An Empirical Study of Extended Marketing Mix for PPE Manufacturing Companies

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Abstract

The Personal Protective Equipment has become an indispensable part of life in the present time and demand keeps on growing day by day. Manufacturing Personal protective equipment such as masks, gloves, coveralls, face shield, goggles etc. has become a new norm as many hospitals, research Labs and Pathology labs require it on a daily basis. It is not only restricted to hospital staff, but front-line staff and even the normal people also require it daily.

The aim of this research is to test whether different types of companies use the same marketing mix strategies which want to manufacture Personal Protective Equipment (PPE). This research paper will help us to identify whether a Government, privately owned or Foreign-based companies are using the same kind of marketing mix strategy i.e., Product, Price, Place, Promotion, People, Process and Physical evidence. This research paper is based on quantitative analysis methods. The respondents are the manufacturers from the Personal Protective Equipment from different parts of the world. The survey questionnaire is made on google forms and is floated to many different organizations across India and other countries who are currently producing Personal Protective Equipment (PPE). Researchers have used Reliability test, ANOVA and sample t-tests to analyse the data and test hypothesis using SPSS 25 version in order to retrieve the results. The result shows that there is no significant difference between 7 P's of Marketing mix and the types of companies whether government, Private and foreign sector.

Keywords: 7 Ps of marketing mix, Marketing management, Industrial Marketing, Service Marketing, Marketing Mix, Personal Protection Equipment (PPE).

Introduction

A Personal Protective Equipment or commonly known as the PPE is a specialized clothing or equipment worn to minimize exposure to hazards that can cause serious injuries and illness by creating a barrier between the possible hazardous substance and the person using the PPE. These injuries could result due to chemical, biological, nuclear, or any occupational hazard. PPE kits collectively comprise items such as coveralls, hand gloves, face masks, face shields, shoes, vests, etc.

In recent times, the requirement of Personal Protection Equipment (PPE) has been massive due to the Covid-19 pandemic outbreak. A large number of manufacturers from different sectors are trying to make PPE's so that people are protected from the Virus. Due to the COVID-19 pandemic, many companies are facing financial problems and thus in order to

keep their businesses afloat, they have started manufacturing all kinds of PPE kits under the essential category.

The marketing mix refers to the collection of actions or strategies, that a company uses to promote its brand or commodity in the market. Many researchers have suggested changes to the 4Ps system of marketing mix (Kotler, 1986; Mindak and Fine, 1981; Nickels and Jolson, 1976). However, the most intense critique emerged from the service Industry. The expansion of the 4Ps paradigm to involve method, physical proof and participants by Booms and Bitner (1981), in particular, has achieved worldwide attention in the marketing literature on services.

Conventionally, PPE kits were meant to be used by the medical personnel and workers employed in hazardous industries. However, the recent Covid-19 pandemic has changed this paradigm and many new users have now been identified. Primarily being as a B2B model, marketing of PPE kits was never a priority, however due to change in the customer segment there is a need to re-look into the marketing philosophy of PPE kits. Due to the sudden surge in demand, many different organisations like the government sector, private and foreign companies are making PPE kits to meet the ever-increasing demand. This increased competition amongst the manufacturers of PPE kits will help us understand the marketing mix to produce a product suitable for the end user or customer.

Literature Review:

Concept of a Marketing Mix:

Marketing refers to business activities relating to purchase and selling of a product or service. This includes deciding what customers want and whether it can be manufactured at the right price. Any marketing executive is a "mixer of ingredients" who aims to produce a profitable business by creatively mixing marketing practices and policies (Culliton, 1948). According to Neil Borden (1964), Culliton's description of marketing managers as a "mixer of Ingredients" was appropriate and keeping this in mind, he devised the "marketing mix" concept. This concept included following elements-

1. Planning of Products

2. Packaging of Products

3. Branding and Promotion of Products

4. Pricing of Products

5. Channels of Distribution

6. Personal Selling

7. Display and Advertising of Products

8. Servicing along with Physical Handling of products

9. Face finding and analysis

However, this concept was reduced to four main factors which were Product, Price, Place and Promotion (McCarthy, 1960). The concept 4Ps of Marketing Mix was accepted as the Academic Standard for marketing strategy by researchers. The importance of standardizing individual marketing practices, acceptance of primary market, product creation carried out through the findings of market research, is extremely relevant and need no further deliberations (Székely, Sipos, 2016). 4P's of the marketing mix gradually became the de-facto

Fig 1. Elaboration of Marketing Mix

standard of scientific studies, whose relevance was taken for granted (Grönroos 1994) and established the 4Ps as benchmark which is likely to affect customer purchasing cycle (Brassington and Pettitt 2003). This does not suit every scenario so it gets outdated. As a result, the marketing researchers intermittently added additional factors or components to the list, since they considered the regular "enshrined version" inadequate (Grönroos 1994).

The 4P's had been subjected to a lot of criticism. For example, Nikels and Jolson (1976) proposed that 'Packaging' should be identified as the 5th P which often has a close relation with any product and affects its perceived quality which is a primary symbol of the brand. Taking into account the significance of packaging, it can be used as a promotional tool. According to Mindak and Fine (1981) a 5th P should be Public relations and another P, according to P. Kotler (1986) should be Power. Baumgartner (1991) proposes the concept of 15 Ps. MaGrath in 1986 proposed the addition of 3Ps (personnel, physical facilities and process management). Albeit, these changes were ad hoc in nature, most of the criticism was coming from the service marketing and Industrial Areas (Rafiq, 1995).

However, the most popular of all the different models is the one propounded by Booms and Bitner's (1982) which is the 7P's model where they proposed that participants, physical evidence and processes must be integrated. A primary dividing feature between services marketing and selling of physical goods is the human dimension, also used in the service marketing mix as a new parameter. (Booms and Bitner 1981). It was later refined to People, Process and Physical evidence (Payne and Ballantyne, 1991). The European academicians were highly dissatisfied with 4Ps of marketing framework while 7Ps framework was accepted with a greater degree of satisfaction as a generic marketing mix (Rafiq et. Al, 1995).

The importance of PPE during Covie-19 pandemic:

As the new Covid-19 cases are creating new records every day, demand for PPEs has also increased exponentially, and thus, many companies have started manufacturing PPEs round the clock. It is a known fact that initially, medical personnel in Italy faced high infection and death rates mostly due to insufficient access and availability to PPE. Also, recent figures in the U.S. indicate that many more respirators and surgical masks are required than are currently available (Ranney, 2020). Earlier, the PPEs were always available and treated as a throwaway in hospitals. But now, they are a much-sought after commodity to treat critically ill COVID-19 patients. Due to the rapid increase in COVID-19 patients, the industry must somehow meet this increasing demand, failing which catastrophe disasters would envelope the society (Livingston & Desai, Mar 28, 2020). According to WHO Director General, the industry needs to enhance its manufacturing capacity by over 40% to meet the current global demand. He emphasised that in order to cope with this requirement, governments should incentivise the industry to boost production by easing exports and reduce distribution restrictions for PPE kits and other medical supplies.

On March 1, 2020, World Health Organization (WHO) announced the global PPE kit shortage, COVID-19 protective coveralls and other PPEs were not made in India. In fact, till March 2020, India was 100% dependent on imports. Due to Indian Government foresight, a little over quarter million PPE kits were imported in January 2020 (Lakshmanan & Nayyar, 2020). The unending requirements for PPE kits and simultaneous stalling of the global supply chain, a lot of lives were at risk due to the COVID-19 pandemic. The criticality of the situation was assessed and with cooperation between central and state governments,
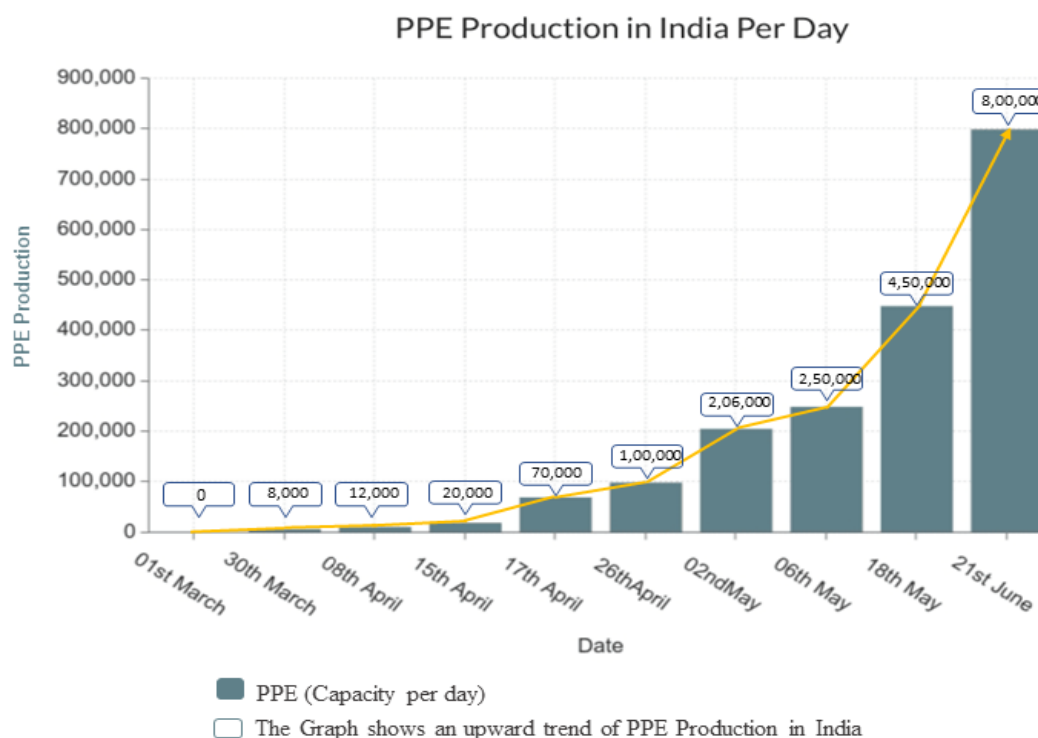

Fig 2. PPE Production Chart in India span March to June

government institutions

like the Ordinance factories, DRDO, etc., along with private industries were directed to either

Robust demand	The demand for PPE's is significantly increasing each day, while external demand is driving the increase in PPE exports from India
Attractive Opportunities	Demand for Protective Gear such as coverall, face shield, face masks in India and world at a rapid pace.
Policy Support	Due to the emergency need of PPE's, the Government of India incentivised Indian companies to produce PPE kits. Further, to enhance exports, it relaxed the government guidlines.
Competitive Advantage	The government is helping various companies by transferring the technology from DRDO and passing it to private companies. Since the lockdown was announced, many companies struggled to operate. Therefore, many companies started producing essential products which were the need of the hour.

Fig 3. Prospective Benefits for PPE Manufacturers in India

create fresh production lies or restore old lines to produce an entirely unknown product abinitio. Due to this proactive action by the Government of India, in just a shade less than two months, India has become one of the world leaders in manufacturing of PPE kits which is the key to fighting this mammoth pandemic outbreak. As of now, the Indian Industry produces more than 800,000 PPE kits per day (Business standard, 2020).This gargantuan increase in capacity is a result of the emergence of domestic manufacturers who have followed the Prime Minister's slogan of "Make in India" and thus made India self-reliant in PPE kits. At present, more than 600 Indian companies are certified to produce PPE kits, whose current global market worth is expected to grow by over 75% to approximately $92.5 billion by 2025. Since India has already attained the top spot in the manufacturing of PPE kits, it would be prudent that India plays a leading role to supply PPE kits to the world during the COVID-19 pandemic. Thus, in a departure from the current policy on the ban of PPE exports, the Government of India, vide a government notification has allowed a monthly export of five million medical coveralls for COVID-19 to ease the current global shortage and also boost Make in India export. (Indian Express, June 30, 2020).Today, India is the most feasible market for manufacturing of PPE kits because of the following reasons:

Are Government agencies, Private and Foreign companies using different Marketing Mix Strategies?

Marketing Mix is an important marketing principle which is relevant to any type of organization. This principle helps to carry out a SWOT analysis of the company to finally ensure that it optimises its operations and maximises profits. The marketing professionals thus have to incorporate all factors of the marketing mix. They will consider all variables of the marketing mix to see where adaptation to commodity, price, and promotion, etc., is required (Kotler and Keller 2009). To quote an example, how the Indonesian Government efficiently transformed the Garuda Indonesia Airlines from a regional to a world-class

operator by incorporating the Marketing Mix concept into its corporate plan is a case study in itself. It effectively focused on a binary market segmentation and targeting the right customers by placing its brand identity as a full-service carrier (Lapian, 2014).

In the case of higher education, marketing has proven capable of offering 7P's framework for identifying, assessing and modifying the business forces present in this domain. Each one affects the student during one or more phases of the service (Enache,2011).

Using ANP (Analytic Network Process) method for Taiwan fast food industry, product, promotion and place were ranked as important factors using the 7P's Marketing Mix framework (Lin, 2011). According to Rafiq and Ahmed (1995), McDonald's, KFC and Domino's provide ideal examples wherein a standardized product is distributed effectively through a franchise without any compromise in quality. The producers ensure and maintain strict controls over the product, promotions, pricing, location, layout, operating procedures and standards in respect of the franchise.

Another example quoted by a researcher was in respect of spiritual tourism which had great potential if it is marketed effectively. The movement of spiritual travellers in any country is independent of any political and economic scenario. The author proposed a Public and Private Partnership (PPP) model as one of the many approaches to effectively address the tourism marketing mix for marketing spiritual tourism. It could safely be concluded that collaboration between the public and private sectors is important, as it is closely related to enhancing the effectiveness of national tourism administrations (NTAs) and national tourism organizations (NTOs) (Haq, et.al, 2009).

Having studied the above case studies, it is evident that a marketing mix strategy, if applied to an industry, is helpful in identifying and addressing its strengths and weaknesses, which eventually results in better profit margins. However, it needs to be further analysed whether the universally accepted concept of marketing mix strategy is equally applicable to the various PPE manufacturing organisation like the government sector, private and foreign industries, which have a different operating model.

Research Gaps:

Over the years, researchers have carried out extensive researches of the Marketing Mix strategy and concluded that by doing a SWOT analysis, companies are able to optimise and maximise their profits. Having analysed these marketing mix concepts in detail by us, it emerged that there was a research void whether the universally accepted concept of marketing mix strategy is equally applicable to the government sector, private industry and foreign companies, which have diverse frameworks and operate in vastly different models. Based on this premise, since no research work has been done on the 7P's of Marketing Mix for PPE kits in respect of different organizations, this can be considered as a research gap.

Research Question:

RQ1 Does the different type of PPE manufacturing companies adapt different marketing mix strategies?

RQ2 What is the strength of association between different marketing mix components for the different type of PPE manufacturing companies?

Hypothesis

Null Hypothesis: The means of marketing mix components of different PPE manufacturing companies are equal ($\mu1=\mu2=\mu3$).

Alternate Hypothesis: The means of marketing mix components of different PPE manufacturing companies are not equal (($\mu1\neq\mu2\neq\mu3$).

Research Objectives:

- To gain insight into these 7Ps from the manufacture's perspective.

- To determine if the marketing mix (7Ps) strategies are different for different

types of PPE manufacturing organizations and companies.

- To give a suggestion on the outcome of the study.

Research Methodology:

For the purpose of this Research paper, a descriptive type of research design was adopted to do the quantitative analysis of the data collected from the questionnaire which has been beneficial for this type of research because it has the scope to involve more subjects and to enhance the generalization of the results. The respondents are PPE kit manufacturers including Government organizations like DRDO, Ordnance Factories, etc. The questionnaire was designed to study the marketing mix strategy of the industry and how this marketing mix strategy is different for different Industries & organisations.

The questionnaire was made on Google form and was circulated to all the PPE kit manufacturers all over the world. This questionnaire can be broken down into eight parts where the first part provides their general information and the next seven are questions related to the 7P's of Marketing; Product, Price, Place, Promotion, People, Process, Physical Evidence of their organisation. The questionnaire is based on the five-point Likert scale.

A Cronbach's Alpha Test was done to check the consistency of the questionnaire. ANOVA and independent sample t tests are used to "*determine whether there is any statistically significant difference between the means of two or more independent or dependent variables*". The purpose is to test for significant differences between class means by analysing variance.

Population and Sample Size: The Population size was 1181 companies manufacturing PPE kits in India and abroad. 117 responses were received from various companies.

Data Collection: All the respondents are reputed manufacturers of PPE kits based in India and abroad. The details of these manufacturers were obtained from the CII website (Confederation of Indian Industry (CII), 2020), Govt of Tamil Nadu, Department of MSME,

Commissionerate of Industries and Commerce (Government of Tamil Nadu, 2020), the Exhibitor Index of the A+A exhibition from 26-29 Oct 2021 at Dusseldorf, Germany (A+a, 2019) and the Interscope organised by Messe Frankfurt Middle East GmbH, Dubai (Messe Frankfurt middle east gmbh, Dubai, 2020)

Data Analysis tools:

Statistical tools like IBM-SPSS and MS Excel were used to analyse the primary data. The data collected using the questionnaire were tabulated in Excel, and codes were given before the data could be imported into SPSS. Once the data coding was completed, data was imported into SPSS 25 and various statistical testing, such as Cronbach's Alpha, ANOVA and Independent sample t-test were conducted.

Data Analysis and Results:

Reliability Test:

Table 1A. Case Processing Summary		N	%
Cases	Valid	117	100.0
	Excluded	0	.0
	Total	117	100.0

Table1B. Reliability Statistics	
Cronbach's Alpha	N of Items
.879	37

In layman's language, **Cronbach's Alpha** is a measure of reliability of raw data. It is the de-facto standard considered to be a measure of scale reliability. As a rule, the value of **α** of **0.6-0.7** indicates an acceptable level of reliability. Any value equal to or greater than 0.8 indicate extremely reliable data. However, on the contrary, values higher than 0.95 are not necessarily good, since they might be an indication of repetitiveness (Hulin, Netemeyer, and Cudeck, 2001). In the extant case, the test was done and a score of **0.879** was obtained, indicating that consistency and reliability is of a high order.

Univariate ANOVA results of 7Ps of Marketing Mix

Table 2. Univariate ANOVA results of Product

ANOVA					
Mean Product					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.252	2	1.126	1.957	.146
Within Groups	65.598	114	.575		
Total	67.850	116			

Table 3. Univariate ANOVA of Price

ANOVA					
Mean Price					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.160	2	1.580	2.835	.063
Within Groups	63.528	114	.557		
Total	66.689	116			

Table 4. Univariate ANOVA of Place

ANOVA					
Mean Place					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.160	2	1.580	2.835	.063
Within Groups	63.528	114	.557		
Total	66.689	116			

Table 5. Univariate ANOVA of Promotion

ANOVA					
Mean Promotion					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.129	2	.064	.121	.886
Within Groups	60.746	114	.533		
Total	60.875	116			

Table 6. Univariate ANOVA of People

ANOVA					
Mean People					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.634	2	.817	1.324	.270
Within Groups	70.375	114	.617		
Total	72.009	116			

Table 7. Univariate ANOVA of Physical Evidence

ANOVA					
Mean PH					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.654	2	3.827	5.853	.004
Within Groups	74.538	114	.654		
Total	82.192	116			

Table 8. Univariate ANOVA of Process

ANOVA					
Mean Process					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.814	2	1.407	2.549	.083
Within Groups	62.930	114	.552		
Total	65.745	116			

The Questionnaire consists of different 7P constructs with 3 to 4 indicators reflecting each. However, to perform ANOVA, each of the dependent variables were combined together and a mean variable was computed for each of them. Hence, the name Mean Product, Mean Price etc. is showing the dependent variables across independent variables which are three types of companies like Private, Government and Foreign in this case. Follow-up univariate ANOVAs were conducted for each of the marketing mix component.

There was a significant main effect of the categories of company on Physical ($F(1,17) = 5.853$, p <0.004), and there were no significant main effect on the Product ($F(2,27) = 1.957$, p > 0.446), on Price ($F(1,17) = 2.835$, p >0.0.63), on the Place ($F(1,17) = 2.835$, p > 0.063), the Promotion ($F(1,17) = 0.121$, p >0.886), Process ($F(1,17) = 2.835$, p >0.0.63), on Process ($F(1,17) = 2.549$, p > 0.083). Except for place and price components Private companies have higher mean scores than government companies.

As the p values are not statistically significant for different marketing mix components, we fail to reject the null hypothesis. The results show that there is no significant difference between marketing mix strategy of a different type of PPE manufacturing companies.

Exhibits of Independent Sample t test

Independent Sample t test are advantageous when it comes to compare the sample means of the data. It is easy in terms of calculating data, in terms of its robustness, ease of gathering data and robustness.

Table 9 shows the sample variances across different categories of companies like Private and Government. The test is performed for other two times between Private and Foreign, and, Foreign and Government. The researchers have observed that all the components of marketing mix for all the three tests are statistically not significant. Hence the null hypothesis that means are equal cannot be rejected in this case. Thus, we can safely say that there is no statistical difference between the marketing mix of different PPE manufacturing companies, which is in line with the results of univariate ANOVAs of all the components

Table 9. Independent Samples T Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Mean Product	Equal variances assumed	.047	.829	.525	103	.601	.14820	.28224	-.41157	.70796
	Equal variances not assumed			.454	7.845	.662	.14820	.32626	-.60676	.90315
Mean Price	Equal variances assumed	.805	.372	-1.289	103	.200	-.35159	.27285	-.89272	.18954
	Equal variances not assumed			-.902	7.504	.395	-.35159	.38983	-1.26097	.55780
Mean Place	Equal variances assumed	.805	.372	-1.289	103	.200	-.35159	.27285	-.89272	.18954
	Equal variances not assumed			-.902	7.504	.395	-.35159	.38983	-1.26097	.55780
Mean Promotion	Equal variances assumed	7.297	.008	.104	103	.917	.02887	.27679	-.52008	.57781
	Equal variances not assumed			.065	7.372	.950	.02887	.44652	-1.01629	1.074 03
Mean People	Equal variances assumed	.094	.759	1.167	103	.246	.34330	.29414	-.24005	.92665
	Equal variances not assumed			1.264	8.453	.240	.34330	.27168	-.27740	.96400
Mean PPH	Equal variances assumed	.674	.414	2.618	103	.010	.79800	.30482	.19346	1.402 55
	Equal variances not assumed			2.257	7.838	.055	.79800	.35362	-.02040	1.616 41
Mean Proce	Equal variances assumed	.397	.530	2.212	103	.029	.61115	.27632	.06312	1.159 17

| ss | Equal variances not assumed | | | 2.399 | 8.460 | .042 | .6111 5 | .2547 5 | .02920 | 1.193 09 |

Interpretation of Independent Sample t-test.

Independent sample t-tests showed that there are no statistically significant differences between companies with specific and no specific marketing strategies regarding the use of their marketing component of product (t (1,17) = 0.525, p = 0.601) and for price and place (t (117) = -1.289, p = 0.2). However, there are statistically significant differences between private, government and foreign PPE manufacturing companies with specific e-marketing strategies and no specific strategies on the use of physical (t (117) = 4.161, p < 0.05), process (t (117) = 3.78, p < 0.05).

These results are in line with the study conducted on e-marketing in hotel industry. According to (Siakalli et al., 2017), different categories of hotels uses different marketing mix components to explore the internet potential to innovate their products. Researchers have also used MANOVA, univariate ANOVA and independent sample t tests to carry out their quantitative analysis. Moreover, the results were not consistent with all of the three tests foresaid except for some couple of components.

Conclusion

It is imperative to get a thorough knowledge of the comparative study of 7 P's of a Marketing mix in the case of different types of organisations, whether government, Private and foreign sector. The present study is carried out with an objective to study the implication of 7P's of a Marketing Mix for PPE kits. Researchers have collected responses from 117 respondents and studied various parameters affecting their marketing strategy. The present study gives a deeper insight into the two important variables that are the types of companies and 7 P's of a Marketing Mix. The ANOVA analysis revealed that there is no significant difference between the marketing mix strategy of a different type of PPE manufacturing companies which is the same as sample T-tests. Based on the analysis, we can safely conclude that 7P's is a universally acceptable concept and proves that despite different types of organisations where it is implemented, the marketing mix of 7P's is very much relevant in the current scenario.

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