Zuwa Energy	MESM-20W	20W	18.43%	12	120,000
	AEM5-60 150W	150W	13.96%	12	160,000
	AE460TMC-144BDS	460W	21.20%	25	390,000
Solar Woks	MESM-20W	20W	18.43%	12	55,000
	EGE-150M-36	150W	19%	10	160,000
	Canadian 460W Solar	460W	19.50%	12	385,000

From the Analysis of table above (Table 4), the data was studied regarding price range, brand influence, quality, competitiveness and customer perception.

- **Price Range**

The prices vary significantly across different companies and models. For instance, the price of a 20W solar panel ranges from MK30, 000 to MK120, 000, showcasing diverse pricing strategies and potential differences in quality and features.

- **Brand influence**

Companies such as Ener-G-Africa and Sunsite offer a variety of solar panels with different capacities and prices, possibly targeting distinct customer segments based on their needs and budget constraints.

- **Quality vs. Price**

Higher-priced panels may indicate higher quality, improved efficiency, or additional features. For example, the JAM72S20-460W solar panel from Ener-G-Africa, priced at MK280, 000, may suggest advanced features or superior performance compared to other models.

- **Competitive Pricing**

Companies like Solar Works offer

competitive prices for their solar panels, potentially attracting customers seeking for affordable yet reliable solar solutions.

- **Customer Perception**

Customer perception of value is crucial. While some customers may prioritize lower prices, others may be willing to invest more in premium panels with higher efficiency and longer lifespans.

Interpretation

The analysis interprets that the variations in cost prices of solar panels across different companies underscore the breadth of offerings, diverse pricing strategies, and potential disparities in quality and features among the panels. Each company's pricing approach reflects its positioning in the market, potentially influenced by factors such as manufacturing processes, technological advancements, and brand reputation.

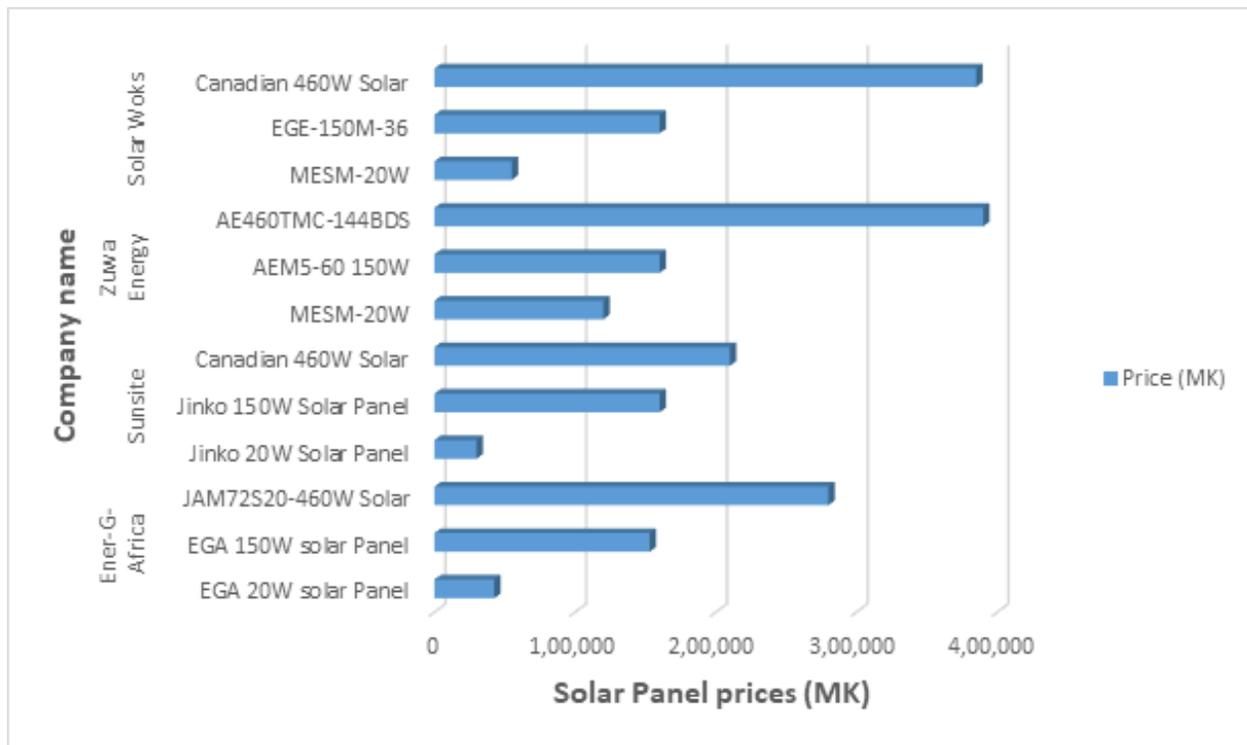
Customers, in navigating this landscape, prioritize factors such as efficiency, lifespan and overall value when considering their solar panel purchases. Efficiency speaks panel's ability to convert sunlight into usable energy, influencing its effectiveness in the harnessing solar power. Lifespan, on the other hand, denotes the durability and longevity of the panel, affecting

its long-term cost effectiveness.

Furthermore, customers weigh the overall value proposition of each solar panel, considering not only its upfront cost but also its performance over time, warranty coverage, and compatibility with their energy needs and sustainability goals. This holistic evaluation enables consumers to make informed decisions that align with their preferences, budget constraints and environmental consciousness.

In essence, the diversity of solar panel offerings underscores the dynamic nature of the market, where companies strive to meet evolving consumer demand while balancing cost considerations and technological innovation. Through informed decision-making, customers can leverage these diverse offerings to transition towards more sustainable and efficiency energy solutions.

Figure 2: presents the prices of solar products collected from four different companies.



Based on Figure 2, the bar graph illustrate varying heights of bars, indicating the price differentiation among different solar panel models offered by four solar companies. This visual representation aids customers in

assessing the range of prices associated with each solar panel model, thereby facilitating informed decisions based on considerations such as product brand and associated costs.

Table 5: Table below presents the prices of solar Inverters collected from four different companies

Company Name	Product Model	Efficiency (%)	Rated Power (W)	Life Span (year)	Price (MK)
Ener-G-Africa	EGA 1200VA	80	720	10	323,000
	EGA MKS 3kVA	90	2400	10	756,500
	EGA 5000MKS	100	5000	10	1,394,000
	EGA 7.2kVA	100	7200	10	1,921,000
	EGA 8kVA	100	8000	10	1,963,000
	EGA 10kVA	100	10000	10	6,205,000
Sunsite	Must Pv15-10212-1.2kVA	90	900	8	260,000
	Must PV18-3024-3kVA	90	3000	8	690,000
	Must 5kVA	90	5000	8	1,200,000
	Sungrow 7.2kVA	100	7200	8	1,600,000
	Must 8kVA	90	8000	8	1,963,000
	Must 10kVA	90	10000	8	4,500,000
Zuwa Energy	Sungrow 1.2kVA	93	1200	10	800,000
	Sungrow 3kVA	97.7	3000	10	1,000,000
	Sungrow 5kVA	97	5000	10	1,940,000
	Sungrow 7.2kVA	97	7200	10	2,300,000
	Sungrow 8kVA	98	8000	10	5,000,000
	Sungrow 10kVA	98	10000	10	6,300,000
Solar Works	Mecer 1.2kVA	90	1200	2	350,000
	Mecer 3kVA	98	3000	5	650,000
	Mecer 5kVA	98	5000	5	1,250,000
	Mecer 7.2kVA	98	7200	5	1,921,000
	Mecer 8kVA	98	8000	5	2,000,000
	Must 10kVA	90	10000	5	6,300,000

From table 5: It is analyzed that there is a price differentiation among the companies due to the product brand and Pricing strategies:

Brand and Pricing Strategies;

I. Ener-G-Africa

- Offers a wide range of products with varying power ratings and prices, targeting different customer segments.
- Pricing is influenced by both product specifications and branding positioning.

ii. Sunsite

- Offers a mix of product with competitive pricing and varying efficiency levels.
- Price strategy focused on affordability and market penetration

iii. Zuwa Energy

- Maintains high efficiency across all products, potentially justifying the higher price points.
- Emphasizes quality and longevity, reflected in the consistent lifespan of 10years across models.

iv. Solar Works

- Offers products with high efficiency but shorter lifespans compared to other brands.
- Pricing strategy has prioritize affordability and attracting customers with lower upfront costs.

Interpretation:

From data analysis, it is interpreted that different companies employ various pricing strategies based on factors like efficiency, rated power, and brand positioning. And also shows that each company targets different market segments with their product offerings, catering to varying consumer needs and preference and also brand reputation. Product quality and perceived value has played a significant roles in determining pricing strategies.

These insights can help companies refine their pricing strategies, understand market positioning and make informed decisions to remain competitive in the renewable energy industry.

Table 6: Presents the prices of solar Batteries collected from four different companies.

Company Name	Product Model	Capacity	Efficiency (%)	Life Span (year)	Price (MK)
Ener-G-Africa	EGA Lead Acid 12-200	12V 200Ah	80	3	540,000
	GRT-2450-C1 LifePO4	24Vdc 50Ah	90	10	1,088,000
	GRT-4850-S3 LifePO4	48Vdc 50Ah	90	10	1,468,000
	GRT-48100-S1 LifePO4	48Vdc 100Ah	90	10	2,975,000
Sunsite	12V 200Ah Lead Acid	12V 200Ah	80	2	450,000
	24V 50Ah Lithium	24V 50Ah	90	10	810,000
	48V 50Ah Lithium	48V 50Ah	90	10	1,100,000
	48V 100Ah Lithium	48V 100Ah	90	10	2,975,000

Zuwa Energy	12V 200Ah Lead Acid	12V 200Ah	80	2	600,000
	24V 50Ah Lithium	24V 50Ah	90	10	950,000
	48V 50Ah Lithium	48V 50Ah	90	10	1,468,000
	48V 100Ah Lithium	48V 100Ah	90	10	3,000,000
Solar Works	12V 200Ah Lead Acid	12V 200Ah	80	2	550,000
	24V 50Ah Lithium	24V 50Ah	90	5	950,000
	48V 50Ah Lithium	48V 50Ah	90	5	1,468,000
	48V 100Ah Lithium	48V 100Ah	90	5	2,975,000

From table 6: It is analyzed that there is a price differentiation among the companies due to the product brand and Pricing strategies:

Price Variation across Brands:

Prices vary significantly across the different brand and models of solar batteries listed in the table;

- The prices range from 450,000Mk to 3,000,000 Mk. The highest-priced battery is 48V 100Ah from Zuwa energy, priced at 3,000,000Mk.
- Ener-G-Africa's prices fall within the mid-range compared to other brands. They offer Lead Acid batteries with varying capacities which may appeal to consumer

seeking cost-effective solutions with moderate lifespans.

- Assess the market penetration strategies of Ener-G-Africa, focusing on distribution channels, partnerships and market positioning and compare these strategies with those of key competitors.

The assessment is there to compare Ener-G-Africa's market penetration strategies, focusing on distribution channels, partnerships, and market positioning, and to compare these strategies with its competitors like Sunsite, Zuwa Energy and Solar Works Company. Below is a table illustrating different market penetration strategies used with the four companies

Table 7 : Illustrating different market penetration strategies used with the four companies.

Aspect	Ener-G-Africa	Sunsite	Zuwa Energy	Solar works
Distribution Channels	<ul style="list-style-type: none"> • Direct sales • Online sales platform • Partnered with local distributors 	<ul style="list-style-type: none"> • Retail • Own distribution network • Direct to consumers 	<ul style="list-style-type: none"> • Wholesale • Distributors • Agent • Online market place 	<ul style="list-style-type: none"> • Direct to consumer • Sales • Agent • Distribution through supermarket and financial banks

Partnerships	<ul style="list-style-type: none"> Strategic partnership with local NGO for community outreach Promotion Production Research Partnership for product innovation 	<ul style="list-style-type: none"> Supplier partnerships for exclusive product lines 	<ul style="list-style-type: none"> Collaboration with government agencies for project funding Distribution partnerships for regional expansion CSR partnership for social impact projects 	<ul style="list-style-type: none"> Promotion
Market Positioning	<ul style="list-style-type: none"> Position as an innovative technology leader and sustainable energy in the renewable energy sector <p>Targeting commercial, industrial clients and middle to High-income households.</p>	<ul style="list-style-type: none"> Positioning as a budget-friendly option for eco-conscious consumers <p>Targeting millennial and post-millennial demographic</p>	<ul style="list-style-type: none"> Position as a premium brand offering sustainable energy solutions <p>Targeting middle to high-income households and businesses and Government projects</p>	<ul style="list-style-type: none"> Positioning as a trusted brand with a long-standing presence in the market. <p>Targeting divers customer segments across socio-economic groups</p>

Source: Survey Data

Based on the Analysis of above table, it reflects their unique approaches to market penetration and customer engagement within the renewable energy sector. Here are their unique approaches:

Ener-G-Africa:

i. Direct Sales

- EGA employs a direct sales approach where it engages with potential customers directly, either through its own sales team or representatives. This methods allows EGA to establish personal connections

with clients, understand their needs, and offer tailored solutions.

- Direct sales enabled EGA to showcase the benefits of its renewable energy products and services firsthand, addressing any concerns or questions customers may have.

ii. Online Sales Platform:

- EGA maintains an online sales platform where customers browse, select, and purchase its products and services. The online platform enhances accessibility by

allowing customers to shop from anywhere with an internet connection.

- Through the online platform, EGA showcased its product range, provide detailed information, and offer a convenient purchasing experience to its customers.

iii. Partnered with Local Distributors:

- EGA collaborates with local distributors to extend its reach into various regions and markets. These partnerships leverage the local distributors' knowledge, networks and infrastructure to distribute AGA's products effectively.
- By partnering with local distributors, EGA is able to penetrate new markets more efficiently and cater to the specific needs of diverse customer segments.

iv. Strategic Partnership with Local NGO for community Outreach:

- EGA forms strategic partnerships with local non-governmental organizations (NGOs) to engage in community outreach activities. These partnerships enable EGA to raise awareness about renewable energy solutions and their benefits local communities.
- Through community outreach initiatives, EGA educates and empowers individuals and communities to adopt sustainable energy practices.

v. Promotion

- EGA employs various promotional strategies to increase brand awareness and visibility. This include advertising

campaigns, social media marketing, participation in the industry events and exhibitions, and sponsorships.

- Through promotion, EGA communicates its value proposition and positions itself as a trusted provider of innovative and sustainable energy solutions.

vi. Production:

- EGA oversees the production of its renewable energy products, ensuring high quality and reliability. The production process involve sourcing raw materials, manufacturing components, assembly, testing and quality control.
- By maintaining control over the production process, EGA uphold its standards and meet the need of its customers effectively.

vii. Research:

- EGA invested in research and development to drive innovation and continuous improvement. Research efforts focus on improving product efficiency, developing new technologies, and addressing emerging market trends and challenges.
- Through research, EGA stays at the forefront of renewable energy sector and maintains its competitive edge.

viii. Partnership for Product Innovation:

- EGA collaborates with technology partners, research institutions, and other stakeholders to drive product innovation. These partnerships facilitate the exchange of knowledge, expertise, and resources to develop new and improved renewable energy solutions.

- By fostering a culture of innovation, EGA enhances its product offerings and meets evolving customer demands.
- ix. Position as Innovative Technology Leader and Sustainable Energy provider:
- EGA positions itself as an innovative technology leader and provider of sustainable energy solutions in the renewable energy sector. This positioning reflects its commitment to developing cutting-edge technologies and promoting environmentally friendly practices.
 - By emphasizing innovation and sustainability, EGA differentiates itself from competitors and appeals to environmentally conscious consumers and businesses.
- x. Targeting, Industrial clients, and Middle to High-Income Households:
- EGA targets a diverse range of customers, including commercial and industrial clients, as well as middle to high-income households.
 - For commercial and industrial clients, EGA offers scalable renewable energy solutions tailored to their specific energy needs and operational requirements.
 - For middle to high-income households, EGA provides residential solar energy systems and other sustainable energy solutions designed to reduce energy cost and environmental impact.

Sunsite Solar Company

I. Retail:

- Sunsite operates through retail channels,

through retail outlets, Sunsite makes its products accessible to consumers who prefer in-person shopping experiences.

- Retail locations featured displays, demonstrations, and knowledgeable staff to assist customers in selecting the right products for their needs.

ii. Own distribution Network:

- Sunsite has its own distribution network for delivering products to retail locations and customers. This distribution network allowed to maintain control over the logistics and ensure timely delivery of its products to various outlets.

iii. Direct to consumers:

- In addition to retail channels, Sunsite sells its products directly to consumers. Sunsite offered special promotion, discounts, or exclusive deals to incentivize direct purchases from its offices.

iv. Supplier Partnership for Exclusive Product Lines:

- Sunsite collaborates with suppliers to develop exclusive product lines that are unique to its brand. By exclusive product lines, Sunsite creates differentiation in the market and enhances its appeal to consumers seeking distinctive and high-quality eco-conscious product.

v. Positioning as a Budget-Friendly Option for Eco-Conscious Consumers:

- Sunsite positions itself as a budget-friendly option for eco-conscious consumers, emphasizing affordability

without compromising on sustainability. This positioning resonates with consumers who prioritize environmental stewardship but are mindful of their budgets.

- Sunsite offered competitively priced products, promotions, or financing options to make eco-friendly choices accessible to broader demographic.

vi. Targeting Millennial and Post-Millennial Demographic:

- Sunsite specifically targets the millennial and post-millennial demographic, recognizing their growing influence and purchasing power. Sunsite tailors its marketing messages, product features and branding to resonate with the values and preferences of younger consumers.
- This demographic tends to prioritize sustainability, authenticity, and social responsibility, aligning well with Sunsite's eco-conscious positioning and budget-friendly offerings.

Zuwa Energy

I. Wholesale:

- Zuwa Energy engages in wholesale distribution, selling its products in bulk to retailers, distributors, and other businesses. Wholesale allows Zuwa Energy to reach a broader market by supplying its products to various retail outlets and distribution channels.
- Wholesale distribution has enabled Zuwa Energy to benefit from economies of scale and streamline its supply chain operations.

ii. Distributors:

- Zuwa Energy partners with distributors who act as intermediaries between the company and retailers or end customers. These distributors helped Zuwa Energy extend its reach into different geographic regions or market segments.
- Distributors have established networks, expertise in local markets, and logistical capabilities that facilitate product distribution and sales.

iii. Agent:

- Zuwa Energy utilizes agents who represent the company and promote its products or services to potential customers. Agents operate on behalf of Zuwa Energy in specific regions or market segments, acting as sales representative or brand ambassadors.

iv. Online Market place:

- Zuwa Energy utilizes online market places as a channel for selling its products directly to consumers. Online market places provide Zuwa Energy with a digital platform to showcase its products, reach a global audience and e-commerce transactions.
- Zuwa Energy partner with established online market places or operate its own e-commerce platform to offer convenience and accessibility to customers.

v. Collaboration with Government Agencies for Product Funding

- Zuwa Energy collaborates with government agencies to secure funding for renewable energy projects. These

collaborations involved grant programs, subsidies, or public-private partnerships aimed at promoting sustainable energy initiatives.

- By partnering with government agencies, Zuwa energy gains access to funding opportunities and support for implementing large scale projects.

vi. Distribution Partnerships for Regional Expansion

- Zuwa Energy forms distribution partnerships to expand its presence into new regions. These partnerships leverage the local knowledge, networks and resources of distribution partners to penetrate target market effectively.
- By collaborating with distribution partners, Zuwa Energy overcame logistical challenges.

vii. CSR partnership for Social Impact Project

- Zuwa Energy engages in corporate social responsibility (CSR) partnerships to support social impact projects and initiatives. These partnerships involved community development programs, environmental conservation efforts, and humanitarian aid projects.
- By investing in CSR partnerships, Zuwa Energy demonstrated its commitment to sustainable development and contributes to positive social change.

viii. Position as a premium Brand Offering Sustainable Energy Solutions.

- Zuwa Energy positions itself as a premium

brand that offers high-quality, sustainable energy solutions. This positioning emphasizes Zuwa Energy's commitment to innovation, reliability, environmental responsibility.

- Zuwa Energy targeted middle to high-income households, businesses, and government projects that prioritize premium products and sustainable technologies.

Solar Works Company

i. Direct to Consumer Sales:

- Solar Works sells its products directly to consumers without intermediaries. This approach allowed Solar Works to establish a direct relationship with customers, understand their needs and provide personalized assistance.
- Direct-to-consumer sales occurred through various channels such as online platforms, physical stores, and door-to-door sales representatives.

ii. Sales Agents:

- Solar Works utilized sales agents who represent the company and promote its products to potential customers. These agents operate in specific geographic regions, market segments, leveraging their networks and relationships to drive sales.
- Sales agents played a crucial role in generating leads, conducting product demonstrations, and closing sales transactions on behalf of Solar Works.

iii. Distribution through Supermarkets and Financial Loan Banks

- Solar Works distributes its products through supermarkets and financial loan banks to reach a wider Customers. Partnering with supermarkets and banks allowed Solar Works to leverage their existing foot traffic and customer base.
- Distribution through these channels enhances accessibility and visibility for Solar Works' products, making them more readily available to consumers.

iv. Promotion

- Solar Works engages in promotional activities to increase brand awareness and stimulate demand for its products. Promotion efforts include advertising campaigns, sponsorships, public relations initiatives, and digital marketing strategies.
- Through promotion, Solar Works communicates its value proposition, highlights product features, and differentiates itself from competitors.

v. Positioning as a Trusted Brand with a Long-standing presence in the Market:

- Solar Works positions itself as a trusted brand with a long-standing presence in the market. This positioning emphasizes Solar Works' reliability, credibility, and track record of delivering quality products and services.
- By positioning itself as a trusted brand, Solar Works builds brand loyalty and instills confidence among customers across various socio-economic groups.

vi. Targeting Diverse Customer Segments across Socio-economic Groups:

- Solar Works targets a diverse range of customer segments across different socio-economic groups. Its products and pricing strategies cater to the varying needs, preferences, and affordability levels of different customer segments.
- Solar Works aimed to make solar energy solutions accessible and affordable to a broad spectrum of consumers, including both urban and rural populations.
- Assess customer satisfaction levels and preferences for the products of Ener-G-Africa Limited and its competitors through surveys and feedback analysis.

This objective has enabled the gathering of diverse perspectives from various age groups and customer demographics, aiding in the understanding of their satisfaction with Ener-G-Africa products relative to those of its competitors.

Primary Data analysis-

Section 1: Respondent Demographics:

Question 1: Gender of the respondent

Table 8: showing Gender of the Respondent

Genders	No. of Respondents	Percentage (%)
Male	97	48.5
Female	103	51.5
Total	200	100

The table above clearly indicates that out of 200 respondents, 97(48.5%) are male, while the remaining 103 (51.5%) are female.

Question 2: Age of respondents

Table 9: showing age of Respondents

Age (in years)	No. of Respondents	Percentage (%)
18-24	32	16
25-34	43	21.5
35-44	98	49
55 and above	27	13.5
Total	200	100

From the table above, it is evident that out of 200 respondents, 32 (16%) fall under the age group ranges from 18 to 24 years, 43 (21.5%) fall under the age group of 25 to 35 years, 98 (49%) fall under the age group of 35 to 44 years, and 27(13.5%) fall under the age above 55 years.

Question 3: Income level of respondent

Table 10: Showing Income Level of the Respondent

Income Level(per month)	No. of Respondents	Percentage (%)
50,000 -100,000	101	50.5
150,000-200,000	56	28
250,000- 300,000	27	13.5
350,000 and above	16	8
Total	200	100

From the table, it is evident that out of 200 respondents, 101(50.5%) have an income level between 50,000 and 100,000, 56(28%) have an income level between 150,000 and 200,000, 27 (13.5%) have an income level between 250,000 and 300,000, 16 (8%) have an income level of 350,000 and above

Question 5: Occupation of the respondents

Table 11: Showing occupation of respondent

Occupation	No. of Respondents	Percentage (%)
Student	25	12.5
Employed	111	55.5
Self-employed	44	22
Unemployed	12	6
Other	8	4
Total	200	100

From the table above, it is clear that out of 200 respondents, 25 (12.5%) are students, 111(55.5%) are employed, 44 (22%) are self-employed, 12 (6%) are unemployed and 8 (4%) are engaged in other occupation.

Question 6: Have you purchased or used solar products before?

Table 12: Showing respondents’ opinions about purchasing or using of solar products.

Particulars	No. of Respondents	Percentage (%)
Yes	121	60.5
No	79	39.5
Total	200	100

From the table above, it is clear that out of 200 respondents, 121 (60.5%) have purchased or used solar products before, while the remaining 79 (39.5%) have not purchased or used solar products before.

Section 2: Product Awareness

Question 7: Were you aware of Ener-G-Africa Limited’s solar products and before taking this survey?

Table 13: Showing respondents’ awareness of Ener-G-Africa solar products.

Particulars	No. of Respondents	Percentage (%)
Yes	91	45.5
No	109	54.5
Total	200	100

From the table above, it is evident that out of 200 respondents, 91 (45.5%) are aware of Ener-G-Africa solar products, while the remaining 109 (54.5%) are not aware of them.

Question 8: How did you first learn about Ener-G-Africa Limited’s products?

Table 14: shows the channels through which respondents first learn about Ener-G-Africa Limited’s products

Channels	No. of Respondents	Percentage (%)
Advertisement	53	26.5
Online search	30	15
Word of mouth	65	32.5
Social Media	41	20.5
Other	11	5.5
Total	200	100

From the table above, it is evident that out of 200 respondents, 53, which is 26.5% of the total, learned about Ener-G-Africa Limited's products through advertisements. This indicates that advertising plays significant role in reaching potential customers, constituting more than a quarter of the respondents. 30 respondents, (15%) of the total, found out about the company's products through online searches. With 65 respondents, accounting for 32.5% of the total, word of mouth appears to be a highly influential factor in spreading awareness about Ener-G-Africa Limited's products. This indicates that satisfied customers or brand advocates may play a significant role in attracting new customers.

41 respondents, constituting 20.5% of the total, learned about the products through social media channels. This suggests that maintaining an active presence on social media platforms is important for the company to engage with its target audience and attract potential customers. 11 respondents, making up 5.5% of the total, discovered the products through channels not explicitly listed.

Question 9: Are you aware of any competitors in the market offering similar solar products?

Table 15: Indicates the awareness of respondents regarding any competitors in the market offering similar solar products

Particulars	No. of Respondents	Percentage (%)
Yes	178	89
No	22	11
Total	200	100

From the table, it is evident that 178 respondents, which accounts for 89% of the total are aware of the competitor's similar solar products. This indicates a high level of awareness among the respondents regarding the competitive landscape in the market. The majority of respondents are knowledgeable about alternatives to the solar products being offered, suggesting a mature market where consumers actively seek out and compare different options before making a purchase decision.

22 respondents, making up 11% of the total, are not aware of any competitors offering similar solar products.

Section 3: Product Features

Question 10: Price Differentiation:

i. How would you rate the price of Ener-G-Africa Limited's products compared to competitors?

Table 16: Shows prices of Ener-G-Africa's solar products rated by consumers.

Prices	No. of Respondents	Percentage (%)
Lower	61	30.5
Similar	20	10
Higher	119	59.5
Total	200	100

From table above it is indicated that 61 respondents, constituting 30.5% of the total, rated the prices of Ener-G-Africa's solar products as lower compared to their expectations. This suggests that a significant portion of consumers perceives the prices of these solar products as affordable/competitive,

which could positively influence their purchasing decisions.

20 respondents, making up 10% of the total, rated the prices of Ener-G-Africa's solar products as similar to their expectations or previous experiences. This indicates that a smaller proportion of consumers finds to be in line with what they anticipated.

119 respondents, representing 59.5% of the total, rated the prices of Ener-G-Africa's solar products as higher than their expectations. This suggests that a majority of consumers perceives the prices of these solar products as relatively expensive or above market average, which could potentially deter some consumers from making a purchase.

Interpretation

- The data reveals that there is a significant disparity in how consumers perceive the prices of Ener-G-Africa's solar products. The fact that nearly 60% of respondents rated the prices as higher suggests that there may be a concern among customers about the affordability or value proposition of these solar products.
- On the other hand, the 30.5% of respondents who rated the prices as lower indicates that a substantial portion of consumers finds the prices to be reasonable and competitive, which could contribute positively to sales and customer satisfaction.
- The relatively smaller percentage (10%) of respondents who rated the prices as similar suggests that there is a segment of consumers whose perceptions align closely with their expectations or experiences with pricing in the solar products market.

ii. What factors influence your perception of the product's value for its price?

Table 17: shows factors influenced customer perception of the product's value prices.

Product's value	No. of Respondents	Percentage (%)
Quality	48	24
Brand Reputation	25	12.5
Features and functionality	26	13
Durability and Longevity	37	18.5
Price comparison	20	10
Customer service	43	21.5
Total	200	100

From the table it is clearly indicated that, 48 respondents, which accounts for 24% of the total respondents, perceive quality as a significant factor influencing the product's value. This indicates that a quarter of the respondents prioritize quality when assessing the value of a product in relation to its price. 25 respondents, which is 12.5% of the total, consider brand reputation as an important factor in determining the product's value. While this percentage is lower compared to quality, it is still signifies that brand reputation holds significant weight in the perceived value of the product.

Features and Functionality: 26 respondents, making up 13% of the total, believe that features and functionality play a crucial role in determining the product's value. This suggest that a notable portion of the respondents value the practical aspects and capacities of the product. 37 respondents, accounting for 18.5% of the total, prioritize durability and longevity when assessing the product's proposition. This indicates that nearly one-fifth of the respondents consider the long-term performance and lifespan of the product as important factors.

On price comparison; 20 respondents, representing 10% of the total, rely on price

comparison with similar products to gauge the value proposition. While this percentage is relatively lower compared to other factors, it still suggests that a portion of the respondents considers price competitiveness when evaluating value.

On customer service; 43 respondents, making up 21.5% of the total, emphasize the importance of customer service in determining the product's value. This indicates that a significant portion of the respondents values post-purchase support, warranty terms, and overall customer experience.

Question 11: How would you rate the durability of Ener-G-Africa Limited's products compared to competitors?

Table 18: Shows the product durability of Ener-G-Africa in the market, as rated by customers.

Product durability of Ener-G-Africa	No. of Respondents	Percentage (%)
Less	33	16.5
Similar	44	22
More durable	123	61.5
Total	200	100

From the table above indicates that a significant majority of customers perceived Ener-G-Africa's products as more durable compared to alternatives, with 61.5% expressing this sentiment. Only a smaller fraction found them less durable or similar durability.

Section 4: Overall Satisfaction:

Question 12: If you have purchased or used Ener-G-Africa Limited's products, please rate your overall satisfaction on a scale of 1 to 5 (1 being extremely dissatisfied, 5 being extremely satisfied)

Table 19: Shows product satisfaction for Ener-G-Africa.

Product satisfaction	No. of Respondents	Percentage (%)
1=Extremely dissatisfied	7	3.5
2=Dissatisfied	33	16.5
3= Neutral	39	19.5
4= Satisfied	86	43
5=Extremely satisfied	35	12.5
Total	200	100

From the table above it clearly indicated that, 3.5% of respondents, which corresponds to 7 individuals, rated their satisfaction as extremely dissatisfied. This indicates that a small portion of customers had a highly negative experience with Ener-G-Africa Limited's products.

16.5% of respondents, or 33 individuals, rated their satisfaction as dissatisfied. This group still represents a significant portion of customers who are unhappy with their experience.

19.5% of respondents, corresponding to 39 individuals, rated their satisfaction as neutral. These customers neither expressed satisfaction nor is dissatisfaction with Ener-G-Africa limited products.

The largest portion, 43% of respondents, or 86 individuals, their satisfaction as satisfied. This implies that a significant proposition of customers are content with products and services offered by Ener-G-Africa Limited. Their positive experiences can serve as a foundation for building brand loyalty and advocacy.

12.5% of respondents, which corresponds to 35 individuals, rated their satisfaction as extremely satisfied. This represents a smaller but still notable group of customers who have had exceptional experiences with Ener-G-Africa Limited's products. These highly satisfied customers are like to be strong advocates for the brand and may contribute to positive word-of-mouth referrals and testimonials.

Question 13: If you have products from competitors, please rate your overall satisfaction with them on a scale of 1 to 5.

Table 20: Shows product satisfaction for other competitors compared to Ener-G-Africa.

Product satisfaction Rating	No. of Respondents	Percentage (%)
1=Extremely dissatisfied	5	2.5
2=Dissatisfied	27	13.5
3=Neither satisfied nor dissatisfied (Neutral)	56	28
4= Satisfied	87	43.5
5=Extremely satisfied	25	12.5
Total	200	100

From the table above; comparing the satisfaction data for other competitors to Ener-G-Africa’s data, it is observed some similarities and differences:

Satisfaction levels: Both Ener-G-Africa and its competitors have a similar distribution of satisfaction levels. The majority of respondents for both Ener-G-Africa and its competitors rated their satisfaction as satisfied (level 4).

Dissatisfied level: Ener-G-Africa seems to have slightly lower dissatisfaction levels compared to its competitors. The percentage of respondents who rated their satisfaction as extremely dissatisfied or dissatisfied is slightly lower for Ener-G-Africa compared to the other competitors.

Neutral ratings: the percentage of respondents who rated their satisfaction as neutral is higher for the other competitors compared to Ener-G-Africa. This suggests that customers may have stronger opinions (either positive or negative) about Ener-G-Africa’s products compared to its competitors.

Section 5: Market Analysis:

Question 14: How would you describe the current market demand for solar products?

Table 21: shows market demand Assessment for solar products

Rating and description	No. of Respondents	Percentage (%)
1=Very low demand	2	1
2=Low demand	9	4.5
3= Moderate demand	39	19.5
4= High demand	71	35.5
5= High very demand	79	39.5
Total	200	100

From the table above, the majority of respondents, 39.5%, indicated a very high demand for the product being evaluated (Rating 5). This suggests that there is a significant interest or need for the product among the respondents.

Following closely, 35.5% of respondents reported a High Demand (rating 4), indicating substantial interest in the product.

Interpret

From this data, it is evident that the majority of respondents perceive the product as having either high or very high demand, indicating a potentially favorable market or significant need for the product or service being assessed.

Question 15: What factors, in addition to price, durability and ease of use, influence your decision to choose a particular brand or product in this category?

From the data collected from the respondents, it is evident that there are some other factors that influence a consumer’s decision to choose a particular brand or product within a category: Here are some factors to consider:

- **Innovation and Technology:** products

that incorporate the latest technology or offer innovative feature may attract consumers seeking cutting -edge solutions or enhanced functionality.

- **Availability and convenience:** accessibility and convenience also has a significant role in consumer decision-making. Products that are readily available, easy to find both online and offline, and convenient to purchase are more likely to be chosen over alternatives.

Major Findings and Suggestions

- **Comparison features, specifications and Technical attributes of Ener-G-Africa Limited's products with those offered by competitors.**

I. Findings

In the highly competitive market for solar products, companies need to innovate to improve product efficiency and performance in order to outpace their competitors. In Malawi, there are numerous solar brands saturating the market. A comparison of solar panels reveals significant variations in efficiency, power output, and durability among different companies. From the analysis of data it has found that Zuwa Energy stands out with the highest efficiency rating at 21.20%, indicating superior performance in converting sunlight into electricity. Higher efficiency signifies a more effective conversion of sunlight into usable energy, which can lead to increased cost-effectiveness and better overall performance for customers. While analyzing solar inverters, it is evident that EGA and Sungrow inverter models represent valuable and dependable

investments for customers seeking robust and enduring solutions for sustainable energy.

Their consistent high performance, coupled with an extended lifespan, positions them as an attractive choice in the competitive market, meeting the needs of customers who prioritize both effectiveness and longevity in their inverter selection.

While Sunsite and Solar Works present trade-offs between efficiency and lifespan that users should carefully evaluate based on their specific requirements.

ii. Suggestions

- **Continuous innovation and Differentiation:** invest in continuous innovation to differentiate Ener-G-Africa's products from competitors.
- **Research and Development (R&D) Investment:** allocate resources to research and development initiatives aimed at enhancing product features and performance.
- Investigate the pricing strategies employed by Ener-G-Africa Limited and its competitors, analyzing the cost effectiveness and perceived value of their products.

I. Findings

It is found that Ener-G-Africa's solar products cost price positions is competitively within the market, offering consumers a balance between affordability and performance. While not the cheapest option, their focus on Lead Acid batteries with varying capacities caters to the needs of a specific consumer segment seeking cost effective and reliable energy storage solutions.

ii. Suggestions

To be more competitive in the market, Ener-G-Africa should offer products that cater to low-income consumers, striking a balance between affordability, performance, and pricing to appeal to various market segments.

- Assess the market penetration strategies of Ener-G-Africa, focusing on distribution channels, partnerships and market positioning and compare these strategies with those of key competitors.

I. Findings

It has been observed that Ener-G-Africa adopts a comprehensive approach, encompassing direct sales, online sales platforms, partnerships, community outreach, promotion, production, research, innovation, and strategic positioning to penetrate the market, and meet the needs of its target customers effectively. However, Ener-G-Africa lags behind by failing to provide agents in the geographical areas where awareness of the products offered by Ener-G-Africa is lacking. This oversight can lead to the loss of potential customers and reduce returns for the company.

ii. Suggestions

To address the issue of lacking agents in geographical areas where awareness of Ener-G-Africa's products is lacking, the company can implement the following strategies:

a) Market Research and Analysis

- Conduct thorough market research to identify regions or areas where awareness of Ener-G-Africa's products is low.
- Analyze demographic, economic, and cultural factors to understand the unique

needs and preferences of potential customers in these areas.

b) Agent Recruitment and Training

- Recruit and train agents or representatives specifically for the identified geographical areas.
- Ensure that agents are knowledgeable about Ener-G-Africa's products, benefits, and value proposition.

c) Localized Marketing Campaign

- Develop localized marketing campaigns tailored to the needs and preferences of the target regions.

d) Performance Monitoring and Evaluation

- Implement systems to track the performance of agents and monitor the effectiveness of marketing initiatives in increasing awareness and sales.

By implementing these strategies, Ener-G-Africa can bridge the gap in awareness and effectively reach potential customers in geographical areas where its presence is currently lacking.

- Customer satisfaction levels and preferences for the products of Ener-G-Africa Limited and its competitors.

I. Findings

It has been found that Ener-G-Africa has slightly lower levels of customer satisfaction, at 43%, compared to its competitors, who have slightly higher satisfaction levels at 43.5%. This indicates difference of significance of 0.5%. While the differences might seem marginal, it underscores the importance of fine-tuning strategies to address customer needs and preferences effectively.

ii. Suggestions

Understanding the factors contributing to this nuanced variation in this satisfaction levels could be pivotal for Ener-G-Africa's strategic planning. It prompts inquiries into various aspects such as product quality, pricing, customer service, and brand perception. Assessing these dimensions comprehensively can unveil actionable insights to enhance customer experiences and fortify competitive positioning.

Moreover, the slim margin of difference, merely 0.5%, accentuates the significance of meticulous attention to detail in the competitive landscape. Even minor differentials in customer satisfaction can influence market dynamics and consumer loyalty over time.

Therefore, Ener-G-Africa Limited should explore strategies to reduce the cost of its products while maintaining quality and reliability. While Ener-G-Africa may trail slightly behind its competitors in overall satisfaction metrics, the marginal gap underscores an opportunity for strategic refinement and innovation to augment customer-centric approaches.

Conclusion-

This research work holds significant importance as it aims to provide valuable insights into the competitive positioning of Ener-G-Africa Limited within the renewable energy market. The findings will not only benefit the company in refining its product strategies but will also contribute to the broader understanding of market dynamics in the context of sustainable energy solutions.

Ultimately, this comprehensive analysis will

serve as a strategic guide for Ener-G-Africa Limited, enabling informed decision-making to enhance its competitive edge and contribute positively to the ongoing evolution of renewable energy sector.

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Study of Problems Faced by Small Entrepreneurs for Selling Products through E-Commerce

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ABSTRACT

E-commerce websites are essential for organizations looking to develop, improve efficiency, and compete in the digital age. E-commerce websites reach people all over the world, offer the convenience of buying at any time and from any location, and have fewer overhead expenses than traditional storefronts. Small-scale business is considered the backbone of an economy. Small business owners play a key role in economic development. E-commerce technology but they face some problems in selling products and give up online sales. Small Entrepreneurs face some problems such as lack of technical knowledge, lack of storage for products, order returns problems, etc. E-commerce does not need a physical shop setup. It helps to reach a new market. It helps entrepreneurs grow their business from small to large. In this study, the researcher understands the importance of e-commerce and identifies the relationship between e-commerce and problems faced by small entrepreneurs in selling products. The study involves both primary and secondary data and the research work is empirical with a sample size of respondents 23 taken randomly from the area Vishrantwadi area in Pune in the state of Maharashtra.

Keywords: E-commerce, Small Entrepreneurs, Challenges, online sale, offline sale

Introduction

E-commerce websites are vital for businesses seeking growth, efficiency, and competitiveness in the digital age. E-commerce websites reach customers worldwide, it is convenient for shopping any time anywhere, and lower overhead costs than physical stores. E-commerce websites can significantly benefit offline sellers by expanding their business, increasing sales, and providing a convenient platform for customers to browse and purchase products. They offer global reach 24/7 availability, and convenience of online shopping, all e-commerce websites can serve as a powerful tool for offline seller to grow their business, reach new customers, and adapt to

changing customer performances. Offline sellers transitioning to the online business may face challenges due to a lack of understanding of digital marketing strategies. Offline sellers may struggle with inventory management, fulfillment logistics, and adopting their product offering suit online damage in this study, will find out how small entrepreneurs face challenges to going offline to an online selling mode. To make suggestions for making small entrepreneurs' businesses effective through e-commerce, to create awareness for doing businesses e-commerce.

Objectives of Study

1. To understand the process of doing business done by entrepreneurs.
2. To understand the mode of doing business preferences of the entrepreneurs.
3. To understand the challenges small entrepreneurs face while doing online business or e-commerce.
4. To make suggestions and recommendations for making small entrepreneurs' businesses effective through e-commerce.
5. To create awareness for doing business through e-commerce.

Literature Review

Kim Edward S. Santos (2020): Social media platforms can serve as a marketing tool for businesses, eliminating the need for setting up online stores. This allows businesses to reach customers easily and engage in two-way conversations at their own pace. However, challenges include customers' preference for physically inspecting products and their hesitation with online transactions. For success in online business and marketing, it is essential to have strong business decision-making skills to navigate both benefits and difficulties.

Vladimir Simakov (2020): In recent years, e-commerce has garnered significant attention from both practitioners and academics. This interest stems from the need to address practical issues with innovative scientific solutions to enhance efficiency and introduce new e-commerce tools. E-commerce traditionally involves online sales of goods, but it can also encompass broader activities, including the electronic transmission of goods and services both physically and digitally.

Mr. Sarate Bhagwan Haribhau (2021): Small-scale industries could benefit from e-commerce technology, but many are reluctant to adopt it due to various barriers, which limit the advantages they experience from it.

Pritesh Pradeep Somani (2021): The shift from physical retail stores to e-commerce portals has significantly transformed shopping habits, moving from a tactile experience to virtual interactions. This research explored the marketing mix and other parameters to understand virtual shoppers' nature and their satisfaction levels.

Mr. Gajanan Prabhu Dagade (2021): The rise of e-commerce and growing consumer interest in online shopping have notably altered the Indian retail market. Customers are increasingly open to online shopping due to the internet's ability to provide extensive information quickly and affordably.

Danika P. Nolasco, Mary Joy E. Gumayagay, Lorelie B. Marquez, Danisse Mae P. Hernandez, and Syrille Joyce R. Barayuga (2022): Despite challenges, online sellers view online selling not only as a marketing platform but also as a means to build relationships, expand market reach, and gain enjoyment and income. It challenges sellers to strategize and utilize their skills and creativity, making it both a promising opportunity and a challenging endeavor.

Gowtham Ashirwad K (2022): Retailers face difficulties with unregulated online marketing, which creates various issues for textile retailers. The rise of online marketing is leading to the closure of small retail outlets and impacting the profitability of existing retailers. There is a need for government regulation to help retailers compete effectively and build a strong customer base. Adopting suggested strategies can help textile retailers improve their long-term

business prospects despite online marketing pressures.

Zulkarnain Kedah (2023): E-commerce, a subset of e-business, includes not just commercial activities but also business partnerships, customer support, and job openings. With widespread Wi-Fi and internet access in Indonesia's major cities, it is an opportune moment for businesses to establish e-commerce services.

Karen Sutherland, Sarah Casey, & Gail Crimmins (2024): The main challenges identified are product supply, distribution, and unreliable internet connectivity. The study highlights the heavy reliance on Facebook and Instagram to drive website traffic and sales, contributing to knowledge about how entrepreneurs use social media for community development.

Anjali Gupta (2024): E-commerce involves trading goods and services electronically, encompassing B2B, B2C, and C2C transactions. It has revolutionized business competition and infrastructure, creating a new marketplace for consumers and businesses.

M. Sternad, B. Jereb, and Milena Kajba (2023): Advanced technologies optimize product movement through supply chains, with electronic administration of logistics playing a crucial role. The efficiency of e-commerce in logistics can be assessed using data envelopment analysis (DEA) based on average added value in the logistics sector in EU countries in 2021.

Research gap

Researcher did an extensive literature review by referring to research papers, articles, and journals. As per the study, some studies related to e-commerce, e-commerce companies, digital

marketing, small and micro enterprises, online selling, e-commerce challenges, online business sellers, offline traders, online marketing, and rural women entrepreneurs were found. However, a study on challenges faced by small entrepreneurs in selling their products through e-commerce is yet to be done. It was further observed from the literature review that offline small entrepreneurs and their preference for business through e-commerce have not been studied yet. From the extensive literature review, it is found that due to a lack of technical knowledge is one of the major issues. Further, it was observed that sellers who do business online as well as offline face some problems while doing business through e-commerce.

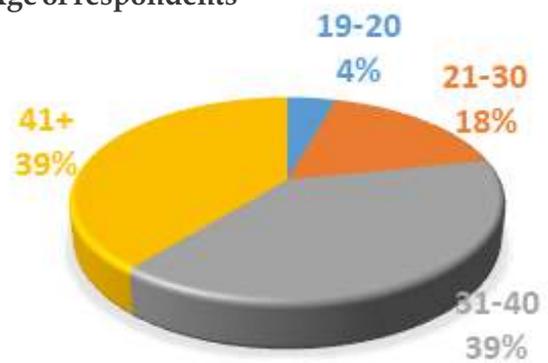
Research Methodology

Research is descriptive in nature. Research is done by collecting primary as well as secondary data. Primary data respondents are small entrepreneurs in the Vishrantwadi area. Sample size for research work is 23. Simple random sampling method is used for the research work.

Data analysis and Interpretations

Primary data is collected by making structured questionnaire. Total 23 respondent's data is gathered. Data collected was analysed using percentage method.

Age of respondents



The chart represents the age distribution of respondents. The chart is divided into four segments, each representing a different age group, along with the percentage of respondents in each group.

- **Age 19-20:** This group constitutes 4% of the respondents. It is represented by a small blue segment.
- **Age 21-30:** This group makes up 18% of the respondents, indicated by an orange segment.
- **Age 31-40:** This group is the largest, accounting for 39% of the respondents. It is shown by a large gray segment.
- **Age 41+:** This group includes 39% of the respondents, represented by a yellow segment.

The chart indicates that the majority of respondents fall within the 31-40 and 41+ age groups, each making up a significant portion of the total respondents. The younger age groups, 19-20 and 21-30, have smaller representation among the respondents.



Above chart reflect the distribution of respondents based on their education level. The chart is divided into four segments, each representing a different level of education and the corresponding percentage of respondents.

- **SSC:** This group accounts for 17% of the respondents and is depicted by the blue segment.

- **HSC:** This group makes up the largest portion, with 44% of respondents, shown by the orange segment.
- **Graduate:** This group includes 30% of the respondents, represented by the gray segment.
- **Post-Graduate:** This group constitutes 9% of the respondents, indicated by the yellow segment.

The chart shows that the majority of respondents have an HSC (44%), followed by those who graduates are (30%). A smaller proportion of respondents have completed SSC (17%) and post-graduate education (9%).



The chart shows the distribution of different types of shops. Each segment of the chart represents a different category of shop along with the corresponding percentage of respondents or instances.

- **Cloths:** Represented by the blue segment, this category constitutes 26% of the total.
- **Shoes:** Indicated by the orange segment, making up 22% of the total.
- **Toys and Gifts:** Shown by the gray segment, also accounting for 26% of the total.
- **Home Appliances:** Depicted by the yellow segment, comprising 13% of the total.

- **Furniture:** Represented by the light blue segment, making up 13% of the total.

The chart indicates that the most common types of shops are those selling clothes and toys and gifts, each comprising 26% of the total. Shops selling shoes are also significant, representing 22% of the total. Home appliances and furniture shops are the least common, each making up 13% of the total.



The data provided describes the distribution of respondents based on their monthly sales categories. Here's an interpretation of the figures:

- **0-1 Lakh Category:** The majority of respondents (39%) fall into this category. This indicates that most respondents have relatively lower monthly sales.
- **2-3 Lakh Category:** This category includes 31% of respondents. This group has moderate monthly sales, and is the second largest category.
- **4-5 Lakh Category:** Representing 17% of respondents, this category indicates a smaller portion of respondents with higher monthly sales.
- **5-7 Lakh Category:** The fewest respondents (13%) fall into this category, suggesting that only a small number of

respondents achieve very high monthly sales.

In summary, the majority of respondents have monthly sales in the 0-1 lakh range, followed by a significant portion in the 2-3 lakh range. Fewer respondents report higher sales in the 4-5 lakh and 5-7 lakh categories. This distribution suggests that lower and moderate monthly sales are more common among the respondents.



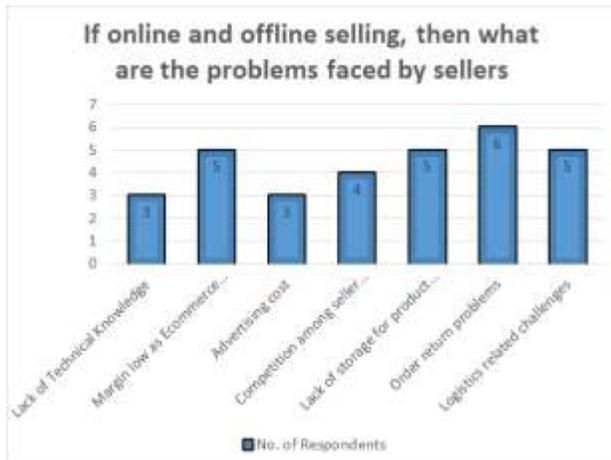
Interpretation: Based on the study's findings, here's an interpretation of the problems and challenges respondents are facing:

1. **Lack of Technical Knowledge:** The majority of respondents (14 out of a likely small sample) struggle with technical knowledge. This suggests that technical expertise is a significant barrier and could affect their ability to effectively use or leverage digital platforms and tools.
2. **Logistics Challenges and Phobias:** Some respondents (4 and 3) face logistics challenges, indicating difficulties in managing the distribution and transportation of goods. Phobias could refer to fear or discomfort related to the logistics processes, which could hinder their business operations.
3. **Order Return Problems and Quality/Size Issues:** Around 7-8 respondents experience problems with order returns and issues related to product quality and size. This suggests that managing product

returns and ensuring consistent quality and size are ongoing concerns.

- 4. Storage, Margins, and Fees:** A few respondents (3) face challenges related to storage limitations, low profit margins, and fees charged by websites. These issues indicate financial and logistical constraints that impact profitability and operational efficiency.

Overall, the findings highlight that while technical knowledge is a major concern, logistics, product management, and financial factors also play crucial roles in the respondents' challenges. Addressing these areas could improve their overall experience and effectiveness.



Interpretation: It was found that respondents encounter multiple problems or challenges. Majority (6) of the respondents have faced order returns problems. Some faced a lack of technical knowledge and advertising costs. About 4-5 respondents faced the problems of competition among sellers, lack of storage for product stock, margin low, and logistics challenges.



According to majority of respondents, 83% of respondents agree that educational training on online selling is beneficial.



According to majority of respondents, 85% of respondents agree to attend the educational training on online selling.



Maximum responses for a rating on online selling is in 5 to 6 categories which is 57% and 1 to 2 categories is 4%.

Major Findings and Observations

- It is found that most of the small entrepreneurs shut down online selling within the time period from one to six months.
- It was found that age of majority of the

respondents are within the 30+ age group and thus all were married as well.

- It was found that the majority of respondents were HSC-qualified (44%). Postgraduate respondents were very few (9%). Thus education level of the respondents was not high.
- It is found that most of the respondents own their own shop. Most respondents have their Shop Act License but very few have GST no.
- It is found that majority of respondents had monthly sale of about 0-1 lakh and only a few respondents had monthly sale of about 5-7 lakh.
- It is found that 18 respondents out of 23 do offline selling & rest of them do both online and offline selling.
- It is found that respondents face more than one problem or challenge. Majority: 14 of the respondents have faced a lack of technical knowledge. Some faced logistics challenges and phobias. About 7-8 respondents faced the problem of order return problems and quality and size problems. Very few have even faced problems like lack of storage for products & low margins and fees charged by websites further reduce their margin.
- It is found that respondents face more than one problem or challenge. Majority: 6 of the respondents have faced order returns problems. Some faced technical knowledge and advertising costs. About 4-5 respondents faced the problems of competition among seller, margin low, and logistics challenges.
- According majority of respondents, 83 % of respondents agree that educational training on online selling is beneficial.

- According majority of respondents, 85 % of respondents agree to attend the educational training on online selling.
- Maximum responses for rating on online selling is in 5 to 6 category which is 57% and 1 to 2 categories is 4%

Conclusion

E-commerce business has much more potential soon. In this study using primary and secondary data it is found that challenges faced by small enterprises doing online and offline business. As per the research study, small entrepreneurs face different types of problems who are shifting from offline to online platforms for selling. They are ready to attend training and modules regarding selling on e-commerce platforms and hence this shall help them in executing their business on e-commerce websites efficiently

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An Analysis of Consumer Satisfaction with Smart watches across different Brands

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ABSTRACT

The rapid growth and increasing competition in today's technology industry have led to a rise in consumer expectations for new products. The advancement of technology has been significant, particularly with the emergence of the Internet of Things (IoT), which enables numerous technological devices to be connected via the internet. Within the technology sector, one of the fastest-growing markets is wearable devices, especially smart watches. These wireless sensors, worn on the body, offer new experiences for everyday activities. Modern smart watches operate on mobile operating systems and function as portable media players through Bluetooth or Wi-Fi connections. They also serve as extensions of their paired smartphones, offering phone call and text messaging features. This research provides an overview of smart watches from various brands, examining their usage, factors influencing their adoption, and the elements that shape customer perceptions of smart watches, focusing on usability, brand, and pricing.

Keywords: brands, competition, markets, Smart watches

Introduction

Smartwatches trace their origins back to the early 1970s. One of the first digital watches was the Hamilton Pulsar, released in 1972, marking a significant point in history when computers became small enough to be worn on the wrist. Another early digital watch was the Calcron calculator watch, featuring a nine-digit display. The Seiko Data 2000, a precursor to smartwatches, was released in 1983 and came with a separate keyboard, allowing users to store memos of up to 1,000 characters each. The Seiko RC 1000, introduced in 1984, could connect to a personal computer, while the Seiko Receptor Message Watch, launched in 1990, was

capable of receiving pager messages. Numerous companies have ventured into the smartwatch market, though many early attempts were too niche or impractical for widespread adoption.

In 2012, Pebble revolutionized the wearable market and the Kickstarter community with a \$10 million campaign that demonstrated significant consumer demand for smartwatches. Omate followed in 2013, becoming the first company to design a truly independent smartwatch, known as the True Smart, which could make calls, use maps, and run Android apps without relying on a smartphone. Although the Kickstarter campaign had its share of mistakes and unmet

promises, it marked the beginning of a new era in smartwatch development. In 2014, Google launched Android Wear, a mobile operating system specifically designed for smartwatches.

A smartwatch is essentially a wearable computer in the form of a wristwatch, providing a local touchscreen interface for everyday use. In addition to displaying the time, many smartwatches are Bluetooth-enabled, effectively acting as wireless accessories that extend a smartphone's functionality to the user's wrist. They can display notifications, updates, and messages directly on the watch, eliminating the need to take out a smartphone to check emails. Many smartwatches run mobile apps, use a mobile operating system, and function as portable media players with capabilities such as FM radio and playback of digital audio and video files via Bluetooth or USB headsets.

Various brands of smartwatches available today include Apple, Fossil, Fitbit, Fastrack, Amazfit GTS 2, Samsung, Fire Bolt, Boat, and Noise, among others. Smartwatches also offer health monitoring features, such as tracking heart rate, SPO2 levels, blood pressure, sleep patterns, and step count. Bluetooth-enabled smartwatches facilitate communication by allowing users to make and receive phone calls, read emails and text messages, check the weather, listen to music, dictate messages, and interact with digital assistants directly from their wrists.

This research provides a comprehensive overview of smartwatches from different brands, examining their usage, the factors influencing their adoption, and the elements that shape customers' perceptions, focusing on aspects such as usability, brand, and pricing.

Objectives of the study

- To analyze and comprehend the different smart watch brands available in India.

- To identify which smart watch brand has the highest usage.
- To understand consumer satisfaction and perceptions of smart watches across different brands.

Literature Review

Dr. P. Kishore Kumar and V. Venkateshwarlu (2014) conducted a study on customer perception and purchase intentions regarding smartwatches. Their findings revealed that consumers believe smartwatches are highly convenient for completing both personal and professional tasks. Additionally, consumers perceive smartwatches to be reasonably priced based on their features, and many are likely to consider owning one in the future to perform a variety of tasks.

Apurva Adapa (2016) focused on examining the factors and challenges associated with the adoption of smart wearable devices. While these devices offer numerous functions that make them useful in daily life, the factors influencing their adoption are not entirely clear. This study employed the laddering approach to explore the factors that either inhibit or promote the adoption of wearable devices. Qualitative data was collected through in-depth interviews using the laddering technique to understand these influences. The research enhances our understanding of wearable device adoption and provides insights into key design criteria that better meet user needs.

Shweta A. Panchbudhe, Nandkishore Bankar, Sanika Kalambe, and Ujwalla Gawande (2021) conducted a study based on user experiences with smartwatches from various brands. The study highlights that smartwatches are becoming increasingly popular because they allow users to access and interact with online information while on the go. Smartwatches provide users with spatial and temporal

information, displaying maps on the screen, and function as a modern device that integrates smartphone features with continuous data monitoring to promote fitness, such as step counting, heart rate monitoring, energy consumption tracking, and monitoring physical activity levels. The study's findings suggest that smartwatches are becoming more prevalent and valuable in daily life, enabling users to access information about their surroundings and monitor health-related conditions.

Research Methodology

In simpler terms, research methodology means to collect accurate and reliable data from different sources to achieve research objectives. Research work is based on collection of primary as well as secondary data.

1. Primary Data Source- It include simple questionnaire. This questionnaire has some close end questions. Primary data was collected by mailing the questionnaire. Personal interviews was taken from smart watch distributors.
2. Secondary Data source- The secondary data was collected through websites like Smart watch Wikipedia, Investopedia, Research Gate, Digital booklet handbooks.

A structured questionnaire was used as a research instrument to collect primary data.

Different brands of Smart Watch

- **FOSSIL:** Fossil India Private Limited is a privately held company that was established on August 31, 2007. It is classified as a private limited company and is based in Bangalore, Karnataka.

- **BOAT:** Boat is an Indian consumer electronics brand founded in 2015. The company operates under Imagine Marketing Services Private Limited, which was incorporated in November 2013 by co-founders Sameer Ashok Mehta and Aman Gupta.
- **FIRE BOLTT -** Fire boltt is a leading Indian brand established in 2015 by co-founder Aayushi Kishore and Founder and CEO Arnav Kishore. It is located in Mumbai, Maharashtra.
- **NOISE -** Noise is an India-based brand established in 2014 by founders Amit and Gaurav Khatri. It is a Private company which is located in Gurugram, Haryana.
- **FASTRACK -** Fastrack is a public company founded in 1998. It began as a joint venture with TIDCO and is now a part of the Tata Group. It is located in New Delhi, India.

Fire Bolttt and Noise together accounted for over half of the total smart watch market. Fire Bolttt led the market with a 27.7% share and had the highest number of product launches in Q2 2022, followed by Noise with a 26% market share. Boat held a 19.5% market share, while Samsung captured 3.3% of the market.

Primary Data Analysis and Interpretation-

Researchers did survey in some regions of Patna. Total sample size for the research work is 103. Data analysis and its interpretation is shown below.

Q1. Classification of respondents on the basis of Age group (years)-

Age group (years)	No. of Respondent
15 – 20	47
21 – 25	42
26 – 30	5
Above 30	9

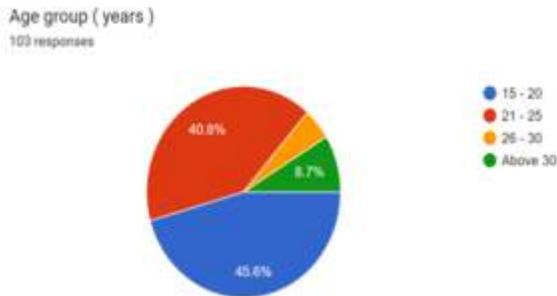
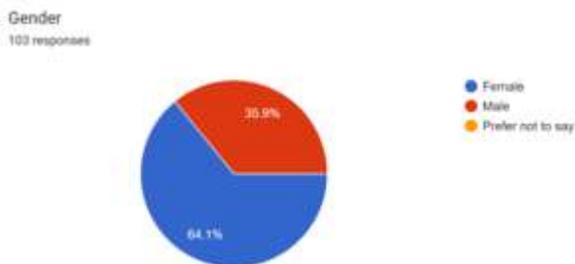


Fig 1.

From the above figure It can analyzed that the majority of them are from the age groups 15-20 followed by age groups 21-25 and least from age groups 26-30.

Q2. Classification of respondents on the basis of Gender-

Gender	No. of Respondent
Female	66
Male	37
Prefer not to say	00



From the above figure It can be interpreted that the majority of them are females (64.1%) and only (35.9%) of them are male.

Q3. Classification of respondents on the basis of Occupation-

Q3. Classification of respondents on the basis of Occupation-

Occupation	No. of Respondents
Student	87
Employed	11
Homemaker	05
Unemployed	00

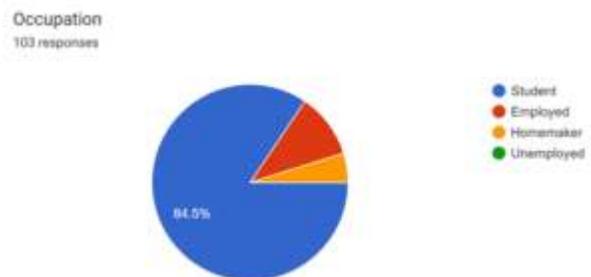


Fig. 3

From the above figure It can be stated that many of them are students and less to it are from employed and least of them are from unemployed category.

Q4. Do you have a smart watch?

Options	No. of Respondents
Yes	79
No	24

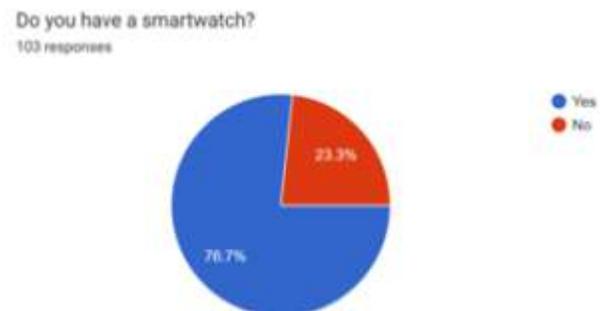


Fig. 4

The above figure shows that the majority of the people has the smart watches and only few people doesn't uses the smart watches.

Q5. Which brand of smart watches do you use?

Brands of smart watches	No. of respondents
Fossil	05
Noise	28
Fastrack	26
Fireboltt	10

Which brand of smartwatch do you use?
60 responses

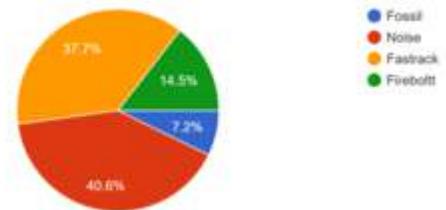


Fig. 5

From the above figure It can be stated that 40.6% of people are using Noise brand followed by Fastrack that is, 37.7% and least of them are using the Fossil brand.

Q6. If not the above brands, then type in your smart watch brand name-



Fig. 6

From the above figure It can be interpreted that there are number of different brands of smart watches to which the customers prefer and uses such as Apple, Boat xtend, honor, realme.

Q7. How long you have been using your watch?

Time Period	No. of respondent
Less than 1 year	51
1 year to 2 year	18
Above 2 years	14

How long you have been using your watch?
83 responses

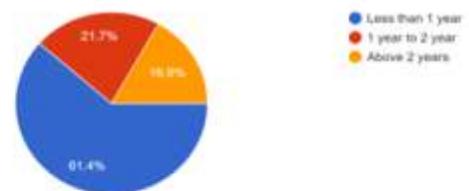


Fig. 7

From the above figure It is found out that the maximum people has started using smart watches within 1 year and very few of them has known smart watches from above 2 years.

Q8. Which feature of smart watch is most important to you while buying?

Features	No. of respondent
Brand	16
Price	09
Innovative design	15
Functionality	51

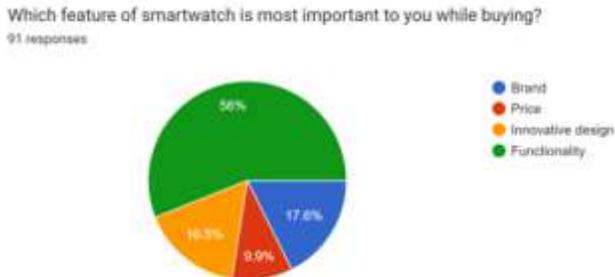


Fig. 8

From the above figure, it is interpreted that the Functionality is the feature which is most important to the people while buying and are least interested in checking up the price of the smart watch.

Q9. Is operating a smart watch difficult?

Options	No. of respondents
Yes	06
No	68
Neutral	17

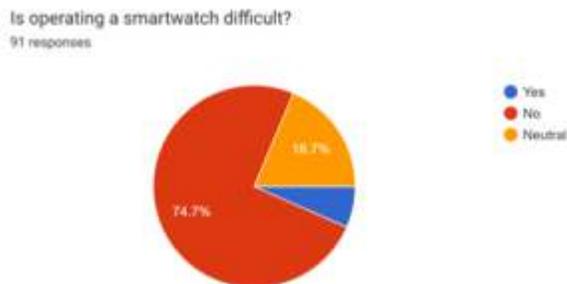


Fig. 9

It can be stated from the above mentioned Pie-chart majority of the customer won't find any problem in operating a smart watch since it is easy to use and handle.

Q10. Do you have a swappable watch brand?

Options	No. of respondents
Yes	34
No	31
Can't say	21

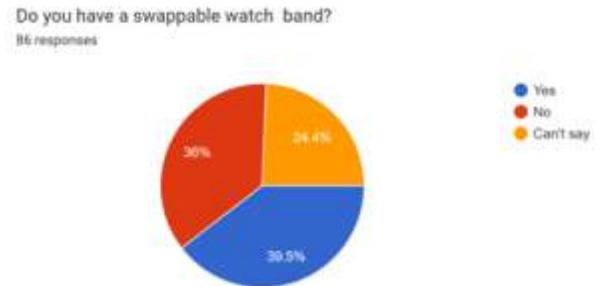


Fig. 10

From the above figure It can be stated that 39.5% people has swappable watch band which helps smart watches to stand apart and 36% people doesn't have swappable band in their smart watches.

Q11. Whether your smart watch is a waterproof smart watch?

Options	No. of respondents
Yes	71
No	14

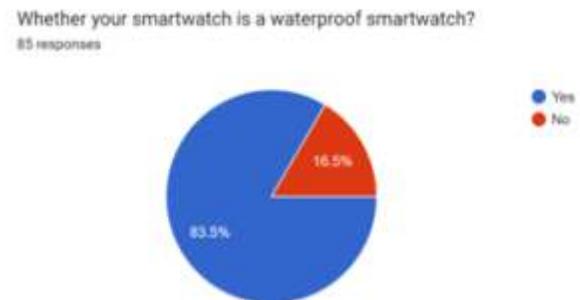


Fig.11

From the above figure It can be interpreted that 83.5% people has waterproof smart watches where only 16.5% people do not has such smart watch.

Q12. Can your smart watch work without a phone?

Options	No. of respondents
Yes	48
No	23
Sometimes	10
Can't say	04

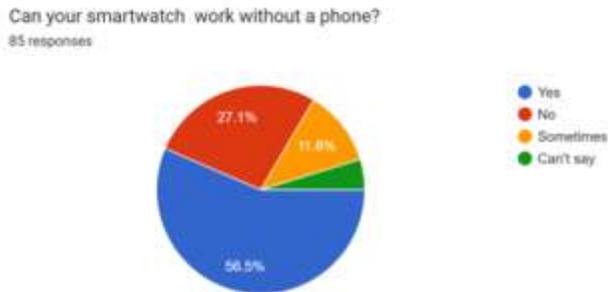


Fig. 12

From the above figure, it can be observed that majority people's smart watches can work

without their phones but there are few people whose smart watches couldn't.

Q13. Which feature does your smart watch have?

Features	No. of respondents
Sleep tracking	45
Heart rate monitoring	65
Integrated GPS tracking	34
Blood oxygen monitoring	52
Voice assistant (Siri, Google assistant)	33
Phone calls and text messages	66
Always on display	38
Playing games	23
Longer battery life	49

Which feature does your smartwatch have?

85 responses

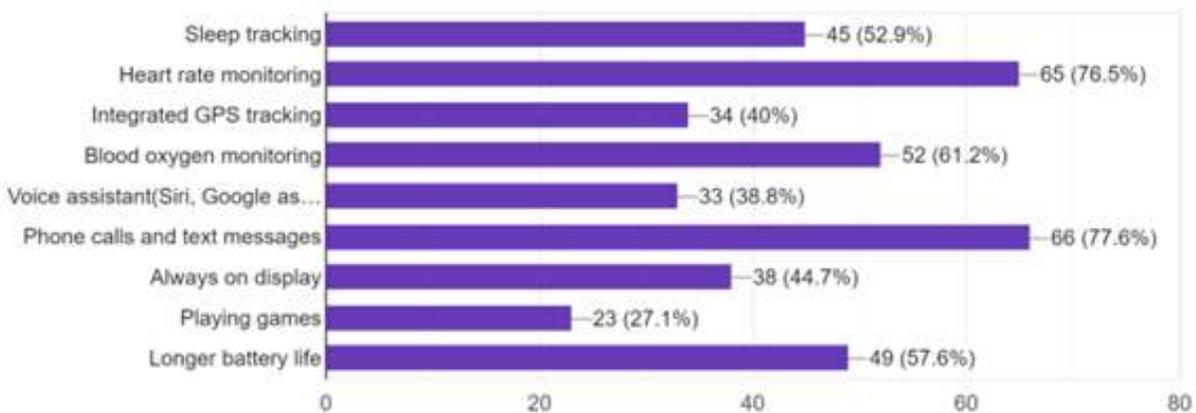


Fig. 13

From the above figure, it can be observed that smart watch poses different features such as phone calls and text messages followed by heart rate monitoring, longer battery life, sleep tracking and so on. Least smart watches has the facility of playing games in them.

Q14. When compared to other brands what according to you is the best smart watch brands?

When compared to other brands what according to you is the best smartwatch brand?

62 responses

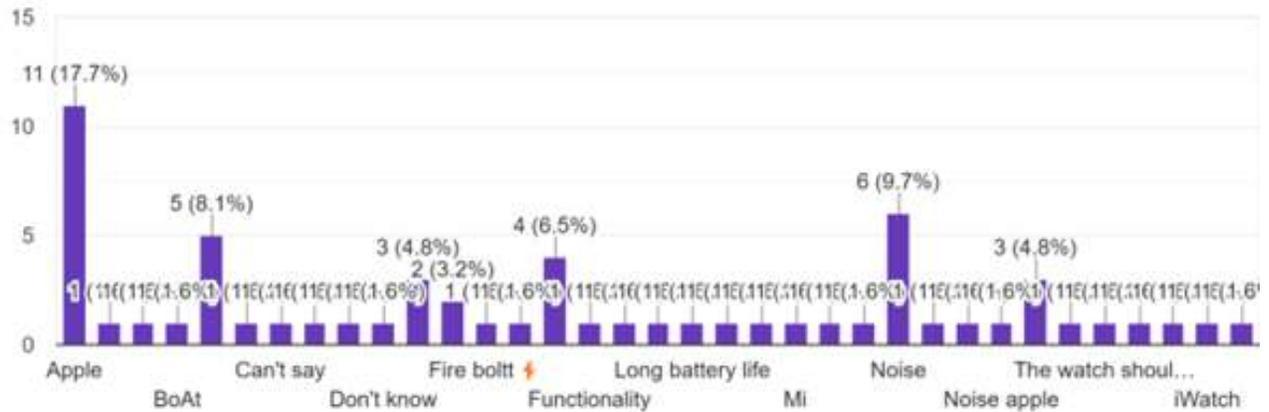


Fig. 14

From the above graph it can be stated that the choices of people differs since there are number of options available while purchasing the smart watch.

Q15. Are you satisfied with your smart watch?

Options	No. of respondents
Highly satisfied	27
Satisfied	49
Neither satisfied nor dissatisfied	08
Dissatisfied	00
Highly dissatisfied	00

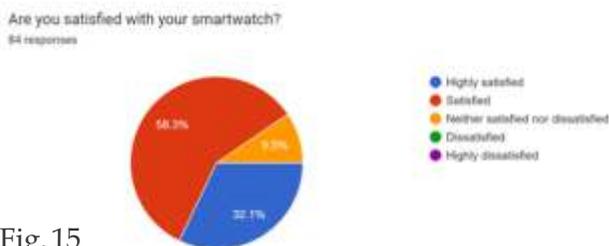


Fig. 15

From the above chart, It can be stated that most people are satisfied with the brand of smart watch they are using in comparison to their dissatisfaction level.

But there are few who are neither satisfied nor dissatisfied with their smart watch.

Major Findings and Observations

1. Smart watches are preferred by almost all the age group people but mainly it is liked by people of age group 15-20.
2. Noise and Fastrack captured more than half of the total smart watch market.
3. The functionality feature of smart watch attracts and is most important to the people while buying.
4. Maximum people have started using smart watches within 1 year.
5. Many respondents believe that smart watches are not difficult to operate.
6. Most smart watches of the respondents are waterproof.
7. Many respondents are satisfied by the different features that a smart watches possess.

Recommendations and Suggestions

- Smart watches signify next evolutionary leap in smart devices so it should open shops in every area so that all people can easily access to the different brands.

- Company should have a close eye on customers to know their changing needs and wants and also on the competitors for benchmarking.
- Try to develop loyal relationship with customers.
- Online payment at store should be encouraged more and at every store and only debit card should not be allowed as it is not convenient for students to carry so.
- The company should look after the functionality feature in the smart watches since the customers highly rely and is considered the most by them while purchasing.
- The company should increase more workers at stores for billing and packaging separately of the product to reduce time and crowd at stores.

Conclusion

“Smart watches of today simply are the external output / input devices for our phones.”

Without a doubt, Wearable technology is and will be the most important technology to be used and make its market efficient. Wearable will continue to reign in popularity. In this study, we examined the influence factor of usability, brand and pricing factors to the smart watch customer’s perceptions. The wearable world is constantly changing. Every year, new products and brands are introduced, offering better metrics and user experience. Smart watches of different brands provides with less features and functionality to wide variety of features and functionality at a reasonable prices according to people’s need and affordability. It is clear that smart watches of all brands are readily available and people like them because they can be used anywhere and include all updates, as well as a health status. Smart watches signify next evolutionary leap in Smart Devices. Smart wearable devices which remain

on person for major part of day and help interacting with Physical and Digital world should turn a lot of heads.

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Mini Sugarcane Juice Extraction Machine

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ABSTRACT

Over the years, small-scale farmers have played a crucial role in supporting sugarcane production, which traditionally involved biting the rind and chewing the inner tissues to extract the sweet juice. At the concentration stage, the juice is extracted more efficiently. To enhance sugarcane production and its related products, a project has been developed called the sugarcane juice extractor. This research work focuses on the functionality and effectiveness of the extractor in maximizing juice extraction. The design approach for this machine includes a 24-volt DC motor and a crushing mechanism comprised of gears, rollers, bearings, and a juicer, all mounted to the frame with an inlet.

Keywords: Sugarcane, Extractor. Extraction Efficiency.

Introduction:

The sugarcane plant is a common name for a species belonging to the grass family, known as a source of sugar for daily consumption. There are three main types of sugarcane found in Nigeria, Asia, and India: *Saccharum officinarum*, *Saccharum spontaneum*, and *Saccharum barberi*. Traditionally, extracting juice from sugarcane by chewing or biting the rind can damage teeth, cause discomfort, and requires significant effort, which are major drawbacks. Additionally, the quantity of juice extracted using traditional methods is limited, making it challenging to produce a substantial amount in a day.

Various automatic and semi-automatic sugarcane juice extracting machines are

available in the market, but their high cost and weight make them inaccessible for the average person. To address this, we aim to develop a more affordable, lightweight sugarcane juice extractor. Currently, interest in drinking sugarcane juice has declined due to the difficulty of finding clean and suitable conditions during its production. Sugarcane juice is often sold on roadsides where hygiene can be compromised by dust and windborne germs. Fresh and chilled sugarcane juice is ideal, and a clean processing mechanism with proper disposal of sugarcane fibers (known as bagasse after extraction) offers a promising solution for better marketing and more efficient juice production.

Purpose of Machine:

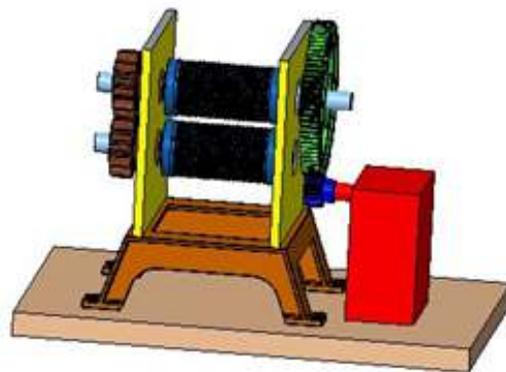
- Objective:
 - 1) Aim of our project is that this machine can be made available to every farmer as well as common people at a low cost.
 - 2) The juice will be available easily in the desired time.
 - 3) This machine is portable less expensive and also occupies less space.
- Scope of Project:
 - 1) As more efficient machine become available at a lower cost demand may increases.
 - 2) This machine is comparable to other machine in the market.
 - 3) Sugarcane juice extraction machine can be easily made available to everyone at home.

Problem Identification:

1. Sugarcane juice is not available to people every time where they want in it but this type of machine can make sugarcane juice easily available at homes
2. Conventional machines are very bulky and not portable also it has a time consuming.
3. The prices of the machine in the market are high
4. Since the design of machine is large it occupies more space.
5. In a conventional machine uses more equipment and that it difficult to make
6. Rarvantages places where impurities are found can be kept clean by such machine
7. Maintenance cost of conventional machine is high.

Methodology:

This machine was built using a straightforward rolling and crushing mechanism. The rollers are composed of two components: the slicing part and the crushing unit. These rollers were created using a lathe machine and involved operations such as facing, turning, and threading. The machine is mounted on a base made from square cast iron, with an electrical motor and reduction gear positioned on a side support. The designed rollers were assembled and attached to the shaft within the crushing chamber, and pinion gears were installed on both sides of the rollers to connect to the gear drive.



Description of major components of the Machine:

A. Motor

In this mechanism DC motor are used for generating power and rotating gears using initially 3300 rpm developed with 24 volt and output power 250 w also gear reduction ratio 9.78 with done final motor rpm 337.42



B. Gear

Gear are using for transmitting the power through motor we are using total four gears Helical gears(1), Spur gear(2), Bull gear (1) using pinion gear in mechanism motor shaft is connected directly to pinion an again pinion are forwarding power to bull gear in this movement power loss are generated with the help of shaft bull gear and spur gear are attached parallely bull gear are power transmit to spur gear.



Fig. 2. Gear

C. Rollers

Manufacturing of roller mild steel material are used in this mechanism 33.27 mm and 76 mm diameter and length respectively using mainly objective of roller to crush the sugarcane



Fig. 3. Rollers

D. Ball Bearings

Two Ball bearings are mounted on the metallic rod and the frame is fixed on these bearings so that there is connection between rotating rollers

and frame. Wide range of application reduce friction we used ball bearing in this mechanism.to support the roller assembly as well as reduce friction losses.



Fig. 4. Ball Bearings

Fabrication Procedure:

After completing the design work for each section, the materials were organized. This included sorting the roller gears, gear motor, and other components. The required size and frame were constructed using mild steel plates. Before proceeding with the major joints and assembly processes, the necessary drilling was performed.

The sugarcane juice extractor mechanism is made up of four major components:

- 1) ELECTRIC GEAR MOTOR
- 2) ROLLER
- 3) SPUR GEAR
- 4) BEARING

Operations Involved:

1) Lathe operation:

The lathe machine is used to manufacture roll shaft turning step in both ends. 1st

stage with 33.27mm and 76mm diameter and length. Measure and mark the desired length of the roller. On the mild steel bar stock.

2) Grooving Operation:

With the help of lathe machine grooving operation is done of 2mm depth, On circular roller.

3) Cutting Operation:

A cutting machine is employed for precise measurement and cutting of materials.

4) Drilling Operation:

A vertical drilling machine is utilized to drill 5mm thick plates and create holes with a diameter of 15mm. Additionally, a hand drill machine is used for drilling the body to facilitate easy fastening.

5) Welding operation:

With the help of welding operation bushing welded on the plate which support the bearing.

Working of the Machine:

Sugar cane juice extraction machines typically involve a feeding mechanism that leads the sugar canes into the machine. The canes are then crushed between two rollers. break up the canes and extract the juice from the material.

The juice is collected in a container placed at the bottom of the machine, while the fibrous material called bagasse is separated and discharged through an outlet. The roller can be applying more or less pressure, depending on the desired juice extraction rate and the quality of the cane.

Some modern sugar cane juice extraction machines may also include a filtration system to separate fine particles from the juice. The juice is then ready to be bottled, sold, or further

processed for producing sugar or other products.

Overall, the operation of a sugar cane juice extraction machine involves a combination of mechanical and electrical components that work together to crush and extract the juice from sugarcane stalks.

Test Parameters:

After assembling the machine, its efficiency was tested to determine whether the modifications were advantageous or detrimental to its performance.

Test Procedure:

The following equipment and materials were used for the test:

- Length of harvested sugarcane
- Sugarcane juice extractor
- 24V electric gear motor
- Weighing balance for measuring the sugarcane juice or bagasse
- Vernier caliper for measuring diameter
- Measuring tape for measuring sugarcane length
- Container for collecting the extracted juice
- Stopwatch
- Calculator
- Polythene bag

When the sugarcane was purchased from the market, it was cleaned before production and measured for dimensions such as average diameter, length, and weight. The motor was warmed up for 5 minutes prior to operating the sugarcane juice extractor. The stopwatch was started at the beginning of the extraction process and stopped at the end for each specimen. Each

piece of sugarcane was fed into the machine, and the juice was collected, while the bagasse was discharged through a rear channel. After each extraction, the bagasse was gathered in a marked polythene bag, and its weight was recorded. Efficiency calculations for the machine were conducted based on these measurements.

Result and Discussion:

Rpm :3300

Voltage: 24v

Output power: 250 watt Gear reduction ratio: 9.78

Motor Output rpm :337.42

Weight of machine :8kg

Power Selection for Motor The required power for the electric motor:

Power required (1) Where T is the torque in (N/m)

P is the transmitted power in watt ω is the angular speed

However, a of 3300 rpm was chosen

Determination of Actual Motor Torque The actual motor torque (Tm) was obtained using equation:

Were,

Motor Power is 250 watt Angular velocity is 131.57 Motor torque = 250/ 131.57

The Actual Motor Torque was 1.9Nm

Design of Roller:

Length of roller :76mm Diameter :33.27mm

Thread 13

Pitch Diameter: 5mm Shaft diameter: 16.80mm

Diameter of Roller :D= 33.27mm =0.0333m

Radius of Roller r= 16.63mm = 0.01663m

Angular Velocity = $2 \times 3.14 \times N / 60$

= $2 \times 3.14 \times 3300 / 60$

345.4 rad/sec

Velocity (v) = $w \times r$

= 131.57×0.01663

= 2.18 m/s

Actual speed of roller:

The actual speed of the rollers was obtained using equation

$\eta_2 = \eta_1 (N_1 / N_2)$

R1 is the speed of roller which is 56rpm

G2 (bull gear) is the speed of rotation is 66rpm

G1 (pinion) is the speed of rotation is 120rpm

$\eta_2 = \eta_1 (N_1 / N_2)$

= $56(56 / 66) R_2 =$

47.51rpm

R2 is the speed of roller is 47.51rpm

Design of Shaft :

shaft diameter: 16.80mm

Torque (t) transmitted by shaft is calculated from equation $T = P \times 60 / 2 \times 3.14 \times N$

$T = 250 \times 60 / 2 \times 3.14 \times 337.42 T = 7.08 N/m$

Design of Gears:

HELICAL GEAR:

Pinion (1) : Outer Diameter - 32mm

MESHING GEAR:

Spur Gear (2): Outer Diameter – 55mm

No. of Teeth – 26

BULLGEAR:

Outer Diameter :92m Inner Diameter :17mm

NO. of Teeth :38

G2 (bull gear) is the speed of rotation is 66 rpm.

G1 (pinion) is the speed of rotation is 120 rpm.

EFFICINCY OF JUICE EXTRACTION

Specimen Length Initial Bagasse Extracted
initial Effi.

	Mm	weight	weight	juice	weight	(%)
A	600	806.3	486	196	320.3	61.19
B	550	1000.5	580.3	186	420.2	44.26
C	490	997.3	530.2	177	467.1	37.89
D	600	885	630.1	201	500.3	40.17

The required for the sugarcane juice extracting is 40 to 45 ml within 1 minute.

Conclusion:

Researchers have successfully developed a sugarcane juice extraction machine that meets user requirements based on established engineering specifications. Here is a summary of our work and approach:

Hygiene, portability, and space efficiency were identified as key requirements. These factors were integrated into our design and implemented in the final model.

Researchers created and followed a detailed fabrication plan, which outlines the steps necessary for replicating our work. The final design was divided into four main components: motor, roller, gears, bearings, and filter net.

Each component was fabricated separately in the machine shop and then assembled to form the complete model.

Recommendations for Further Work:

To improve the machine and address additional needs, the following modifications are recommended:

- 1. Material Upgrade:** Replace the slide plate in contact with the juice with stainless steel to enhance hygiene, especially for industrial use.
- 2. Bagasse Collection:** Incorporate a sieve to capture small bagasse particles, which can be separated from the juice through the chute or exhausted.
- 3. Cutting Section:** Add a cutting section to the machine to preprocess the sugarcane by scraping it before extraction, thereby enhancing overall operation.
- 4. Adjustable Crushing Mechanism:** Modify the crushing mechanism to allow adjustments in the gap between rollers, which would enable variations in crushing and juice extraction for different diameters of sugarcane.

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Stock preferences of Customers dealing in the Stock Market

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ABSTRACT

The study examines the stock preferences of participants in the Indian stock market, focusing on factors that influence their investment choices. It targets retail investors, institutional investors, and traders in urban areas, aiming to identify key drivers behind stock preferences over the past five years including market trends, economic indicators, risk tolerance, and individual financial goals. The findings will showcase how market volatility and economic policies impact investment patterns and customer behavior. The research intends to bridge the gap between customer expectations and financial service offerings, providing actionable insights into stock preference trends to improve decision-making for both investors and financial firms.

Keywords - Risk, investments, stock market, consumer preferences, financial goals.

Introduction:

The stock market is a crucial part of the global financial system, where individuals and institutions buy and sell financial securities. Understanding customer stock preferences is important for investors and service providers. This research focuses on exploring the stock preferences of customers in the rapidly evolving Indian stock market. It aims to identify the factors that shape their investment choices and behaviors and assess the impact of external forces on investment patterns. The study focuses on the dynamic Indian stock market, known for its diverse investor profiles and ever-changing market conditions. With participants ranging from retail investors to high-net-worth individuals, each driven by unique financial

goals, risk appetites, and market perceptions, it's a complex financial landscape.

By identifying the factors that influence these preferences—such as market trends, economic indicators, and individual investor characteristics—this study seeks to provide a comprehensive understanding of customer behavior in the stock market. Additionally, the research will assess the impact of external forces, such as market volatility and economic policies, on investment patterns. The ultimate goal is to bridge the gap between customer expectations and the services offered by companies like Exclusive Securities Ltd., enabling more informed decision-making and enhanced customer satisfaction. Through a detailed analysis of stock preferences, investment trends,

and key drivers such as risk tolerance and financial goals, this study aims to offer actionable insights that can help shape future strategies for both customers and service providers in the stock market.

Objectives of study

The objectives are as follows -

- The primary objective of this study is to understand the stock preferences of customers dealing in the stock market.
- The study aims to identify the factors influencing these preferences, such as market trends, economic indicators, and individual investor characteristics.

Scope of study

The scope of study includes-

- **Target Population:** Customers, including retail investors, institutional investors, and traders.
- **Geographical Area:** The research focuses primarily on the Indian stock market, with an emphasis on urban centers where stock trading is more prevalent.
- **Time Frame:** The study covers data from the last 5 years to capture recent trends and behaviors.
- **Research Focus:** The study will concentrate on stock preferences, investment patterns, and the impact of external factors such as market volatility and economic policies.

Statement of problem

The problem addressed in this research is the "Stock Preferences of Customers Dealing in the Stock Market." The challenge lies in identifying

the key drivers behind these preferences, such as risk tolerance, market conditions, and individual financial goals. This study aims to bridge the gap between customer expectations and the company's service offerings by providing actionable insights into stock preference trends

Research Methodology:

This research adopts a mixed-methods approach, combining both quantitative and qualitative research methodologies to gain a comprehensive understanding of stock preferences.

Types of Research:

- **Quantitative Research:** This involves the collection and analysis of numerical data, such as the frequency of certain stock trades, customer demographics, and market trends. Surveys and structured questionnaires will be used to gather this data from a large sample of customers.
- **Qualitative Research:** This aspect of the research focuses on understanding the underlying reasons and motivations behind stock preferences. In-depth interviews and focus groups with selected customers will provide rich, qualitative insights.

Research Design:

- **Descriptive Research Design:** This study employs a descriptive research design, which aims to systematically describe the characteristics of the population being studied. This includes analyzing patterns in stock preferences, identifying common factors influencing these choices, and understanding the impact of external market conditions.
- **Sampling Method:** A stratified sampling

method will be used to ensure representation across different customer segments, including retail investors, institutional investors, and traders. This method allows for a more accurate analysis of the diverse preferences within the customer base.

The combination of quantitative and qualitative methods, along with a descriptive research design, provides a robust framework for understanding the stock preferences of customers.

Conceptual understanding of Stock Market and Stock Exchanges:

The stock market is where companies raise funds by issuing shares, and investors buy and sell these shares to earn returns. It functions as a marketplace for trading company ownership and supports economic growth by allowing companies to secure capital for expansion. For example, Tata Steel can use the funds to invest in new projects, creating jobs and driving growth. Investors can benefit from dividends and price appreciation by purchasing shares in companies like Tata Steel or HDFC Bank. In India, the two main stock exchanges are: Bombay Stock Exchange (BSE): Established in 1875, it is Asia's oldest stock exchange, listing companies like Tata Motors and Infosys. National Stock Exchange (NSE): Established in 1992, it is the largest stock exchange in India by trading volume, hosting companies such as Reliance Industries and HDFC Bank. Most major Indian companies are listed on both NSE and BSE. Both exchanges facilitate the buying and selling of shares, providing a platform for companies to raise funds and investors to participate in growth. For example, an investor in Mumbai can buy shares of a Chennai-based company listed on the NSE, while an investor in Delhi can

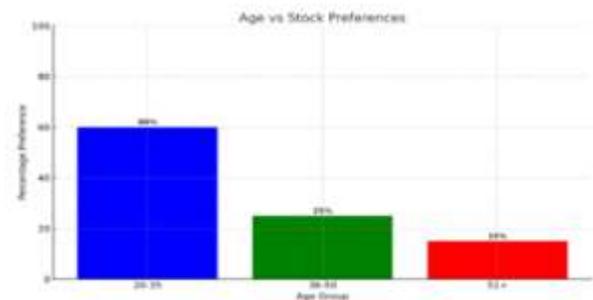
sell shares of a Kolkata-based company listed on the BSE.

Data Analysis and Interpretation:

The data analysis section provides insights into the stock preferences of customers at Exclusive Securities Ltd. based on the research conducted. The analysis focuses on various factors, including demographic characteristics, risk tolerance, market influences and factors affecting the customer preferences.

1. Demographic Analysis:

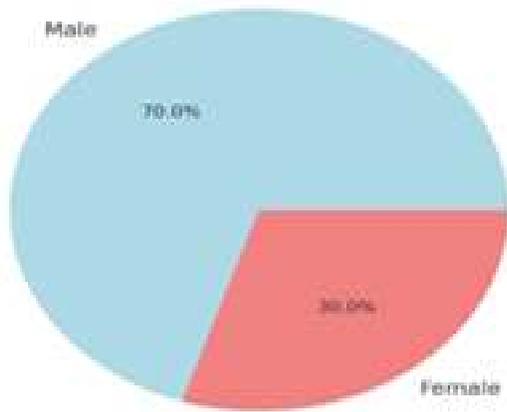
- **Age:** Younger investors (ages 20-35) tend to prefer high-growth stocks, particularly in technology and emerging sectors. This demographic is more willing to take risks in pursuit of higher returns.



Younger investors (ages 20-35) have a higher preference for technology stocks (60%), while older investors (51+) lean more towards dividend-paying stocks (15%)

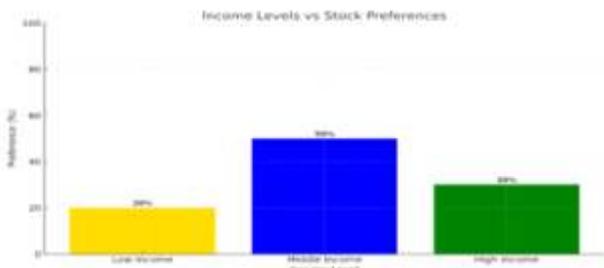
- **Gender:** Male investors are generally more inclined towards riskier investments, while female investors prefer more stable, dividend-paying stocks

Gender Distribution of Investors



Pie chart illustrating the proportion of male versus female investors and their respective stock preferences.

- Income Level:** High-income investors show a preference for diversified portfolios, including both high-risk and low-risk stocks. Middle-income investors are more likely to focus on blue-chip stocks, which offer a balance of risk and return.

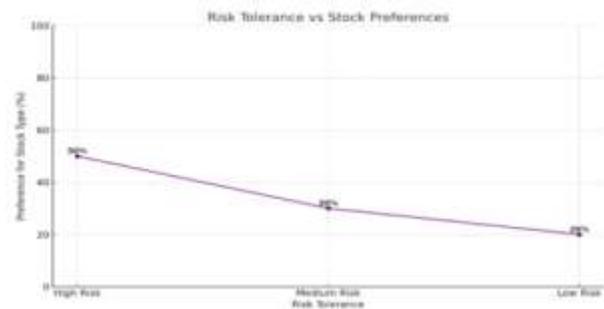


Here is the stacked bar chart showing the relationship between income levels and stock preferences:

- ❖ Low Income: 20% prefer safe investments.
- ❖ Middle Income: 50% prefer blue-chip stocks.
- ❖ High Income: 30% prefer a diversified portfolio

2. Risk Tolerance:

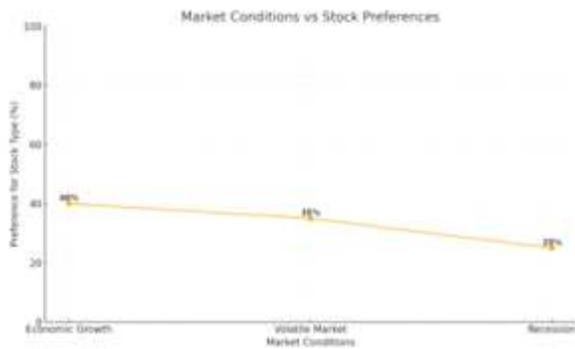
- Investors with high risk tolerance prefer stocks in volatile sectors like technology and biotechnology. These investors are also more likely to engage in short-term trading.
- Those with low to moderate risk tolerance tend to favor stocks in established sectors, such as consumer goods and healthcare, which are perceived as safer investments.



A line graph indicating that investors with high risk tolerance prefer tech stocks (50%), those with medium risk tolerance prefer consumer goods (30%), and those with low risk tolerance prefer healthcare stocks (20%)

3. Market Influences:

- Economic Indicators:** During periods of economic growth, there is a noticeable increase in the preference for cyclical stocks, such as those in the automotive and retail sectors. Conversely, during economic downturns, defensive stocks, like those in utilities and healthcare, become more popular.
- Market Volatility:** High market volatility often drives investors towards safer investments, such as large-cap stocks and government-backed securities.



A multi-line graph showing that during economic growth, 40% of investors prefer cyclical stocks, 35% prefer blue-chip stocks in volatile markets, and 25% opt for defensive stocks during a recession.

4. Factors affecting the Customer Preferences:

The factors affecting stock preferences of customers in the stock market could be broadly categorized into psychological, economic, market-related, and company-specific influences. Here's a detailed exploration of these factors:

A. Psychological Factors

- **Risk Tolerance:**

Individual investors have varying levels of risk tolerance, which significantly impacts their stock preferences. Risk tolerance is influenced by factors such as age, financial situation, investment goals, and personal comfort with market fluctuations. Investors with a high risk tolerance might prefer growth stocks or speculative investments, while those with a low risk tolerance may choose more stable, dividend-paying stocks.

- **Investment Goals:**

Investors' objectives—such as retirement savings, wealth accumulation, or income

generation—shape their stock preferences. For example, investors looking for long-term growth may favor stocks with high growth potential, whereas those seeking regular income might prefer dividend stocks.

Behavioral Biases:

Behavioral finance identifies biases that affect investment decisions, such as:

- **Overconfidence Bias:** Investors may overestimate their knowledge and abilities, leading to aggressive stock choices.
- **Loss Aversion:** The fear of losses can lead investors to avoid risky stocks or hold onto losing stocks longer than advisable.
- **Herd Behavior:** Investors might follow the crowd, influenced by popular opinion or trends, rather than independent analysis.

B. Economic Factors

- **Economic Indicators:**

Key economic indicators, such as GDP growth, unemployment rates, and inflation, influence stock preferences. Positive economic conditions generally boost investor confidence and stock preferences, while economic downturns can lead to more conservative investment choices.

- **Interest Rates:**

Interest rates have a significant impact on stock preferences. Higher interest rates often lead to lower stock prices as borrowing costs increase and investors may shift their funds to interest-bearing assets. Conversely, lower interest rates can

make stocks more attractive compared to fixed-income investments.

- **Inflation:**

Inflation affects stock preferences as it erodes purchasing power. During periods of high inflation, investors might seek stocks in sectors that historically perform well under inflationary pressures, such as commodities or utilities.

C. Market-related Factors

- **Market Trends and Conditions:**

Overall market conditions, including bull and bear markets, influence stock preferences. In a bull market, investors are more likely to prefer high-growth stocks due to positive market sentiment. In a bear market, they might shift towards defensive stocks or cash to preserve capital.

- **Sector Performance:**

Investors often look at the performance of specific sectors when selecting stocks. For instance, technology stocks might be preferred during periods of technological innovation, while healthcare stocks could be favored in times of increasing health concerns.

- **Company Performance and News:**

Individual stock preferences are influenced by the performance of companies and relevant news. Strong financial performance, positive earnings reports, and favorable news about a company can attract investors. Conversely, negative news, poor earnings, or management issues can lead investors to avoid or sell the stock.

D. Company-specific factors

- **Financial Health:**

The financial health of a company, including metrics such as earnings per share (EPS), return on equity (ROE), and debt levels, plays a crucial role in stock preferences. Investors often favor companies with strong financial performance and stability.

- **Management and Leadership:**

Effective management and leadership are key considerations for investors. Companies with experienced and credible management teams are often viewed more favorably, as strong leadership can lead to better strategic decisions and overall performance.

- **Dividend Policy:**

For income-focused investors, a company's dividend policy is a critical factor. Companies with a consistent and attractive dividend payout are preferred by investors seeking regular income from their investments.

- **Growth Potential:**

The potential for future growth is a significant factor. Investors are drawn to companies with promising growth prospects, innovative products, or expanding markets. Companies that demonstrate strong growth potential often attract investors looking for capital appreciation.

E. External Factors

- **Political and Geopolitical Events:**

Political stability, policy changes, and geopolitical events can impact stock preferences. Uncertainty or changes in regulations and trade policies can

influence investor sentiment and stock choices.

- **Technological Innovations:**

Technological advancements and innovations can create new opportunities

and affect stock preferences. Investors may favor companies that are at the forefront of technological changes or those that can leverage new technologies to gain a competitive edge.

5. Factors influencing Stock Preferences:

Factor	Description	Market Impact	Stock Examples (India)
Income & Spending Habits	Rising disposable incomes fuel spending in specific sectors.	Retail, travel, and entertainment sectors benefit during economic booms.	Retail: Reliance Industries, Aditya Birla Fashion and Retail
Demographics	Age, location, and family structure influence preferences.	The growing elderly population drives demand for healthcare and retirement services.	Healthcare: Apollo Hospitals Enterprise, Dr. Lal PathLabs
Psychographics	Values, attitudes, and lifestyles play a role.	Environmentally conscious consumers drive demand for sustainable products.	Renewable Energy: Adani Green Energy, Tata Power Company
Technology & Innovation	New technologies change how we consume.	Online shopping impacts traditional retailers, creating opportunities for tech companies.	E-commerce: Flipkart, Amazon India
Social Media & Trends	Viral trends influence choices.	Companies catering to trending preferences benefit.	Food Delivery: Zomato Ltd, Swiggy

Overview:

- **Income & Spending Habits:** As disposable incomes rise, consumer spending shifts towards retail, travel, and entertainment. Stocks in these sectors tend to perform well during economic booms.

- **Demographics:** The age and structure of the population influence demand. For example, India's growing elderly population drives demand for healthcare services, benefiting companies in this sector.

- **Psychographics:** Consumer values and lifestyles, such as environmental consciousness, affect stock preferences. Companies involved in renewable energy are increasingly favored.
- **Technology & Innovation:** Advances in technology, such as the rise of e-commerce, have disrupted traditional retail but created growth opportunities for tech-focused companies.
- **Social Media & Trends:** Viral trends, often driven by social media, can significantly impact consumer choices. Companies that align with these trends, like food delivery services, may see increased demand.

Findings:

- **Income and Spending Habits:** It was found that customers with higher disposable incomes tend to prefer investing in sectors such as luxury goods, travel, and entertainment. This preference aligns with economic booms, where spending increases and stock prices in these sectors tend to rise. Notably, companies like Reliance Industries and Aditya Birla Fashion and Retail were popular choices among these investors.
- **Demographic Influences:** The study highlighted the significant impact of demographics on stock preferences. Older investors, especially those approaching retirement, showed a marked preference for healthcare and pharmaceutical stocks. This trend reflects the increasing demand for healthcare services in India's aging population, with stocks like Apollo Hospitals Enterprise and Dr. Lal PathLabs being particularly favored.
- **Psychographic Factors:** Values, attitudes, and lifestyles play a critical role in shaping

stock preferences. For example, environmentally conscious investors are more inclined to invest in renewable energy companies, such as Adani Green Energy and Tata Power Company. This trend is in line with the global movement towards sustainable and responsible investing.

- **Technology & Innovation:** The rise of technology and e-commerce has significantly influenced investor behavior. There is a strong preference for technology-driven companies, particularly those in the online shopping and tech innovation sectors. Companies like Flipkart and Amazon India were among the most favored by investors looking to benefit from the digital transformation of retail.
- **Social Media & Trends:** Social media trends are increasingly influencing stock preferences. Companies that cater to viral trends or popular consumer preferences tend to attract more investor interest. For instance, Zomato Limited and Swiggy have benefited from the growing trend of online food ordering, making them popular investment choices.

Conclusion:

The analysis indicates that stock preferences among customers are heavily influenced by a combination of income levels, demographic factors, psychographic profiles, technological advancements, and social media trends. These factors collectively drive investor behavior, shaping their choices in the stock market. The data suggests that understanding these underlying factors is crucial for predicting market movements and making informed investment decisions.

The report also highlights that while traditional factors like income and demographics remain significant, emerging trends such as technology adoption and social media influence are becoming increasingly important in determining stock preferences. This shift indicates a more complex and dynamic market environment where both individual preferences and external trends play pivotal roles

Summary:

This report explores the stock preferences of customers, identifying key factors such as income, demographics, risk tolerance, and market trends that influence investment decisions. The study finds that while traditional elements like income and demographics remain crucial, emerging factors like technology and social media are increasingly shaping investor behavior. Recommendations include offering customized portfolios, leveraging technological advancements, and monitoring social media trends to better align with customer preferences. The findings underscore the importance of a nuanced understanding of customer behavior in developing effective investment strategies.

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Websites -

- Getmoneyrich.com - Financial Markets
- Tradingbells.com - How do Consumers Behavior Impact Stock Market

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Bharati Vidyapeeth (Deemed to be University) is one of the top-ranking universities in India committed to providing the best academic experience. It was established by Dr. Patangrao Kadam in 1964 in Pune with the aim to provide enhanced learning opportunities and bring about intellectual awakening of people through the spread of education that would have a positive impact on the world. Today it has 8 campuses spread over different locations in India. Vision of the university is “To be a world class University for Social Transformation through Dynamic Education”

About IMED

Institute of Management and Entrepreneurship Development (IMED), Pune established by Bharati Vidyapeeth in 1978, is a well-known Business School in India. It is continuously contributing in the field of Management, Computer Science and Research since inception. The Government of India under section 3 of UGC Act brought this Institute under the ambit of Bharati Vidyapeeth (Deemed to be University), Pune (India) w.e.f. 20th July 2000. IMED has been consistently ranked among top Indian Business Schools in India. IMED is laid out on sprawling four acres of land with 'state-of-the-art' infrastructural & instructional facilities. As a constituent of Bharati Vidyapeeth (Deemed to be University), Pune, IMED contributes in its own ways to the philosophy, vision and mission of Bharati Vidyapeeth i.e. “Be a World-Class University and a Global Resource in Innovative University Education for Ever-better World” and “Social Transformation Through Dynamic Education” respectively.

At IMED, the students, faculty and management, share team oriented common goals that are intellectually stimulating. Besides training young professionals to meet the challenges of globalization, we at IMED develop entrepreneurial skills in our students. Value addition lies at the core of our teaching curriculum and the syllabus is updated with the feedback from industry and is comparable with curriculum of leading national and international level institutes to retain edge in academics. The programmes are approved by AICTE.



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