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Virtual Reality as a Tool for Enhanced Industrial Product Demonstration: A Study on Pump Selection

Dr. S. Dharchana, *Associate Professor, Department of Commerce, Dr. N.G.P Arts and Science College, Coimbatore, India***.**

Ms. Aishwarya Ramesh, *AR Student of B. Com, Department of Commerce, Dr. N.G.P Arts and Science College,Coimbatore, India***.**

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Abstract: This research explores the integration of Virtual Reality (VR) technology in industrial product selection, particularly in the pump manufacturing sector. Traditional product selection methods are often time-consuming and lack interactivity. VR offers a transformative alternative by allowing consumers to engage with 3D models and simulate product operations in immersive environments. This study investigates how VR affects consumer understanding, purchasing confidence, and decision-making behavior in industrial contexts. The findings highlight VR's potential to enhance product marketing, improve buyer experience, and streamline complex technical evaluations, especially among younger, tech-savvy professionals.

Keywords: Virtual Reality (VR), Industrial Marketing, Pump Selection, Consumer Behaviour

1. Introduction:

In industrial sectors such as water treatment, manufacturing, and energy, equipment like pumps plays a critical role in system performance and efficiency. Selecting the right pump requires a comprehensive understanding of operational parameters, compatibility, and performance metrics. Conventionally, engineers and buyers rely on catalogues, technical drawings, and site visits to evaluate products. However, these traditional tools often fail to convey the full scope of a pump's capabilities, especially when dealing with intricate specifications or customized requirements.

Virtual Reality (VR) technology provides a new frontier for industrial product demonstration. Through immersive simulations, VR enables users to explore product features, interact with components, and visualize real-world applications without physical constraints. VR also helps overcome geographical limitations, reduces the need for physical samples, and accelerates the sales cycle by delivering information more effectively. This transformation is especially relevant in today's digital economy, where decision-makers seek efficiency, clarity, and reduced procurement risks. The study evaluates VR's influence on the decision-making process, engagement levels, and user confidence during pump selection. It also considers the readiness of organizations to integrate such technologies into their operations and sales infrastructure.

2. Problem Statement

VR has great potential for product demonstrations, yet its adoption in the pump sector remains limited. Many companies continue to rely on traditional sales and marketing strategies, often unaware of the impact immersive experiences can have on consumer decision-making. Additionally, there is a lack of research on how consumers respond to VR-based demonstrations and whether these experiences influence their confidence, understanding, and purchasing decisions. This study aims to assess consumer attitudes toward VR as a tool for industrial product selection. Specifically, it investigates whether VR-based pump selection and demonstration can enhance user experience, support decision-making, and drive adoption within the industry.

3. Objectives of the Study

The main aims of this research are as follows:

1. To study demographic factors of the respondents
2. To investigate consumer awareness and familiarity with VR technology in choosing industrial products.
3. To find various factors that attract consumers towards VR in decision making

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4. To investigate consumer awareness and familiarity with VR technology in choosing industrial products.
5. To examine the effect of virtual reality technologies on consumer behaviour in a virtual shopping environment.

4. Scope of the Study

This study primarily focuses on consumer perception of VR technology in the pump industry, examining its role in enhancing product selection and demonstration. The research considers industrial buyers, engineers, and procurement professionals who play a key role in pump selection. It aims to explore how VR influences decision-making processes, engagement levels, and the overall efficiency of the selection process. Additionally, the study seeks to provide insights into how VR can address common challenges in pump selection, such as lack of hands-on interaction, complexity in comparing specifications, and logistical constraints., examining its role in enhancing product selection and demonstration. The research considers industrial buyers, engineers, and procurement professionals who play a key role in pump selection. It does not delve into the technical development of VR but instead explores its usability, accessibility, and impact on decision-making.

5. Research Methodology

In Coimbatore, this research is descriptive concerning parents' purchasing behaviour. The data used for the research are both primary and secondary.

Primary Data: According to the structured schedules, the data were collected from surveys of the customers who use VR for the purchase of pump.

Secondary Data: These comprise information from journals and research papers and also market reports, along with sources from online databases.

Sampling Method: A convenience sampling technique will be employed in order to obtain a diverse spread of customer's responses to different questions.

Data Analysis: Data collected shall be subjected to analysis through statistical tools in order to identify trends and patterns in buying behaviour. Online and offline shopping orientations with and without VR.

This methodology provides a strong basis for the study of customer purchasing behaviour, thus rendering an understanding of the business into marketing and policymaking of the pump industry using VR

6. Period of the Study

The study is conducted from December 2024 to March 2025.

7. Area of the Study

The study is conducted in Coimbatore city.

8. Statistical Tools Used for Data Analysis

- Mean Rank Analysis
- Anova
- Chi-Squar

9. Limitations of the Study

While this research highlights the advantages of VR in pump selection and demonstration, certain limitations must be acknowledged:

- The study may include participants from a specific demographic or industry sector, making it difficult to generalize findings to all potential users of VR-based pump selection.
- Not all companies or consumers have access to high-end VR equipment, potentially limiting the widespread adoption of VR-based pump selection tools.

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10. Literature Review

Chih-Wen Wu (Mayil 2024) explored the impact of **virtual and augmented reality on customer loyalty in fashion retail.** The study, using a questionnaire survey of 308 respondents, examined factors like usefulness, ease of use, hedonic experience, customer engagement, and satisfaction. Results indicated that hedonic factors significantly influence loyalty, while usefulness and ease of use do not. The research highlights that immersive and entertaining VR experiences enhance customer retention. Wu suggests that businesses should focus on enhancing the fun and engagement aspects of VR shopping rather than just usability improvements to increase consumer loyalty.

Cecile Meier, Jose Luis Saorín, Silvia Díaz Parrilla, Alejandro Bonnet de León, and Dámari Melián Díaz (2024) examined **user experience in virtual tours of heritage sites using 360º photos, focusing on the Chapel of Dolores in Tenerife.** Their study compared smartphone and VR headset experiences, finding that VR did not significantly enhance immersion but increased discomfort like dizziness and vertigo. The results suggest that simpler smartphone-based virtual tours may be more effective for accessibility and engagement. The study highlights the potential of 360º virtual tours for cultural heritage dissemination, emphasizing usability and user comfort in digital heritage experiences.

William Brown, George Wilson, and Oliver Johnson (2024) explored **consumer perceptions of virtual reality (VR) in marketing, emphasizing its impact on engagement and brand perception.** Through thematic analysis, they identified key factors such as familiarity with VR, immersion, technical quality, personalization, and social interaction. Their findings highlight that VR enhances emotional connections and brand recall but requires high-quality graphics and seamless experiences to maintain positive perceptions. Accessibility challenges, including limited VR headset availability, were noted. The study underscores VR's potential to transform marketing through immersive storytelling and personalization while addressing ethical concerns regarding data privacy.

Xiao (2024) examines **human resource management challenges in the AR/VR industry through a case study of Meta.** The study identifies skill gaps, high employee turnover, and cross-cultural management as key HR concerns. Meta addresses these issues through partnerships with universities, competitive salaries, and diversity initiatives. The research highlights the need for continuous learning, effective recruitment, and retention strategies in the rapidly evolving AR/VR sector. Findings suggest that aligning HR practices with technological advancements is crucial for sustainable growth. This study offers insights into talent management strategies that could benefit other companies in the industry.

11. Data Analysis

Anova

Relationship between demographic profile and VR experience in selecting pumps.

Hypothesis

There is no significant difference in perceived convenience of VR experience in selecting pumps across different demographic factors of the respondents.

Variable	Group	Mean	SD	No	t-value	F-value	Table value	Sig
Age	Below 25 years	1.03	0.164	37				
	26-30 years	1.08	0.270	39		2.772	2.42	0.029
	31-35 years	1.08	0.270	39				
	36-40 years	1.29	0.470	17				
	Above 40 years	1.17	0.383	18				
Education	High school	1.00	0.000	17				

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	Diploma	1.14	0.354	14		0.658	0.65	0.579
	Undergraduate	1.08	0.270	32				
	Postgraduate	1.11	0.315	64				
Occupation	Student	1.00	0.000	17				
	Home maker	1.14	0.363	14		0.895	2.42	0.469
	Govt. employee	1.09	0.296	32				
	Private employee	1.09	0.294	64				
	Business	1.17	0.388	23				
Income	Below 25,000	1.00	0.000	21				
	25,000-50000	1.11	0.323	35		1.131	2.37	0.344
	50000-75000	1.10	0.307	39				
	75000-100000	1.18	0.390	28				
	Above 100000	1.07	0.267	27				

Interpretation

The ANOVA analysis shows that age significantly affects how people experience VR, with younger or more tech-savvy individuals possibly perceiving it more positively ($F = 2.772$, $p = 0.029$). However, other factors such as education level ($F = 0.658$, $p = 0.579$), occupation ($F = 0.895$, $p = 0.469$), and income ($F = 1.131$, $p = 0.344$) do not show significant differences, indicating that these demographic variables do not notably influence how respondents perceive VR experiences.

Chi-Square

Relationship between demographic profile and satisfaction level towards VR

Hypothesis

Variable	Pearson Chi-square	Sig (p-value)
Gender	4.265	0.118
Age	12.874	0.118
Education	7.451	0.282
Occupation	10.326	0.243
Income	5.978	0.649
Residence	1.125	0.570

The Demographic Profile of the respondents have no significant association with the satisfaction level towards VR.

Interpretation

The chi-square analysis indicates that none of the demographic factors significantly influence satisfaction levels. Gender ($\chi^2 = 4.265$, $p = 0.118$), age ($\chi^2 = 12.874$, $p = 0.118$), education ($\chi^2 = 7.451$, $p = 0.282$), occupation ($\chi^2 = 10.326$, $p = 0.243$), income ($\chi^2 = 5.978$, $p = 0.649$), and residence ($\chi^2 = 1.125$, $p = 0.570$) all have p-values above

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0.05, suggesting no statistically significant associations. While descriptive statistics showed some variation across groups, these differences are not strong enough to be considered meaningful, indicating that satisfaction with VR experiences is generally consistent across demographic lines.

Mean Rank Analysis

Mean Rank Analysis of Factors Considered While Making Pump Purchase Decisions Using VR

Factors	**Mean Rank**	**Actual rank**
Realism of experience	2.40	2
Ability to interact	**2.38**	**1**
Quality of graphics and sound	2.40	3
Personalization	2.39	5
Reduced use of physical prototypes	2.40	4
Ease of use	2.40	6

Interpretation

Users prioritize interactivity and realism most when evaluating pumps in VR, while ease of use ranks lowest in importance.

12. Findings

- **Anova:** There is no significant difference in perceived convenience of VR experience selecting pumps across different demographic factors of the respondents.
- **Chi-Square:** The Demographic Profile of the respondents have no significant association with the satisfaction level towards VR
- **Mean Rank Analysis:** Users prioritize interactivity and realism most when evaluating pumps in VR in the highest rate of 2.40

13. Suggestions

An enhanced user experience is crucial for sustained VR engagement. VR platforms must be designed with user-friendly, intuitive interfaces that are easy to navigate, even for those with limited technical knowledge. Personalization options such as language selection, adjustable brightness, control settings, and features for differently abled users can significantly improve usability. Furthermore, technical improvements such as better frame rates, optimized motion tracking, and low-latency environments should be prioritized to reduce motion sickness and make the experience more comfortable and immersive for all users.

Lack of awareness and familiarity with VR technology remains a barrier to adoption. Therefore, awareness programs and training initiatives are essential. Educational workshops and live demonstrations at trade fairs, schools, and community events can introduce potential users to the benefits of VR. Additionally, online tutorials, instructional videos, and readily available customer support will help new users learn how to use the technology effectively. Collaborations with educational institutions and industry partners can further support the development of structured training modules, ensuring that both students and professionals are equipped with the skills needed to use VR in practical settings.

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14. Conclusion

Virtual Reality has immense potential to transform industrial product marketing and selection. By offering interactive, informative, and immersive experiences, VR can significantly improve buyer confidence and decision-making. The pump industry, known for its technical complexity, is well-positioned to benefit from this shift. VR facilitates better visualization of product design, enables remote demonstration, and creates a compelling narrative for product features. As digital tools become more accessible and user expectations evolve, companies that integrate VR into their sales and marketing workflows will gain a distinct competitive advantage. Over time, the widespread adoption of VR could standardize how industrial products are evaluated, making the entire process faster, more efficient, and customer-centric

15. References

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