

Distributors' Perspectives on Technological Innovation and Consumer Adoption in the Electronic Market of Modular Switches and Home Appliances

Jash Jain

Prabhavati Padamshi Soni International Junior College

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ABSTRACT

Over the years, there has been an exponential growth in demand for electrical goods, which has also developed the need to cater to consumer needs. As a result, distributors, also referred to as the core of the supply chain, have gained a significant role in determining the success of a manufacturer. This study aims to analyse the distributor's perception of recent technological innovation and consumer adoption in the electrical industry. To evaluate this, primary data was collected using a Google Forms survey from 38 distributors of electrical goods. Using visualizations as the data analysis method, it was found that there has been a growing demand for smart (IoT) electrical devices, especially for energy-efficient devices. This shift has changed the product offerings by distributors. Distributors mostly supplying in urban areas, have noticed that consumers are moderately or not willing to adapt to these changes, mostly because of the limited knowledge of the product and high prices. When consumers were asked about these changes, distributors observed that the feedback was mixed and neutral. It was observed that the most vital factor that drove sales of tech-enabled products was brand reputation. Subsequently, as trends in the market change, distributors need to adapt to dynamism and largely expect regular training sessions from manufacturers. With the recognition of smart devices growing wider by the government and entrepreneurs due to technological innovation, distributors use online sources to keep up with it.

Keywords: Electronic goods; Distributors; IoT-enabled/ Smart devices; Innovation; Consumer Adoption; Demand.

1. Introduction

1.1. General Background

Over the years, there has been intense competition amongst firms in the competitive environment of the electrical industry that has forced firms to differentiate in order to obtain higher sales. These changes and challenges led to technological innovation to take place. As a result, innovations have helped drive the forecasted compound annual growth rate (CAGR) to a substantial 7.5% [1]. These ideations include smart/IoT-enabled devices such as a sensor-controlled light bulb, smart home modules for appliances, and lighting. Alongside that, energy-efficient systems such as LED lighting and low-power consumption switches have also been introduced. With a diverse consumer base that includes industrial buyers, homeowners, and builders, product sellers must adapt to consumer demand not only to grow but simply to remain in the market. In order to do this, manufacturers have to assess and understand signals indicated from the market, which has distinct consumer tastes [2]. Companies also must adapt to dynamic market environments, and in specific situations, take action to control their surroundings through the adoption of exceptional methods, products, and courses of action [3].

In this environment of technological growth in the electrical industry, the distributors play a major role in contributing to the success of the manufacturers. Distributors are intermediaries responsible for storing goods according to the variability of demand for them [4]. Distributors serve as vital contributors to manufacturers in terms of functions such as communicating market information, like dynamic changes in the market, assisting in the physical distribution of electrical goods, and demand forecasting [5]. Moreover, distributors become the location of stock holding of inventory goods and become a part of the push-pull boundary, which involves having limited production [6].

The perception of distributors in the electrical industry plays a crucial role in contributing to the success of the business through the adoption of innovative products. Analogical learning theory suggests that when consumers encounter something unfamiliar, such as a newly developed IoT system, they rely on existing knowledge to understand the innovations [7]. However, in the case of discontinuous innovations—completely new products that require significant new learning—consumers often struggle to grasp the knowledge structures involved [8]. This results in uneven adoption of smart electrical products across regions, driven by high costs, limited awareness, and resistance from retailers and electricians. To solve this knowledge gap and stimulate more innovations, a strong relationship is required between the manufacturers and the entire process in between till the end consumer of final goods. One of the major intermediaries in between is distributors whose importance determines the commercial success of businesses.

1.2. Literature Review

Technological advancements and consumer adoption in the electrical industry is explored evidently in the literature. A study conducted in this domain [9] aimed to analyze industry stakeholders' awareness, adoption drivers, and challenges associated with integrating eco-friendly lighting technologies as crucial components in advancing sustainable smart city infrastructure. Using a primary research instrument, a structured, online cost cost-effective survey as its methodology. It surveyed participants from Asia and Europe, encompassing industry professionals from several geographical regions, consisting of 252 professionals in architecture, engineering, and facility management, selected for their direct involvement in lighting design and implementation. The study assessed the data using descriptive and inferential statistics through SPSS to identify relationships between variables and inform decision-making regarding eco-friendly lighting solutions. An ANOVA test was also conducted to evaluate the perceptions of stakeholders across innovation in energy use reduction, sustainable material choices, and ecosystem-friendly design. On the basis of these results, they have concluded that there is a moderate to high level of familiarity with eco-friendly lighting technologies, with a marked preference for LEDs, CFLs, and OLEDs. Alongside, it promotes global sustainability initiatives, including the UN's Sustainable Development Goals (SDGs), particularly those related to affordable and clean energy, sustainable urban development, and responsible consumption and production, by integrating eco-friendly lighting into the paradigm of smart city development.

Another study conducted by Federico Caniato [10] aims to assess the impact of product complexity, the integration between NPD and manufacturing, and SC integration between buyer and supplier on the operational performance of the firm. Using an International Manufacturing Strategy Survey (a survey-based methodology) as a methodology from firms in 21 countries contributed to this edition of the survey; the size of the data set is 725 manufacturing plants for IMSS. To assess the data and test the hypotheses of the paper, they used multivariate linear regression analyses, with performances as dependent variables. As independent variables, they included product complexity, NPD integration, SC integration, and, in order to test the moderating effect, the interaction between complexity and both of the two integration variables. On the basis of these results, they have concluded that product complexity has no direct impact on performance, contradicting previous results (e.g., Bozarth et al., 2009; Mac Duffie et al., 1996) [11] that showed a negative effect. They discovered no moderating effect between NPD integration and performance, in contrast with their expectations for a negative effect, based on existing literature. Therefore, it was assumed that when new product development is considered, product complexity is no longer an obstacle, allowing NPD integration to provide its full benefits on performance.

Moreover, a study undertaken [12] aimed to analyze what factors influence consumers' desire to buy LED lamps in Kerala. Samples were drawn from the urban area of Kerala. The study assessed the data using a SEM model that was used to examine the factors influencing the desire to buy LED lights. On the basis of results, they have concluded that consumers' attitudes and perceived behavioural control do not influence their purchase intention. Instead, the influence of other individuals in their contact strongly affects purchase intention, which in turn drives actual purchase behaviour. This means most consumers buy LED products because of encouragement from others, rather than their own attitudes or sense of control.

In the same domain, a research was conducted to understand the company's perspective on the cost of trade between the channels viz., traditional and contemporary channels (E-business), to evaluate the economic value added by the intermediaries, to analyse Consumer needs, expectations and buying behaviour [13]. Using a distinctive quantitative approach, data were collected using structured interviews. Moreover, secondary data is acquired by referring to research books, appropriate and relevant reference books, and industry association records. The study assessed the data of 25 interviewees using the Chi-square statistical tool. On the basis of results, they have concluded that physical dealers or intermediaries play a vital role in the channel of distribution of the lighting industry in Bangalore, with selected and stated constraints. Intermediaries are the most significant link in the system, with a selected stream of functions which are performed by them. Companies may incorporate the analysis and consider relevant suggestions while blending policy and procedure in the channel of distribution in the lighting industry. There is sufficient effort to explore new opportunities for producers/manufacturers, which can be incorporated in the existing system with the blending of traditional and virtual channels.

Subsequently, Sateesh Kumar [14] aimed to understand and bridge the gap between the potential market effective use of distribution channels structures followed by various companies in the lighting industry to optimize the resources. Using an interview approach, basically primary data as the method, the study collected data from close interaction with top lighting companies in Bangalore. Specifically, the data was collected from the distributors and dealers of the relevant company. The sample is limited to electrical distribution with reference to the lighting division of Osram only. The study assessed the data by frequency distribution and a suitable statistical tool. On the basis of these results, it was concluded that the company should also engage in designing alternative channels, it can be franchise or its own retail segment, etc as distribution channels. The company is presumed by other channel partners that have all data, such as total outlets, classification, potentially and financially vulnerable pockets. But it can be true to some segments, except few is no considerable thrust for market research in the lighting industry

exercise as of now in Indian lighting. As previously asserted, the majority of distributors feel that dealers have better control over prices and the flow of goods in the market.

Based on a large technical systems (LTS) conceptual framework [15] aimed to find the complex evolution and company and market design adaptation needs in Portugal. It explored how DSOs are facing and accommodating the shift to a smarter, more decentralized, and sustainable electricity sector. Using a survey (case study methodology data collection, which delves deeper into initiative-based learning methodologies) as the method from nine multi-stakeholder workshops, the study assessed the data. Based on the results, it was concluded uncertainty regarding the value of full-scale rollouts of smart meters by DSOs, a corporate culture with high levels of inertia to change, while operational efficiency is important, it may result in job losses in the quest for cost reductions, as well as motivate outsourcing of core business activities, leading to loss of internal knowledge and technical capabilities.

Finally, a study aimed to evaluate the Global Industrial consumable distribution models and their relevance and importance in the Indian electrical consumable products market, and to study the Indian distribution model and compare it against the global markets [16]. It uses descriptive research methodology as the method. So it reads offline and online literature on switchgear. The study assessed the data through mapping and evaluating different distribution models on their websites or other sources of secondary data. Based on the results, it was noted that India is a place where the decentralized distribution model suits best, as India is significantly large in geography and also has multiple industrial clusters where to maintain the customer service and other aspects of industrial service.

1.3. Literature Gap and Rationale of the study

Existing studies often analyze what distributors are and do not really focus on their role as an intermediary specifically in the electronic sector. There are relatively fewer studies that are niche to the topic of the electric sector. It often fails to highlight the main intermediary responsible for bridging the gap between consumer needs and supplying goods. This study aims to focus on distributors as intermediaries and their perception of dynamic changes in the electronic industry and innovations that are occurring recently.

The electrical industry is growing, and sales are responsible for distributors.. The study is important to be done to analyze the literacy and needs of distributors, which could serve as a vital contributor to improve the relationship between the firm and the consumers. This could be done by understanding, training needed, what could be improved to increase sales of distributors and business with changing consumer demand. Hence, this study aims to analyze perceptions of distributors on technological innovation and consumer adoption in the electrical industry.

2. Methodology

2.1. Research Aim and Objectives

The broader aim of this study is to evaluate the distributors' perspectives on technological innovation and consumer adoption. To analyse the same, following objectives have been explored.

- To identify the type of innovations in the electrical industry and analyze the share of sales of these products distributed in the market.
- To assess the consumer willingness to adopt smart technologies, segments and regions showing high demand, review the feedback received on innovation and consumer concerns relating to these products.
- To examine the factors that drive higher sales of tech-enabled products and identify the barriers distributors face in promoting innovative offerings.
- To analyze distributors' knowledge & manufacturer support regarding new tech-enabled innovative products

2.2. Data Collection Tool and Procedure

The survey was conducted to understand the perception of a distributor on Technological Innovation and Consumer Adoption in the electrical industry. It was framed in a way to align distributors' role and relevance to changing consumer needs. Both qualitative and quantitative data was collected through the questionnaire. In the first part of the survey, demographic questions were asked such as their age, gender, education, income, and years of experience in the electrical industry . It also included the type of distributor they are along with the markets which they serve electrical goods to. The following section included the research specific questions. Questions were asked on the lines of recent product innovations observed in the electrical industry, Consumer Adoption & Market Demand, Sales Drivers and Barriers, and Distributor Knowledge & Manufacturer Support for these newer products. The survey was converted into google forms using close ended multiple choice answers for most questions to prevent varied answers being collected. It was communicated to distributors of electrical goods via whatsapp and email.

2.3. Sampling and Sample characteristics

Initially, the sample consisted of 41 respondents. However, only 38 respondents were taken into account for this research as they were the distributors, and the other 3 discarded responses were

only to test the effectiveness of the survey. The data was collected using convenience and targeted sampling wherein the target population is distributors of electrical products. The final sample consisted of all males located in India. The age of the sample consisted of 2/3 of the distributors being aged between 22-25 years. Moreover, 16 distributors held Bachelor's Degree or equivalent, 16 held Master's Degree or equivalent, 3 Below or equivalent to High School, only 1 holding Diploma or equivalent, and 1 other. Income earned in INR included 12 people earning between Rs. 10,00,001 to Rs. 15,00,000, 10 earning between Rs. 5,00,001 to Rs. 10,00,000, 9 earning more than 20 lakhs, 4 earning Rs. 15,00,001 to Rs. 20,00,000, and the lowest number of respondents, i.e. 3, earning Less than or equal to Rs. 5,00,000. It was noted that more than half of the sample were District-level distributors (serving across a district or cluster of towns), 9 being Local distributors (serving within a single city/town), 7 being State-level distributors (serving across one state), only 1 national distributor, and 1 regional distributor. Among these distributors, 65.8% of them distributes electrical products in both Urban and Rural areas, 18.4% serves only Urban areas, followed by 10.5% in semi-urban, and rest 5.3% sells in only Rural areas. Most distributors in the sample had 2–5 years of experience (28.9%). This was followed by 6–10 years (23.7%), 11–15 years (18.4%), and more than 20 years (15.8%). Distributors with 16–20 years of experience accounted for 7.9%, while those with less than 2 years made up the smallest group at 5.3%.

2.4. Statistical tools and techniques

The method used to analyze the data was visualization. The types of charts used for visualization included pie charts, bar charts, and column charts. A pie chart was used to simplify complex data into sections graphed in a circle, making it easier to understand. A bar chart was used so that rectangular graphs could make it easier to compare distinct categories. A column chart was used for mutually exclusive categories that needed comparison.

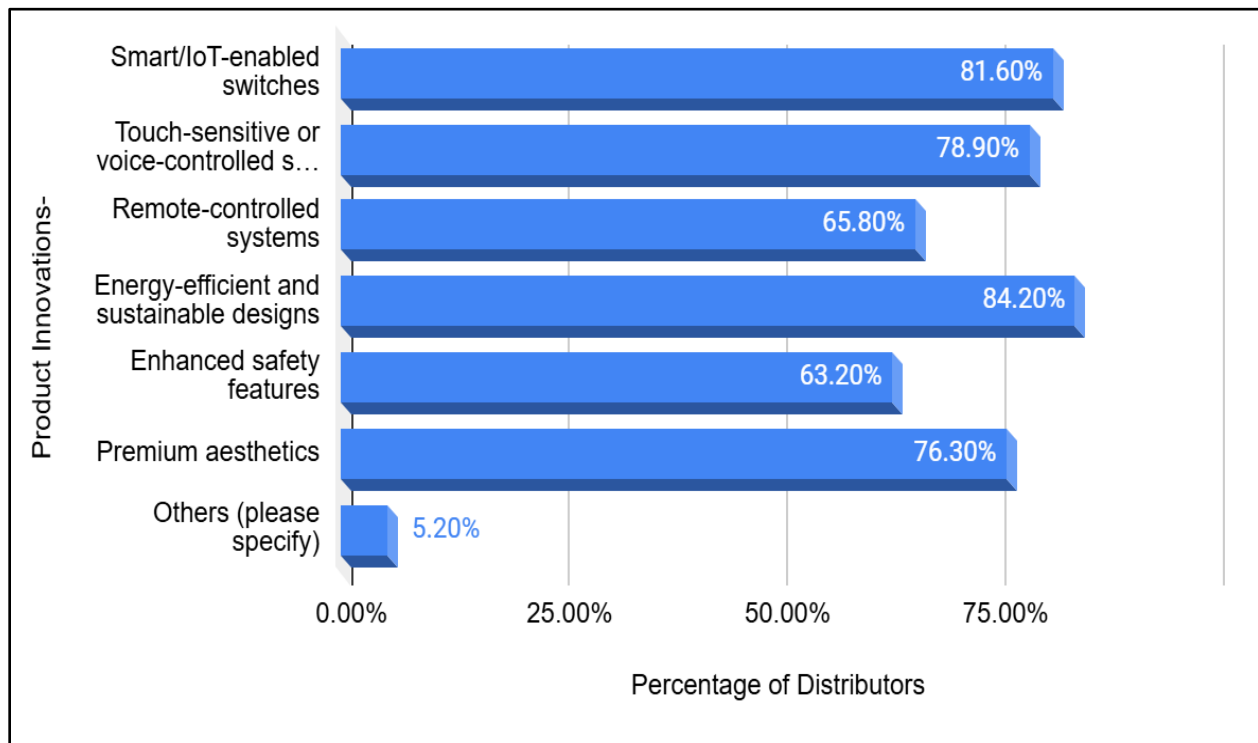
2.5 Ethical consideration

This study guaranteed total anonymity for all participants during the data collection and analysis phases to safeguard their privacy. No personally identifying information, such as names, phone numbers, or IP addresses, was acquired throughout the data collection process. Responses submitted through Google Forms were automatically documented without associating them with particular identities. Prior to commencing the survey, each participant received an informed consent statement detailing the study's goal, the voluntary nature of participation, and the option to withdraw at any moment without repercussions. Confidentiality was rigorously upheld, with all data utilized solely for academic reasons, not disseminated to third parties, and securely retained with access restricted to the principal investigator. Results are presented exclusively in aggregate form, ensuring that no person can be discerned from the findings.

3. Results

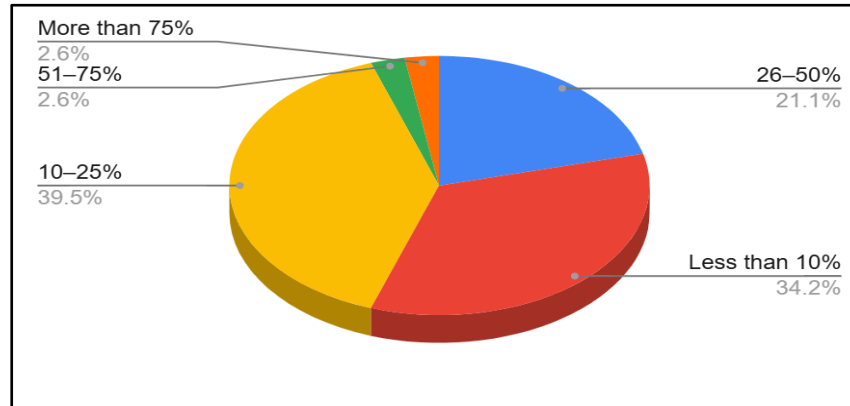
3.1. Innovation Landscape

Figure 1- Product innovations observed in electrical industry



The bar chart in Figure 1 represents the percentage of distributors who have noticed the product innovations in electrical goods. The most innovations in a product category that have been observed by distributors are energy-efficient and sustainable designs, such as LED-integrated systems, low-power consumption switches, with 84.2% distributors observing it. Following this electrical product, they also observed smart/IoT-enabled switches, e.g., app-based control, and Wi-Fi/Bluetooth connectivity, noticed by 81.6% of the distributors. Moreover, touch-sensitive and voice-controlled switches were the third most popular product category, factoring innovations like Alexa/Google Assistant enabled (78.9%). Alongside that, 76.3% of the distributors observed innovations in premium aesthetics. In addition, remote-controlled systems, e.g., remote for lighting/fan control, were seen to have a transformation in their design and structure (65.8%). The need for a change in enhanced safety features, e.g., child-lock mechanisms, fire-resistant material, and surge protection, was observed by 63.2% distributors. Lastly, some other advancements that were observed by a few distributors in terms of innovation were multipurpose lights with less space and more efficiency (5.2%).

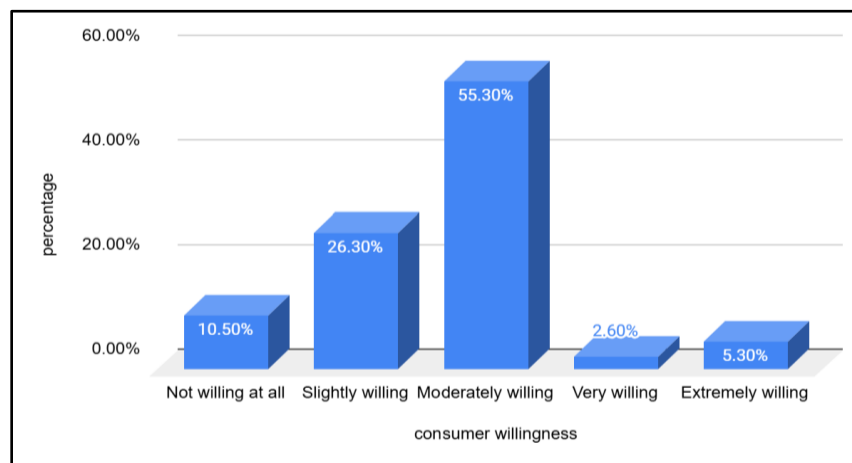
Figure 2- Proportion of smart products in offerings



The pie chart in Figure 2 represents the proportion of current product offerings by distributors that involve advanced or “smart” technologies compared to traditional alternatives. The greatest number of distributors included 39.5% (15), whose current product offerings involved 10-25% advanced or “smart” technologies compared to traditional alternatives. In addition, almost one-third (34.2%) of distributors had the least sales of smart technologies, which was less than 10% in their current product offerings. Moreover, 8 (21.1%) distributors had 26-50% smart product offerings in their shelves. 2.6% distributors observed that 61-75% of the products were smart and newer products. Lastly, 2.6% distributors also observed that most of the products being sold by them were smart, which was more than 75%. Hence, the share of smart and innovative electrical appliances in their sales is between zero to 25 percent.

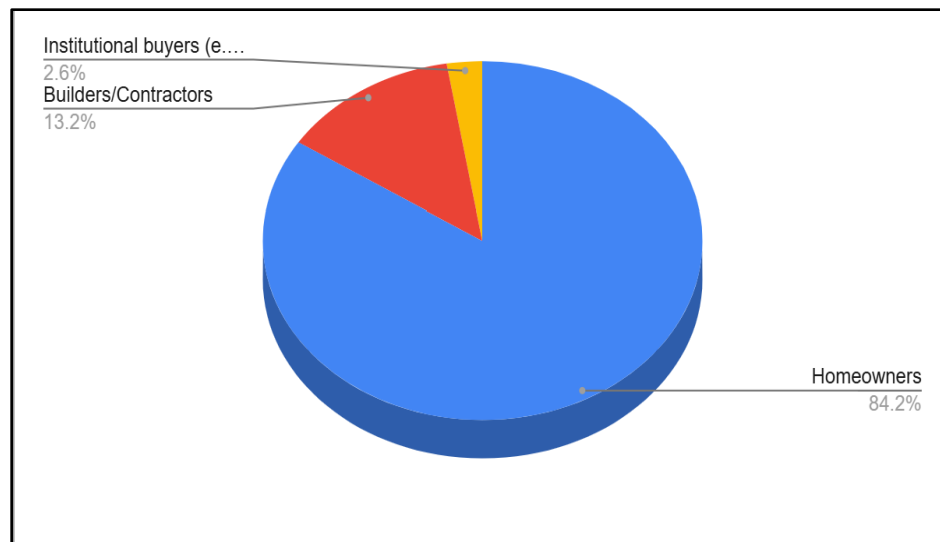
3.2. Consumer Adoption & Market Demand

Figure 3- Consumer willingness to adopt smart/innovative technologies



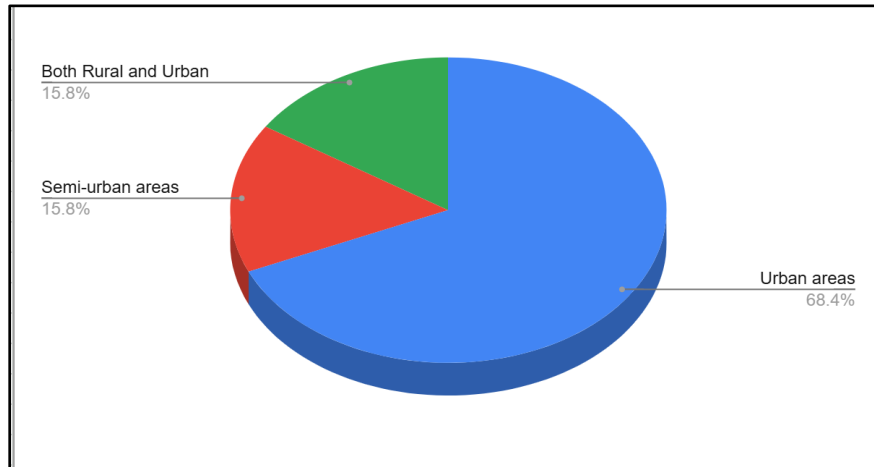
The column chart in figure 3 represents the percentage of distributors who observed consumer willingness in the electrical market to adopt smart/innovative technologies in electronic products. Most distributors which include 55.3% have noticed that consumers in the electrical market are moderately willing to adopt innovative technologies in electronic products. Moreover, 26.3% distributors suggest that consumers are very slightly willing, suggesting mild resistance to adopt smart technologies. Alongside with that, 10.5% distributors observed that there is sheer resistance to adapt to smart/innovative technologies and suggesting more need for traditional ones. Furthermore, on the extreme end, only 5.3% distributors suggest that there are extremely willing consumers open to innovative technologies. Lastly, 2.6% suggest consumers are very willing to use smart technologies. Hence, most of the distributors have experienced that consumers are not or moderately willing to adopt the advanced products in the electrical industry.

Figure 4 - Consumer segments showing higher demand



The pie chart in Figure 4 represents customer segments showing higher demand for innovative electrical products. Distributors noted that the largest number of customers who are willing and able to buy products are homeowners which make up 84.2% of demand. Secondly, 13.2% distributors believe that customer segments with high demand are builders and contractors. This might make up with real estate growth across India. Lastly, institutional buyers such as hotels buy stock from distributors which is 2.6%. Therefore, households are buying the highest amount of smart products probably because of the aesthetics. Moreover, homeowners require only a few units of products and thus, do not have to invest a large amount in the products as compared to builders and hotels.

Figure 5 - Regions with the highest demand



Pie chart in figure 5 shows the percentage of distributors who state regions with highest demand for advanced or smart switches and home electrical products. Largest demand for electrical products on regional grounds are urban areas which add up to 68.4% of products being sold. Moreover, semi urban areas, and both rural and urban have the same level of demand at 15.8%. No distributor suggested that there had been demand for rural areas only. This would be because this customer base can afford these high-end smart products in comparison to the rural areas.

Figure 6- Common consumer concerns about advanced or smart products

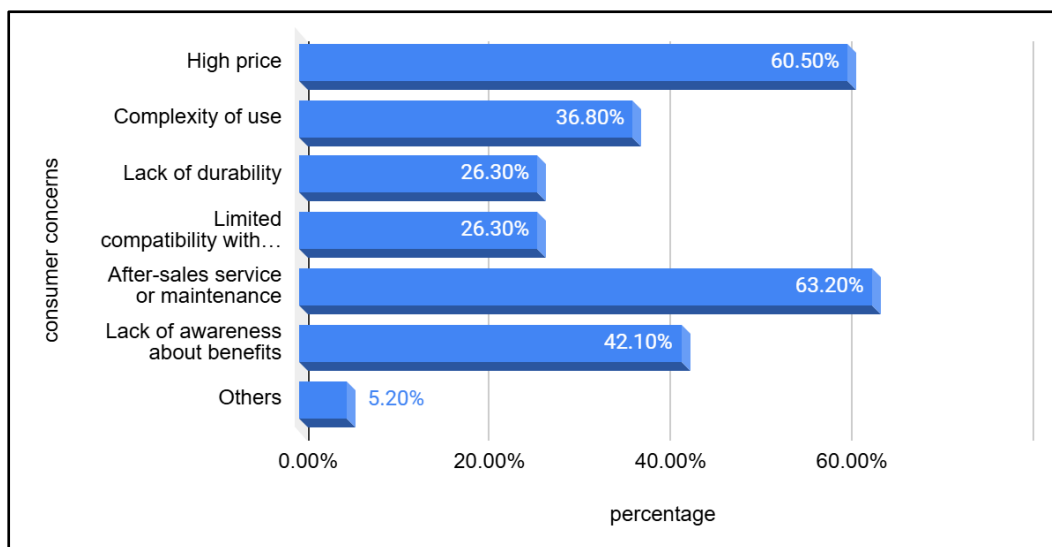
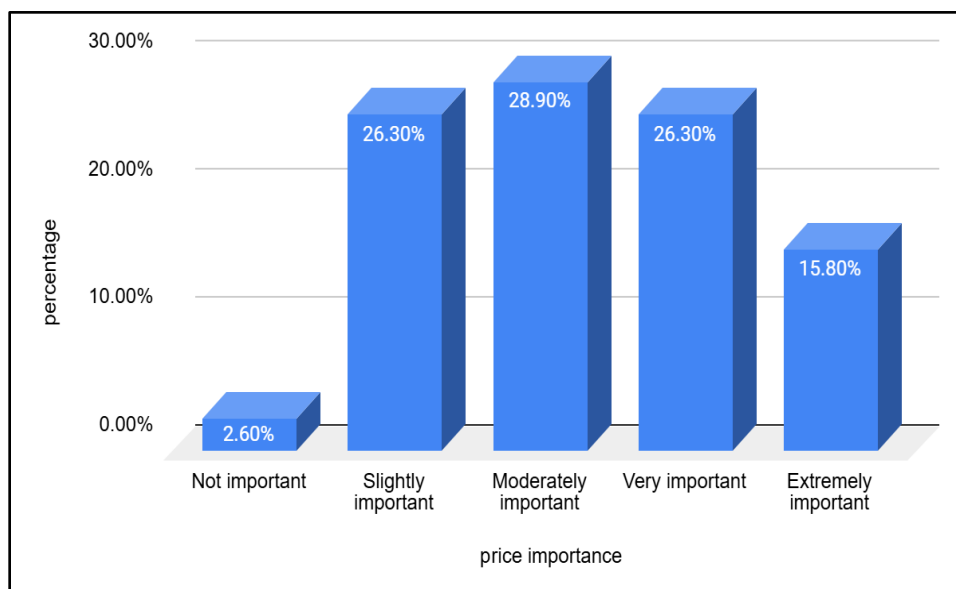


Figure 6 represents most common consumer concerns about advanced or smart products observed by distributors. The largest common consumer concern is the after sales service or

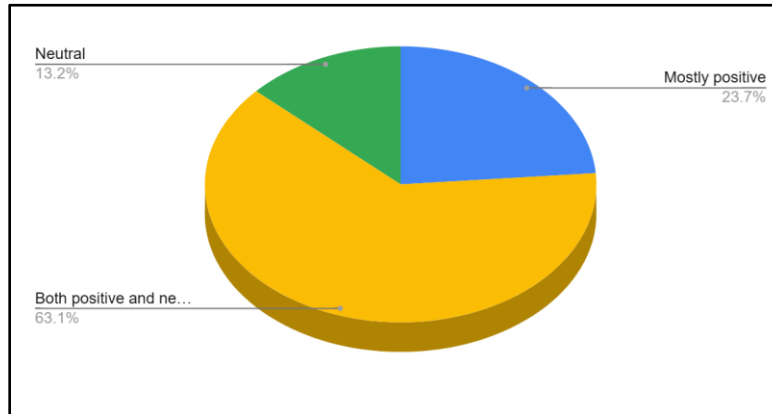
maintenance for electronic products which 64.2% distributors noticed that consumers face. Alongside with that, the high price charged for electronic goods is an issue faced by 60.5% consumers as noticed by distributors. Furthermore, the third major problem faced by 42.1% consumers when buying goods from distributors is lack of awareness about benefits of products which prevents the intangible added value being conceived by them when buying products. Moreover, the lack of technological information has made it complex for 36.8% when using electrical products. Lack of durability and limited compatibility with existing systems is faced by 26.3% of consumers. Lastly, 5.2% distributors observed Lack of proper marketing and better designs for the Indian market, something that shows the elegance and culture of our roots as a concern. In addition, they also noticed that consumers are facing issues with Warranty period on the electrical products.

Figure 7- Importance of pricing in adoption of smart technologies



The column chart in Figure 7 demonstrates the degree of importance of pricing in influencing the adoption of advanced products among your customers. Most of the customers as per distributors which include 28.9% define pricing as moderately important when adopting advanced products. 26.3% believe price is slightly important, whereas, 26.3% believe pricing is very important when influencing adoption of new technologies. 15.8% distributors believe that amongst their consumers, price is extremely important for purchase of smart technologies. Lastly, 2.6% distributors noticed that price does not play an important role when encouraging consumers to adapt to innovative technologies. Hence, according to the mixed responses, it can be noted that price of the product is important for some customers while for others it is not a matter of concern.

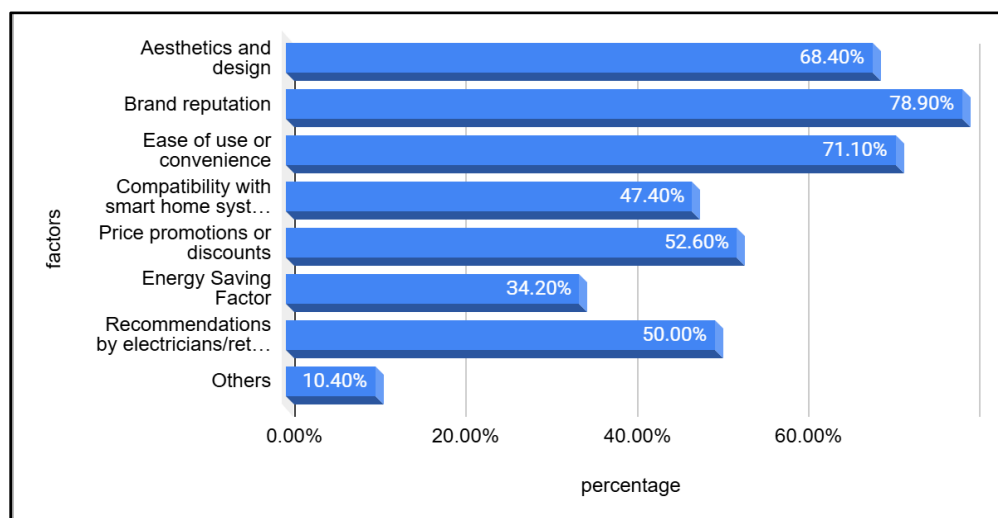
Figure 8 - Type of feedback received for advanced products



The pie chart in Figure 8 depicts the percentage of type of feedback that distributors most commonly receive from consumers about advanced or smart products. Most distributors received a mix of both positive and negative feedback from consumers when asked regarding smart technologies (63.1%). Moreover, 23.7% distributors received mostly positive feedback about smart technologies from consumers. Lastly, the least number of distributors which included 13.2% of them who received neutral feedback on innovative technologies. No distributors received only negative feedback. Therefore, most of the customers are willing to buy these advanced products with a positive feedback, but the concerns for high prices, after sales service, and adequate knowledge still prevails.

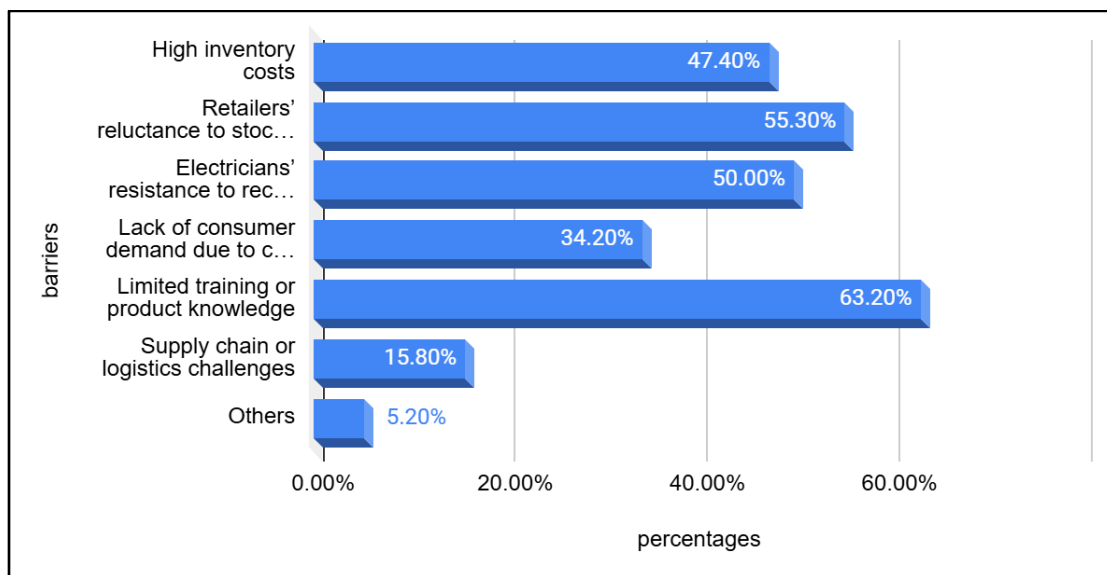
3.3. Sales Drivers & Barriers

Figure 9 - Factors driving higher sales for tech enabled products



The bar chart in Figure 9 represents the percentage of distributors that suggest factors driving higher sales of tech-enabled products in the electrical market. According to the distributors, the major factor contributing to high sales is the brand reputation of the tech-enability of the electrical product which influences customers (78.9%). Secondly, the ease of use or convenience of the product is the second major factor that drives high sales (71.1%). In addition, the aesthetics and design is a factor that customers look up to when buying tech-enabled products (68.4%). Moreover, 52.6% of the distributors have observed that the pricing promotions or discounts influence customers. Also, recommendations by electricians/ retailers have an influence on the sales (50%). Beyond that, 47.4% of the distributors have seen that consumers look for compatibility with smart home systems when purchasing tech-enabled products. Moreover, if the product is energy saving then customers are more likely to drive the sales of these types of products including these factors (34.2%). Only, 1 distributor noticed that if it is Recommended by Interior Designer then only they will go for Tech Enabled Products and most importantly they first look for what will be the warranty period & will it be on-site or not. Furthermore, 1 distributor also suggested that Architect and Builders are a factor that is most likely to encourage purchase of tech enabled products. Lastly, local supplier support is also another factor driving high sales.

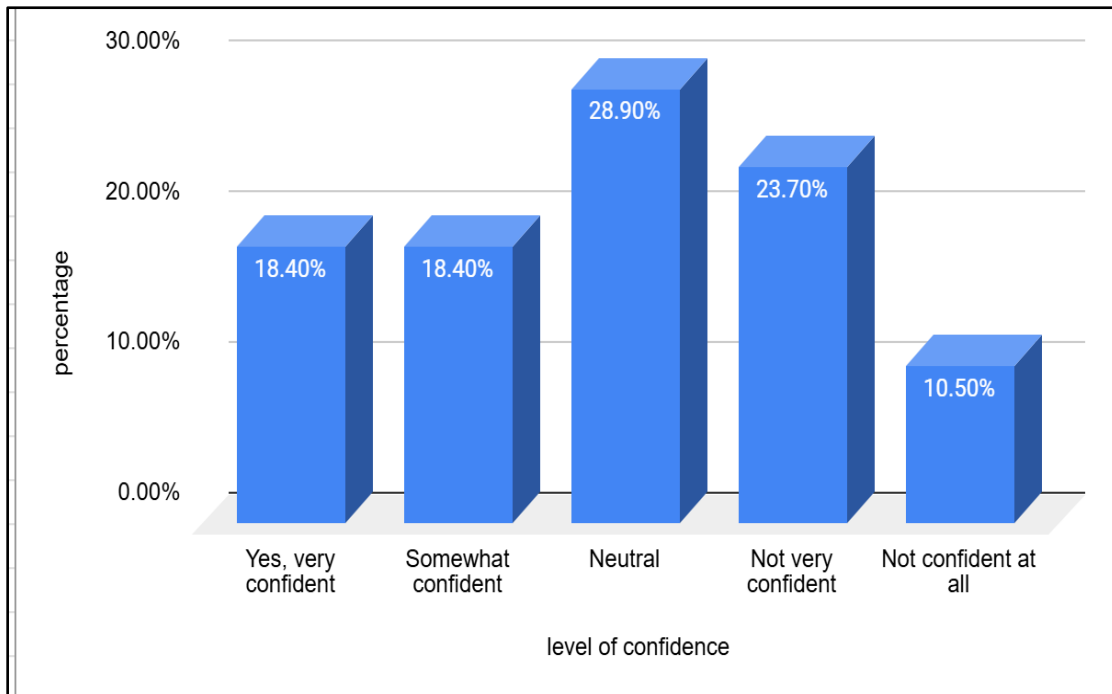
Figure 10 - Barriers faced by distributors when pushing innovative products



The bar chart in Figure 10 represents the percentage of distributors who faced barriers when pushing innovative products. One of the major barriers faced by distributors when pushing for sale of innovative products to retailers is the limited training or product knowledge of tech enabled products (63.2%). Moreover, another barrier that distributors came across was retailers'

reluctance to stock advanced products (55.3%). Furthermore, it is the electricians' resistance to recommending/installing which 50 % of the distributors have observed. In addition, the high inventory costs of holding these products have made it difficult to stimulate innovations among retailers/electricians which amount up to 47.4%. Almost one third of distributors believe that Lack of consumer demand due to concerns regarding newer technologies adoption is an obstacle making it difficult for innovations to take place (34.2%). Also, supply chain and logistics challenges are a common problem faced by 15.8% distributors when selling tech enabled products. Lastly, availability of the products and other concerns add up to 5.2% distributors facing this barrier.

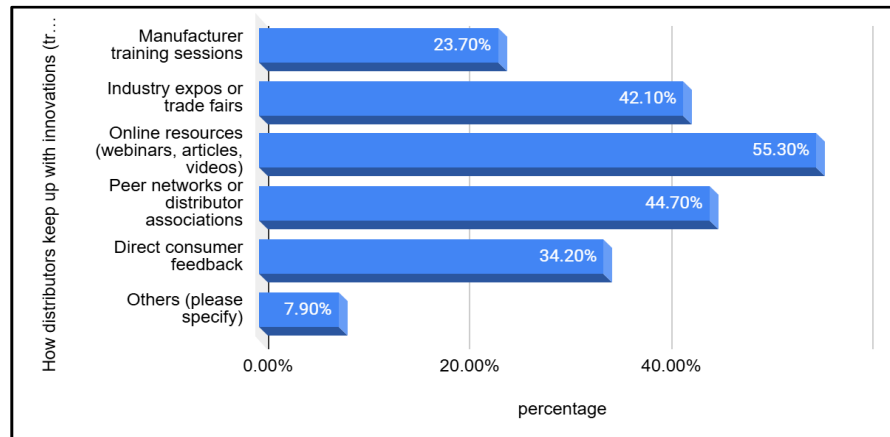
Figure 11 - Retailer confidence in explaining features



The column chart in Figure 11 shows the percentage of distributors observing the level of confidence that retailers have when providing an understanding about tech enabled products to its consumers. Most of the distributors have seen that retailers have neutral confidence in explaining features of new advanced electrical products to the customers (28.9%). Secondly, 23.7% distributors believe that retailers are not very confident in terms of explanation. The same number of distributors believe that retailers are somewhat confident and very confident both at 18.4% individually. Lastly, the least number of distributors which include 10.5% of them who believe that retailers aren't confident at all.

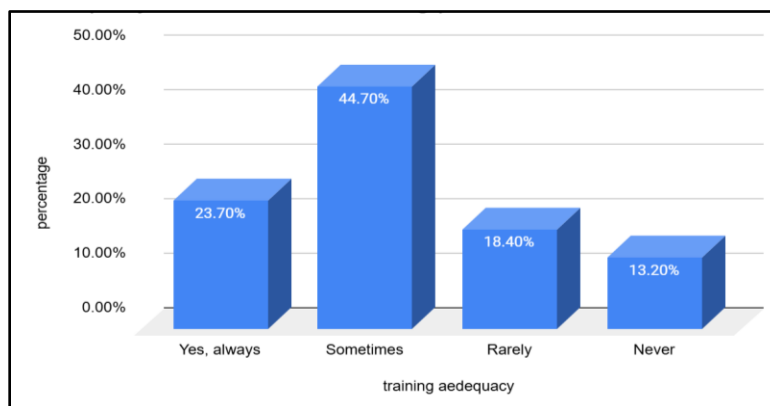
3.4. Distributor Knowledge & Manufacturer Support

Figure 12- How distributor keep up with innovations



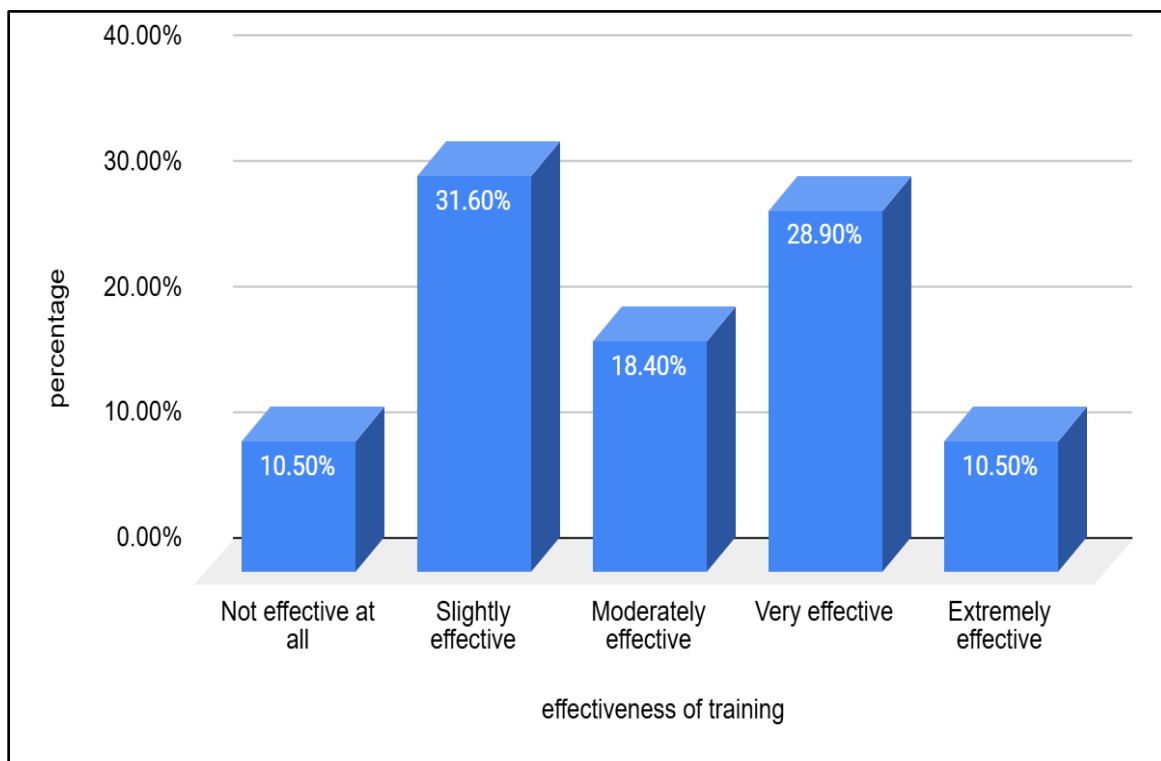
The bar chart in Figure 12 represents the percentage of distributors who adapt to new technologies through training, expos, online, peers etc. The greatest source of innovation adaptation are online resources such as webinars, articles, and videos which 55.3% distributors gain information from. Secondly, 44.7% distributors keep up with up-to-date technologies because of peer networks or distributors association. Moreover, 42.1% distributors adapt to innovation through industry expos or trade fairs. Almost one third keep up with innovations by direct consumer feedback about electrical goods (34.2%). 23.7% distributors also use manufacturer training sessions as their source for meeting with innovations. Lastly, 5.2% distributors gain through site demonstrating when keeping up with innovations. Hence, online sources, peer networks, industry expos and customer feedback play a crucial role in enhancing distributors’ knowledge regarding newer products.

Figure 13 - Adequacy of manufacturer training/product educations

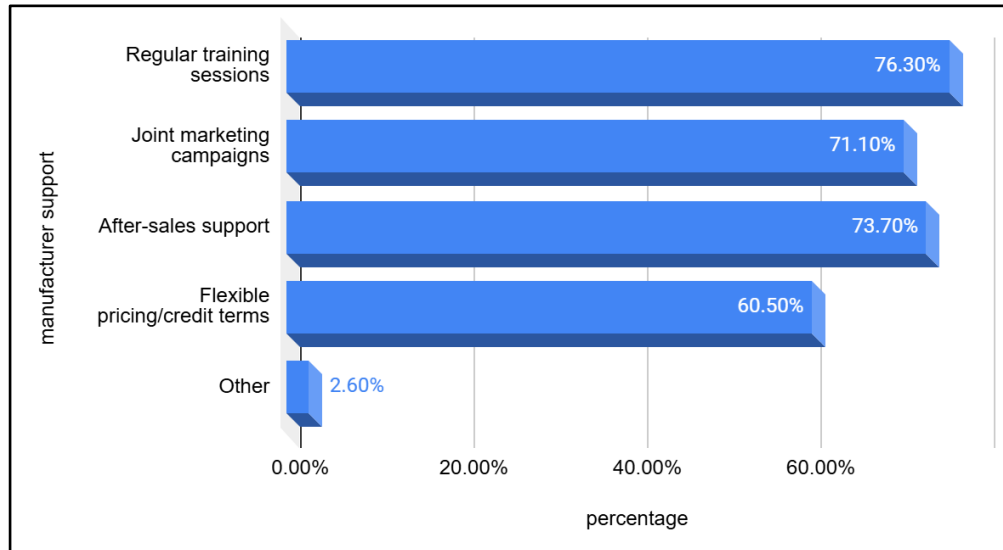


The column chart in Figure 13 represents the percentage of distributors which receive adequate training or product education from manufacturers about new technologies. The largest number of distributors which amount to 44.7% receive training sometimes about technologies from manufacturers. Moreover, 23.7% distributors always receive product education from manufacturer training. In addition, 18.4% distributors receive training rarely about new technologies from manufacturers. Lastly, the least number of distributors never receive training about new products which sum up to 13.2%. Hence, most of the distributors receive adequate training whenever a new advanced product is launched.

Figure 14 - Effectiveness of manufacture led programs



The column chart in Figure 14 illustrates the percentage of distributors who rated the effectiveness of manufacturer-led training and awareness programs in assisting them with the promotion of advanced products. Most of the distributors believe that training is slightly effective by manufacturer which adds up to 31.6%. Secondly, 28.9% distributors noticed that awareness programs are very effective when getting knowledge about promotion of advanced products. Moreover, moderately effective manufacturer led training is 18.4%. Lastly, on the extreme ends 10.5% of the distributors believe awareness programs are extremely effective , whereas, 10.5% suggest that is not effective at all in terms of promoting advanced products.

Figure 15 - Type of manufacturer support expected in the future

Finally, Figure 15 demonstrates the percentage of distributors who expect manufacturer support in the future. The largest number of distributors expect regular training sessions from manufacturers, summing up to 76.3%. Secondly, 73.7% distributors expect after sales support from manufacturers of electronic products. Moreover, 71.1% distributors expect joint marketing campaigns to be provided by firms. Flexible pricing/credit terms for electrical goods sum up by 60.5% distributors. Lastly, only a small proportion of distributors (2.6%) expect on-site warranties for tech-enabled switches and LED lights. They further suggest that warranty periods be extended, up to 4 years for smart switches, 3 years for PVC smart lighting, and 5 years for metal-body smart lighting.

4. Discussion

As seen from the results, there are several technical innovations in the electrical industry. Smart/IoT appliances and energy-efficient products have been created extensively in the industry. There are multiple reasons for this increasing trend. Technological improvements have made electrical goods more affordable with ease of use through IoT-enabled devices. The benefits offered by these products have encouraged managers to add IoT features in their products which has been supported by increased internet usage over geographical areas [17, 18, 19]. Moreover, by 2070, the government aims to meet its net-zero emissions goal. In order to achieve this, they've created mandates on energy-efficient tools and subsidies, and other programs to incentivize the purchase of green technology. Alongside, stringent rules are created for necessities and manufacturers to adopt greener solutions, such as smart grids and other technologies [20, 21, 22]. Therefore, these initiatives encourage smart innovations and adoption.

Furthermore, these energy-efficient and smart IoT electrical products have also shifted the way entrepreneurs and governments work. Entrepreneurs have implemented it in their departments, production, to improve operations. Alongside, the government has adopted measures to offset losses and encourage the adoption of greener technologies [23, 24].

However, it has been observed that many smart devices aren't essential or affordable, which prevents adoption across India [25]. Along with this lack of consumer trust makes them unwilling to do things such as safety threats and data breaches [26, 27]. Less tech-savvy consumers may not want the entire process of installing these devices alongside the complexity of understanding smart technologies [28]. Some consumers may avoid the smart devices as they may be particular about the grade of quality and lack of usp [29, 30] . Finally, some consumers may be satisfied with the traditional alternatives and may not see smart technologies as worth the price [31, 32, 33].

Contrarily, there are some other factors that influence the sales of these advanced products. Brand reputation helps build trust with the consumers, customer satisfaction through assurance of good quality, and good after-sales service, which is really needed for high-tech products. It is also seen as a measure for product standards and the minimum period it will operate also affects consumer demand. Moreover, it also influences brand loyalty, so customers repeatedly buy from the brand that has at least met minimum quality standards [34, 35, 36, 37]. Customers aim to look for short-term benefits and status through the product, which is not offered by energy-efficient products tangibly. Thus, this does not align well with urban consumers of electronic goods, who tend to prioritize convenience and automation over cost savings [38, 39].

It has also been noticed that knowledge of distributors regarding a product plays a vital role in influencing the sales and consumer adoption. As supported by empirical evidence, it has been suggested that online sources such as webinars, articles, and videos are the greatest source of information for keeping up with innovations because they are updated regularly, so it allows distributors to be briefed about new launches by the manufacturer [40, 41]. Secondly, it is easier to access information from these sources and it can be accessed from any geographical location [42, 43]. Along with this, distributors prefer to seek training from the manufacturer of these smart electrical products. Finally, on-site demonstrations of products also help distributors in gaining knowledge about the products. However, site demonstrations likely make distributors geographically immobile for distributors to connect with sites in different areas. Site demonstrations can be time-consuming as time is spent traveling to the site along with travel costs, reducing operational speed of the distributor [44].

5. Conclusion

There has been a substantial growth in the electrical goods industry which has driven the need to understand distributors' perspectives due to its growing importance in the supply chain. They are responsible for storing and supplying goods according to the variability of demand for them. The objective of this study is to consider the innovations occurring and need to address it to distributors and consumers with the growing importance of the electrical industry over the years. A google survey was communicated to more than 35 distributors through whatsapp and email. Data was analyzed using pie charts, column charts and bar graphs. Distributors do include a significant share of smart products in their current product offerings which include Smart/IoT-enabled switches such as app-based control, touch-sensitive or voice-controlled switches, remote-controlled systems e.g., remote for lighting/fan control, energy-efficient and sustainable designs, enhanced safety features boasting child-lock mechanisms, and premium aesthetics. The majority consumer group are homeowners and demand is recognised by them and other consumer groups mostly through urban areas. However, most common concerns with these innovations is the after sales service and the high price of these products. Most distributors are neutrally confident and observed that when pushing innovation in markets retailers were reluctant. There is also a growing need for manufacturer support by distributors in terms of after sales support for electronic products. Existing studies also support these results. Empirical evidence shows that smart devices aren't affordable and essential which prevents the need for adoption of tech enabled devices across India. The bridged gap of trust between consumer and manufacturer such as security risks has made them reluctant to adopt tech enabled products. Moreover, there are less tech savvy consumers present across India. Site demonstration is the least helpful source for distributors when keeping up with innovations due to the inflexibility with new product launches.

6. Policy Implications and Limitations

The study can be used by retailers to know which quantity of products to purchase from these distributors, as they will be aware of demand noticed by an intermediary above their supply chain. It can be used by manufacturers to bring changes to improve awareness and knowledge of innovations that come in the future. It helps them highlight the barriers faced by distributors and the training needed to overcome them. Manufacturers can use it for production decisions on product categories to be produced in order to avoid wastage and improve profitability. Consumers can use it to take policies and pressure groups into action to collectively reduce the market failure occurring in the electrical market. Consumers become more aware of the need to gain knowledge for tech-enabled products.

The sample size is quite small as it only includes 38 respondents to represent all distributors in India. It limits other regions that could be taken into account from example distributors that cater to the south market. Demographic information such as sales from electrical products not included. It doesn't map a lot about consumers' perspective on innovations and is taken from the perception of distributors so it fails to directly address consumers and their opinions so bias perception could be there such as distributors who fail to understand their consumers.

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