Factors Influencing Development Of Critical Technologies

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Abstract

The World has been inspired to innovate and create new technologies by COVID-19. Many people have been saved from life-threatening illnesses; thanks to these technologies which have also improved user comfort. From business perspective, they have ensured the sustainability of economic sectors. Following COVID lockdowns, approximately 72,000 startup business have emerged in India in just couple of years, relying on innovative and vital technologies. Nonetheless, it is necessary to comprehend the motivation behind these advancements and evaluate the technologies for sustainability. The critical technologies impact, their acceptance or rejection, and their psychological effects on people or end users are covered in this paper.

This study with detailed analysis of responses on the socio-economic and psychological effects of Oxygen concentrators is also covered in this paper, along with its findings.

Keywords: Novel Technologies, Oxygen, Impact, Socio-economic, COVID-19

INTRODUCTION

Though being a pandemic for humanity, COVID-19 has encouraged many people—in fact, the entire world—to think creatively, create new technology, and explore self-sustainability. Start-ups and the development of innovative technologies are the results of this shift and exploratory movement.

According to Maria-Elena (2015), people have shown varying degrees of kindness in their embrace or rejection of new technologies. Additionally, she introduced "Technophilia," which is the acceptance of technology, and "Technophobia," which is the resistance to new technology.

Giuseppa et al. (2020) have researched and presented the idea of "Positive Technology," which will significantly affect people's willingness to adopt new technology. Figure 1 outlines the potential of positive technologies and their goal, which affects users' psychology. Additionally, they have indicated that the success of these positive technologies would depend on the following factors: emotional quality, engagement, actualisation, and connectivity.

Maria-elena (2015) has shown how certain comfort criteria have led to individuals developing an addiction to IOT and gaming. She did, however, cite a method through which people might choose to embrace or reject a technology.
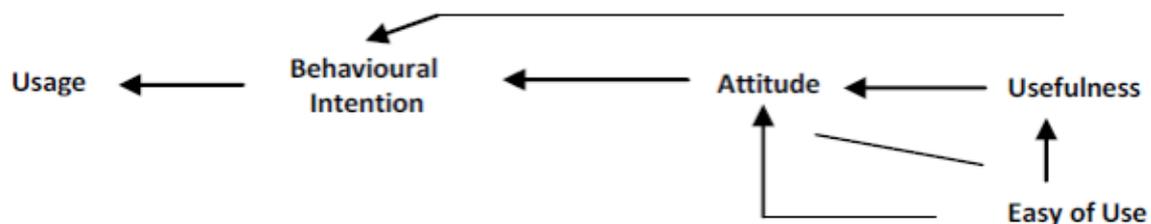

Fig 1: Model for Technology acceptance, by Maria-Elena (2015)

Figure 5 illustrates how a technology is adopted depending on its utility and ease of use, which are determined by the user's attitude and intended use. This article also explores the underlying causes of "technophilia" and "technophobia."

Giuseppa et al. (2020) have examined the factors that affect the adoption of positive technologies. They emphasize the necessity for the rapid development and implementation of innovative technologies to ensure accessibility for the public and fulfill their intended purposes; otherwise, these technologies may face rejection.

Strumsky et al. (2015) have contributed to the discourse on identifying novelty in emerging technologies. Their research includes discussions on concepts such as "Technological Novelty Taxonomy" and "de novo"

creation, which are essential for assessing the technological capabilities of innovations and highlight the significance of reusing existing technologies to foster further advancements.

Pezzoni et al. (2021) concentrated their analysis on estimating the lifespan of innovative technologies and their derivatives. In their research, the authors examined over 10,000 "trajectories" or derivatives to evaluate the impact of technology on its time to market. They developed a methodology for assessing patents to gauge technological influence and established a threshold value for consideration. The study focused on patents related to new technologies from 1985 to 2015, resulting in the identification of more than 10,000 technologies and over 200,000 derivatives. The findings indicate that the technologies identified possess the highest impact factors and longer timeframes for market introduction. However, the research is limited by the fact that the patent data does not encompass all technologies, and it employed only a "Combinational approach" rather than exploring the "de novo creation of technological capabilities."

The Times of India, in its edition dated May 13, 2022, published an article titled "New one-shot drug to cut breast cancer treatment time by 90%." The article concludes that these innovative technologies are likely to have a significant impact on the population, as they directly address both the underlying causes and the effectiveness of treatment.

An additional article published in the Times of India on May 14, 2022, reports that "CCMB scientists have developed India's first mRNA vaccine technology" to address COVID-19 and other infections. The article further emphasizes the necessity of such innovative technologies for society, highlighting their economic benefits while also considering the psychological implications. Ganapuram Venu and Prof. Saisree Mangu (2025), have studied on impact of Metaverse as a critical technology to influence the life style of future generation and summarized the factors that are driving them.

Based on the literature review presented, it is evident that while research has been undertaken regarding the necessity of critical technologies and their applications, there has been insufficient emphasis on the pathways through which these technologies are delivered to end users and the level of awareness needed to maximize their impact. This analytical approach is essential for understanding the effects of critical technologies and the necessity for their advancement in alignment with end-user needs. Furthermore, this study aims to evaluate the long-term utility of these technologies while ensuring they fulfill their intended purposes.

The subsequent sections have addressed the identification of a crucial technology and the methodology employed for the survey. The results and discussion section provides an in-depth analysis of the gap present in the life cycle of the technology or product.

METHODOLOGY AND STRATEGY

To comprehend the influence of a pivotal technology, it is essential to examine user awareness, utilization, satisfaction levels, cost-effectiveness, and accessibility for those in need. Considering these factors, a suitable device has been identified for study, specifically the Oxygen Concentrator, which has demonstrated its significance during the recent wave of the COVID pandemic.

The suggested strategy and methodology encompass a hybrid approach that combines qualitative and quantitative methods through the use of surveys and discussions. Nonetheless, this paper will solely provide an overview of the survey results. The author has developed a questionnaire and circulated it among a targeted group of students, homemakers, and professionals affiliated with GITAM schools across three campuses, employing WhatsApp for distribution.

The primary aim of the study is to assess the extent of the impact that the Oxygen concentrator has had during the pandemic, as outlined in the following questionnaire.

1. Gender (Descriptive)
2. Age (in the rages of 20-30, 31-40, 41-50, 50 and above)
3. Did you use it (Yes / No)
4. Its utility performance (On a scale of 1 – 10)
5. Comfort to use (On a scale of 1-10)
6. Does it need improvements (On a scale of 1-10)
7. Your prediction about its future requirement to the society (On a scale of 1-10)
8. Is it worth buying (On a scale of 1-10)
9. How much reachable to the needy (On a scale of 1-10)
10. How much profit making technology, is it (On a scale of 1-10)
11. Does it need awareness to publicise (On a scale of 1-10)
12. Any other comments (Descriptive)

The aforementioned samples were examined and evaluated utilizing Microsoft Excel and SPSS software, with the findings detailed in the subsequent chapters.

RESULTS AND DISCUSSIONS
The information gathered and the findings are outlined and analyzed in this section. As indicated in the preceding chapter, a data summary is provided in Table 1. The hypotheses state that the respondents lack awareness of these significant technologies, although their usefulness is widely recognized. Additionally, it should be noted that these devices are both cost-effective and efficient. The evaluation is conducted based on these null hypotheses.

The data has been gathered from individuals of all genders within the bracket of age, 20 to 60 years. The table indicates that a significant number of respondents lack awareness regarding the functionality of this device. The descriptive data from the questionnaire is not included in this presentation to emphasize the quantitative findings. The data distinctly reveals that several questions were left unanswered by the respondents, attributed to the unavailability of the devices and a lack of awareness.

Gender	Age in the range of	Its utility performance	Comfort to use	Does it need improvements	Your prediction about its future requirement to the society	Is it worth buying	How much reachable to the needy	How much profit making technology, is it	Does it need awareness to publicise
Male	31-40	5	5	5	6	5	5	5	5
Male	41-50				6	6	3		8
Male	41-50	9	9	6	8	6	4	8	7
Female	31-40	6	8	7	8	8	8	8	9
Female	31-40	6	7	4	10	6	5	9	9
Male	41-50	10	8	4	8	10	4	8	9
Female	31-40				8	9			10
Male	41-50	9	9	6	8	6	3	8	9
Male	41-50	6	6	9	8	9	4	7	9
Female	20-30	6	7	10	10	10	6	8	4
Female	31-40	8	8	7	8	6	6	7	9
Male	31-40	7	7	9	10	7	5	8	10
Male	41-50	9	8	8	10	8	7	7	9
Male	20-30	7	7	9	8	5	4	7	8
Male	41-50	10	10	1	10	10	10	10	10
Male	20-30	9	9	10	8	7	9	9	10
Female	51-60	6	6	6	6	6	9	9	7
Male	31-40	9	9		10				8
Male	41-50	10	10	10	10	10	10	10	10
Male	20-30	6	6	5	8	7	6	7	7
Male	31-40	9	8	7	10	10	3	10	7
Male	41-50	10	10	2	10	10	10	10	6
Male	41-50	10	8	8	10	8	8	10	10

Table 1: Responses from the respondents, Ganapuram Venu (2022)

It is clear from Table 1 and the overall analysis that the respondents did not provide their opinions regarding comfort of use, accessibility, and profitability. A greater proportion of the respondents are male in comparison to female participants.

Gender	Female	5	25.0%
	Male	15	75.0%
Age in the range of	20-30	4	20.0%
	31-40	6	30.0%
	41-50	9	45.0%
	51-60	1	5.0%
Valid		20	100.0%
Missing		3	
Total		23	

Table 2: Summary of Case processing, Ganapuram Venu (2022)

The overall number of samples collected from the population is 23; however, only 20 samples are deemed valid, while 3 samples are unaccounted for. As indicated in Table 2, 75% of the total samples are male, with the remainder being female. The majority of the samples fall within the age range of 41 to 50 years, whereas the fewest samples are from individuals aged between 51 and 60 years.
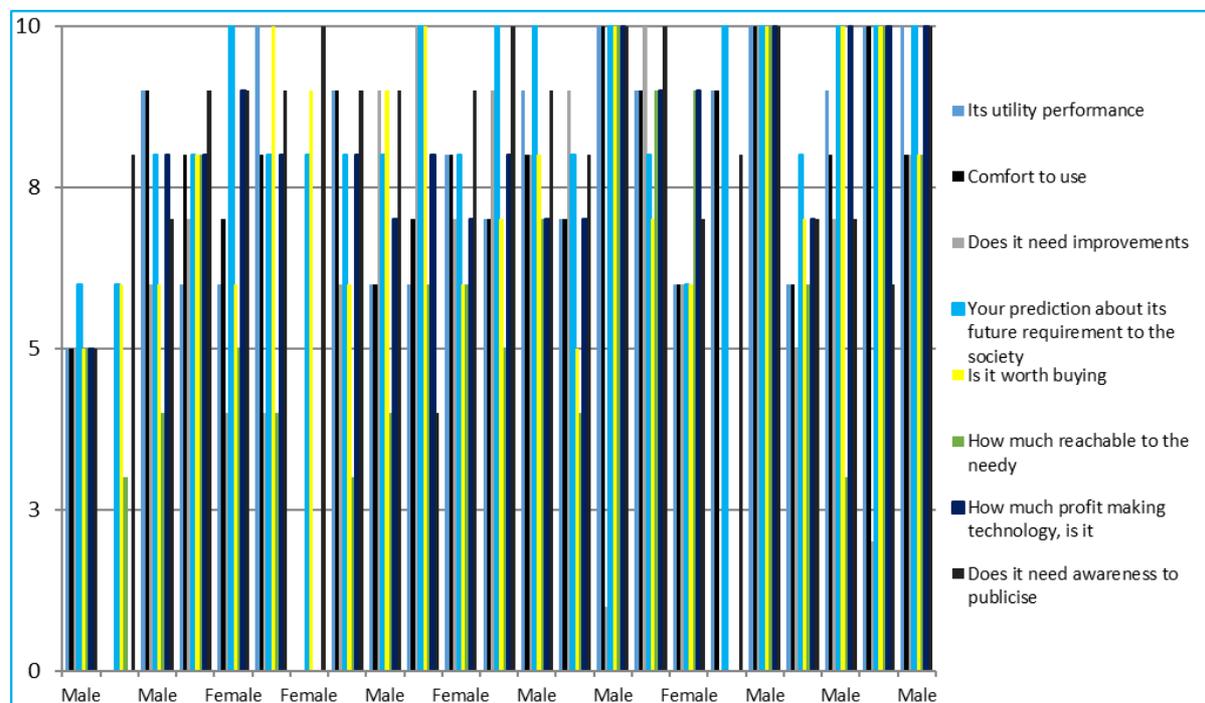

Fig 3: Summary of results, Ganapuram Venu (2022)

Figure 3 indicates that a majority of respondents believe that awareness regarding these critical technologies is essential for individuals aged 41 to 50, particularly among males. Additionally, it has been noted that there is a significant future demand for this device. However, respondents did not assign high ratings for the comfort of use, which may be attributed to the limited availability of such devices, as reflected in the ratings concerning accessibility.
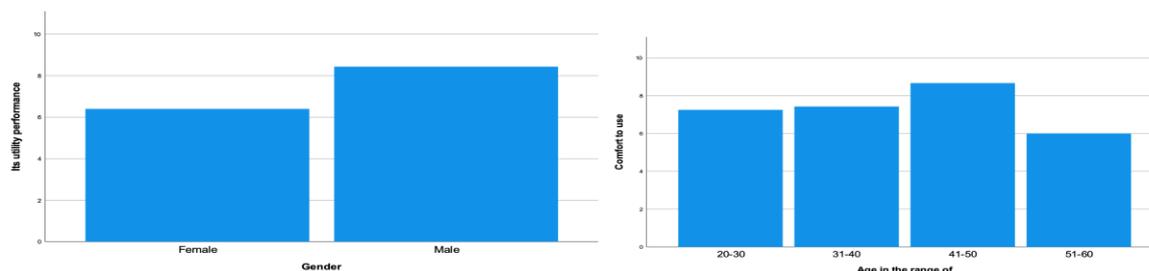
Fig 4: Results for comfort to use gender wise and age groups wise, Ganapuram Venu (2022)

The data presented in Figure 4 indicates that a greater number of males than females have rated the comfort of use positively, with the highest ratings coming from the age group of 41 to 50 years. This suggests that middle-aged males experience a higher level of comfort compared to their female counterparts.

The findings indicate that respondents, regardless of their usage, expressed awareness and a need for such devices.

CONCLUSION

This section encapsulates and draws conclusions from the results of the questionnaire and the perspectives of the respondents.

It is clear from Table 3 that the significant value pertaining to the factor distribution of utility performance across various age categories remains consistent and is below the acceptance threshold of 0.05. As a result, the hypothesis can be dismissed, suggesting that the perspectives of respondents from different age groups are not homogeneous. Conversely, for the other factors presented in Table 3, the significant values surpass the acceptance threshold, resulting in the inability to reject those hypotheses.

To summarise the study the following conclusions are made:
1. H1- Reject the performance and utility factor
2. H2- Fail to reject the comfort to use factor
3. H3- Fail to reject the need for improvement factor
4. H4- Fail to reject the prediction for future need factor
5. H5- Fail to reject the Worth buying factor
6. H6- Fail to reject the Reachability to the needy factor
7. H7- Fail to reject the Profit making factor
8. H8- Fail to reject the Need for awareness and Publicity factor for the technology

Hypothesis Test Summary				Hypothesis Test Summary	
	Null Hypothesis	Test	Sig.[a,b]		Decision
1	The distribution of Its utility performance is the same across categories of Age in the range of.	Independent-Samples Kruskal-Wallis Test	.025	1	Reject the null hypothesis.
2	The distribution of Comfort to use is the same across categories of Age in the range of.	Independent-Samples Kruskal-Wallis Test	.104	2	Retain the null hypothesis.
3	The distribution of Does it need improvements is the same across categories of Age in the range of.	Independent-Samples Kruskal-Wallis Test	.416	3	Retain the null hypothesis.
4	The distribution of Your prediction about its future requirement to the society is the same across categories of Age in the range of.	Independent-Samples Kruskal-Wallis Test	.393	4	Retain the null hypothesis.
5	The distribution of Is it worth buying is the same across categories of Age in the range of.	Independent-Samples Kruskal-Wallis Test	.475	5	Retain the null hypothesis.
6	The distribution of How much reachable to the needy is the same across categories of Age in the range of.	Independent-Samples Kruskal-Wallis Test	.665	6	Retain the null hypothesis.
7	The distribution of How much profit making technology, is it is the same across categories of Age in the range of.	Independent-Samples Kruskal-Wallis Test	.548	7	Retain the null hypothesis.
8	The distribution of Does it need awareness to publicise is the same across categories of Age in the range of.	Independent-Samples Kruskal-Wallis Test	.504	8	Retain the null hypothesis.

Table 3: Hypotheses summary, Ganapuram Venu (2022)

In view of the above, the study referenced suggests that the critical technologies developed during the COVID pandemic have demonstrated a beneficial for psychological effect alongside their socio-economic impact.

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