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Assessing New Product Development Trends and Practices in Manufacturing and Service-Oriented Organizations in Chitwan District, Nepal

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Abstract

This comprehensive descriptive research explores deeply into the intricate domain of new product development within Nepal's Chitwan district, examining its complicated process, stages, evolving trends, and consequential implications. With a robust participant pool of Four hundred and Four (N=404) individuals spanning diverse manufacturing and service-oriented entities, the study provides a panoramic view of the subject matter. The findings reveal a substantial consensus (85.9%) among respondents, declaring the significance of stages, trends, and strategies in new product development, underscoring their pervasive acknowledgement across the district. However, a notable subset (25%) displays partial implementation, particularly regarding concept development and testing, reflecting challenges in translating design phases into seamless product launches and market integration. Yet, a considerable segment (80.6%) displays alignment with product life cycles, new product development stages, trends, and strategies, signalling adaptability and steadfast commitment among Chitwan's enterprises. With an average knowledge score of 5.38 out of 8, the research augments the requirements of theoretical knowledge to the decision makers. These insights resonate especially in urban settings, elucidating the interplay between new product development trends and their far-reaching implications for business competitiveness, consumer experiences, and societal advancement.

Keywords: *renewable energy, solar panel cleaning system, solar photo voltaic, system improvement*

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Introduction

This research focuses on understanding the current trends in new product development (NPD) in Chitwan district, Nepal. It recognizes the importance of implementing formal NPD processes and strategies to effectively launch products in the market. The chosen area, Chitwan district, has a high potential for businesses and organizations, with a significant population and diverse development status. The district serves as a major commercial and service center, offering opportunities for education, healthcare, transportation, and business (Bhandari, 2019). It is also known for its medical institutions and various industries (Chitwan Tourism, 2013). By studying the NPD trends in this region, the research aims to shed light on the overall NPD trends, issues, and opportunities in urban areas of Nepal. Chitwan district consists of seven municipalities, out of which one is a rural local government, one is metropolitan city, and five are urban municipalities. The unique characteristics and population diversity of Chitwan district make it an ideal location for conducting this research on the trends of NPD (Nepal, 2014).

Literature Review

This research study has conducted a review of previous research studies which has conducted with theme of product development and available online.

New Product Development

In today's competitive business environment, companies need to continuously innovate and introduce new products to meet market demands and generate revenue (Barczak, Griffin, & Kahn, 2009). New product development is a crucial process that involves creating and launching innovative products that address changing consumer preferences, increased competition, and technological advancements. While the business landscape has undergone various transformations, the process of new product development has seen limited changes (Wind & Mahajan, 1997). Companies must utilize effective product development strategies and stay informed about the latest trends through market research (Iamratanakul, 2014).

New product development refers to the introduction of a product that requires a new marketing approach and involves significant changes. It encompasses both truly innovative products and those that are significantly different from existing offerings (Esen, 2018). The success of innovative firms relies on understanding market needs and continually improving and developing new products that surpass customer expectations. This process extends beyond established businesses and includes any product or service introduced to the market for the first time (Akroush, 2012)

By prioritizing new product development, companies can adapt to evolving market dynamics, enhance competitiveness, and drive economic growth. This focus on innovation has far-reaching implications for businesses, customers, and society as a whole, leading to improved customer satisfaction, economic development, and overall business success.

Stages of New Product Development

Different articles and research highlight the existence of 4 to 8 stages in the ideal/product development process. Regardless of the specific number of stages, a systematic approach is crucial for effective product development (Esen, 2018).

The stages of the product development process include idea generation, screening and evaluation of ideas, concept development and testing, marketing strategy, business analysis, product development, test marketing, and commercialization (Qualtrics, 2020)

New product ideas can originate from various sources, including customers, consultants, competitors, employees, and online platforms. Encouraging an open culture within the organization can also foster idea generation. Research shows that a significant portion of new product ideas (41%) come from employees, followed by customers (36%) and the R&D department (14%) (Brex, 2022: Mishra et al, 2023).

With a multitude of ideas, the focus shifts to separating the promising ones from the less viable options. This screening process is crucial to avoid pursuing poor ideas. The selected idea should meet the criteria of being real, capable of winning in the market, and worth pursuing based on the business's growth strategy (Brex, 2022). Ideas evolve into concepts that address consumer needs, technology, user experience, and usage situations. The paragraph discusses key aspects of the

product development process and underscores the significance of a systematic approach for effective development. While there may be variations in the number of stages outlined by different sources, the importance of a structured approach is highlighted, as indicated by Esen (2018). The typical stages of the product development process are then outlined, including idea generation, screening and evaluation of ideas, concept development and testing, marketing strategy, business analysis, product development, test marketing, and commercialization, as per the Qualtrics source from 2020. The study also emphasizes that new product ideas can originate from a wide array of sources, such as customers, consultants, competitors, employees, and online platforms. It further underscores the role of fostering an open organizational culture as a means to encourage idea generation. The statistics provided, citing Brex (2022) and Mishra et al. (2023), indicate that employees are a primary source of new product ideas (41%), followed by customers (36%), with the Research and Development (R&D) department contributing 14%. Lastly, the paragraph stresses the importance of the screening process in separating viable ideas from less promising ones. These concepts are tested among selected customer groups to identify the most favorable ones (Brex, 2022). Once alternative concepts are chosen, the next step involves designing the marketing strategy, including market segmentation, targeting, positioning, and developing an appropriate marketing mix. Key considerations include identifying the target market, determining pricing and estimating long-term sales volume (Brex, 2022). It notes that selected ideas should meet specific criteria, including being realistic, having market potential, and aligning with the business's growth strategy. The selected product concept and marketing strategy undergo evaluation for market potential, return on investment, capital requirements, and profitability. Business analysis combines elements of marketing research, cost-benefit analysis, and profitability analysis (Brex,2022).

The chosen product concept is transformed into a physical product through prototype development, consumer testing, and finalizing branding, packaging, and labelling. Various tests are conducted to ensure safety, attractiveness, and effectiveness (Brex, 2022). Test marketing assesses different aspects such as target market, market position, advertising, distribution, packaging, and costs. The results inform businesses about the viability and success of their strategy, providing insights for commercialization (Brex, 2022).

This final phase involves full-scale production, marketing, sales, support, and distribution of the new product. It is the process of bringing the product to the market with a comprehensive marketing strategy and plan (Brex, 2022). However, limitations such as limited data, the impact of the ongoing pandemic, and the scope of the study only within Chitwan District should be considered. Future research could explore different organizational types, broader contexts, alternative NPD models, and incorporate customer perspectives to enhance the generalizability and reliability of the findings.

These stages form a comprehensive framework for the systematic development and successful launch

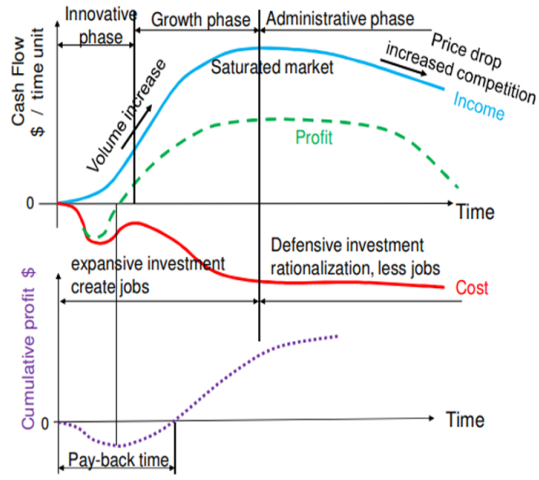

Figure 2: *Product Development Life Cycle "S Curve (Persson, 2016)*

Most businesses have aims to gain sustainable competitive advantage in the market, using and improving methods for innovating faster, reliable and consumer friendly products with high customer value (Persson, 2016). Driving forces in Product Development are: Technology, Market and Society, Ecological, economic and social sustainability require recycling, reuse, energy conservation and new business concepts (Persson, 2016). The life cycle of product development

which includes the introductory phase (Innovative Phase), Growth Phase, Maturity and Decline Phase (Administrative Phase). After the commercialization of the product, it undergoes a life cycle of continuous evolvement. Right mindset of the management team can lead the product to success but on the contrary, if the product is not handled properly it may be a disaster (Figure2).

Product Development Life Cycle Phases:
Product development starts with introduction phase and lasts to maturity and decline phase (eGyanKosh, 2023).

slower sales growth and management challenges. Without timely improvements, the product may enter the decline phase due to changing consumer interests, competition, or technological advancements. The firm should consider a new product mix to address these challenges.
During the decline phase, the product may be eliminated or its price reduced. Adapting to market changes and making informed decisions are essential for effective management in this phase (eGyanKosh, 2023).

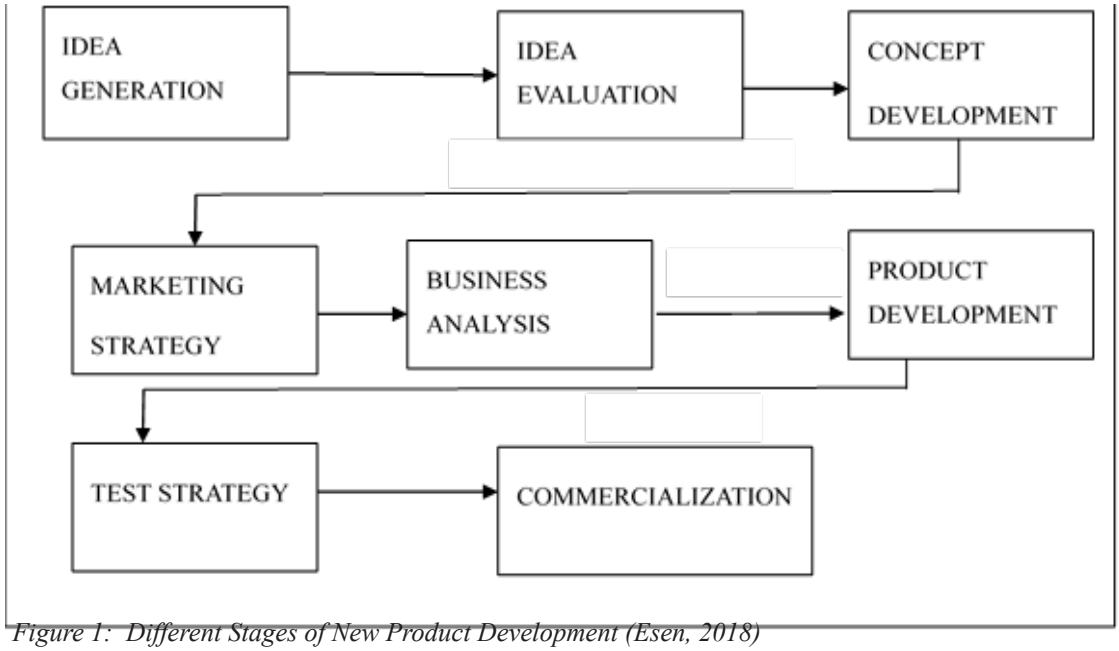

Figure 1: Different Stages of New Product Development (Esen, 2018)

Introductory Phase (Innovative Phase): This phase involves introducing the product to the market, with increased investments and production but minimal profits. Sales trends can vary, but exponential growth is ideal. Proper product design and thorough business analysis contribute to a successful introductory phase.
Growth Phase: This critical phase occurs when the product gains traction and sales start increasing rapidly. Sales volume rises exponentially, and the product becomes profitable as distribution and promotion efforts expand. Manufacturing costs per unit tend to decline during this phase.
Administrative Phase (Maturity and Decline Phase): The maturity stage is characterized by

Objectives
The main objective of the research is to comprehensively analyze the new product development (NPD) process, trends, and investment patterns in manufacturing and service-oriented organizations in Chitwan District.
By carrying out this study the research aims to provide a detailed understanding of the NPD process, evaluate the effectiveness of NPD strategies, assess the level of investment in R&D for NPD, and explore the attitudes and perceptions of firms towards NPD trends. By achieving these objectives, the research aims to contribute to the knowledge and practice of NPD in Chitwan, enabling organizations to enhance their product

Methodology

This research article is based on a descriptive research design method, which aims to accurately and systematically describe a population, situation, or phenomenon. The study collected primary data using questionnaire and analyzed collected data using Microsoft Excel to obtain relevant information. The research questionnaire was divided into two sections, and the interpretation of each section is presented in the results and discussion. The study used a random sampling technique to create diversification on data taken from questionnaires and personal interviews (Research Guides, 2023). The data were collected through personal interviews from either middle-level or top-level management, and 404 data were collected by 11th July 2021 during the pandemic of Covid-19, using a digital form made with the help of Microsoft Forms. During study period there was pendamic of Covid-19. The sample size is calculated by using Cochran (1977) formula for unknown population using 96% confidence, 5% desirable error and unknown prevalence of practice(p=0.05) that gave 384 sample size and 10% non-response (39) is taken thus more than 423 responses is taken. However, some questionnaires had incomplete responses thus 404 complete information sample is taken for the study.

Results and Discussion

The data analysis of the current research is begin with descriptive analysis and the results are discussed with the outcomes.

Demographic Profile of Respondents

Demographic profile of respondents are considered important covariates of the study. This study has collected data of age and gender of respondents to determine whether there is any association of demographic variables with product development trend and practices adopted by the managerial level officers in Chitwan district.

The age distribution exhibits a pronounced diversity of participation, with the most substantial contingent found within the 18-24 age bracket, representing 39.36%. This notably high percentage underscores the significant involvement of young managers within the industrial sectors of the Chitwan district. Following this prominent cohort, the age group of 25-34 years accounts for the second highest presence at 24.01%, mirroring a considerable engagement within Chitwan's industrial landscape. Remarkably, the near parity between the 25-34 and 35-44 age groups underlines a pervasive youth presence, aged 25-44, occupying a pivotal role in Chitwan's industrial sectors. In terms of gender distribution, males dominate the sample composition at 61.88%, eclipsing the representation of females at 36.14%, implying an unequal gender ratio in managerial capacities within Chitwan's industrial sectors. Importantly, the inclusivity of the study is underscored by a non-binary respondent accounting for 0.25% and a segment of respondents opting not to specify their gender (1.73%), a choice that respects their privacy (Table 1).

When scrutinizing the sample according to their respective industrial categories, a noteworthy trend emerges. The highest representation among respondents emanates from the academic sector, constituting a substantial 19% of the total sample. Similarly, the soap and beauty industry also commands a considerable presence, with 14% of respondents hailing from this sector. In contrast, respondents affiliated with the engineering sectors comprise a comparatively smaller proportion, accounting for 7% of the overall sample composition (Figure 3).

Table 1: *Demographic Profile of Respondents*

Demographics	Categories	Respondents	Percentage
Age Group	18-24	159	39.36%
	25-34	97	24.01%
	35-44	104	25.74%
	45 and above	44	10.89%
Gender	Male	250	61.88%
	Female	146	36.14%
	Non Binary	1	0.25%
	Prefer not to Specify	7	1.73%

After carefully examining the data from 404 respondents based on their industry positions, it is clear that the majority fall within the middle level (183), followed by entry-level (143) and top-level (78) positions. During the pandemic of Covid-19, it has limited top-level participation due to communication challenges. The middle level stands out for active involvement as they implement policies and suggest new market trends. This distribution aligns with the industry hierarchy, highlighting the middle level's crucial role in linking top-level strategies with practical implementation (Figure 4).

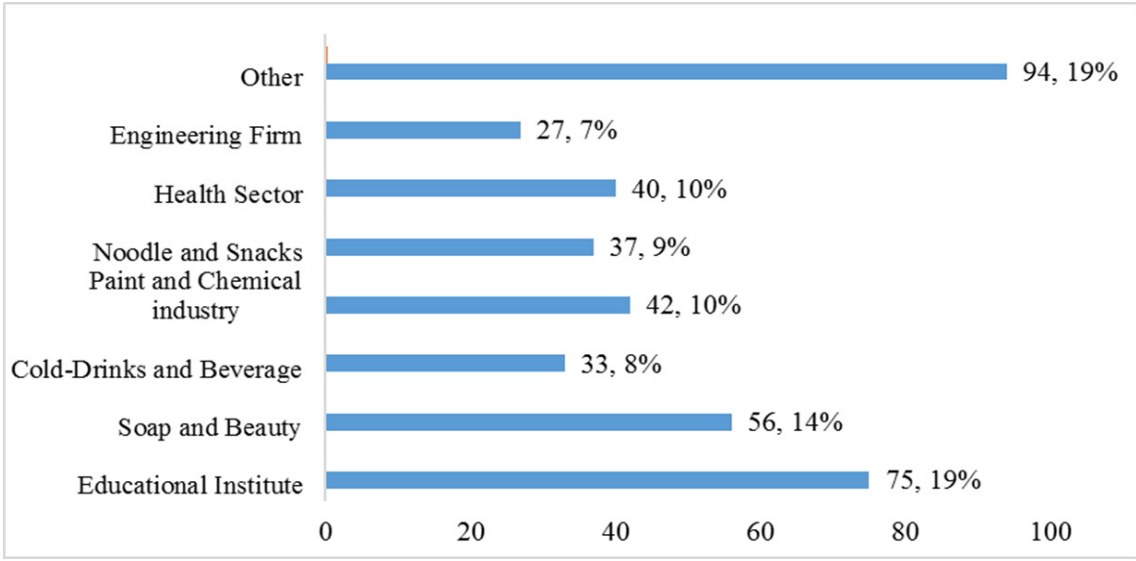

Figure 3: *Sector wise Representation of Respondents in Various Organizations*

In relation to the participants' departments, the largest segment of respondents, comprising 24%, was drawn from the production department.

Subsequently, 20% of respondents originated from the administration department, while the research and development sector exhibited the lowest representation. Interestingly, a significant contingent of respondents, constituting 24%, fell under the "other departments" category, reflecting a diverse array of roles beyond the pre-established divisions, and indicating a notable degree of versatility and inclusion in the survey (see Figure 5).

Among the 404 respondents, a breakdown reveals that 89 were from rural locations, 180 hailed from urban area, 64 were residents of sub-urban regions, and 91 were based in densely urbanized areas. Primarily, respondents were concentrated in urban settings, with a lesser representation from rural areas, indicating a promising notion that the principles of new product development hold potential across geographical locations (see Figure 6).

Asking about the district of the respondents it is found that the participants were mostly from Chitwan district, which is what the research aimed to understand. This helps see how neighboring areas might also affect new product trends. Out of the total, 72 respondents (18%) came from distant districts, not even close by. On the other hand, 193 respondents (48%) were from Chitwan itself, and 139 respondents (34%) were from nearby districts (see Figure 7).

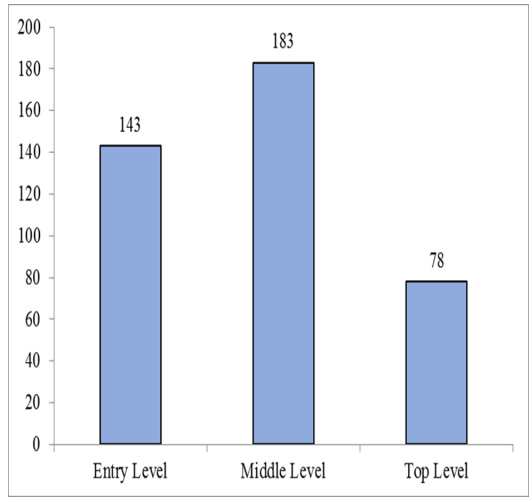

Figure 4: *Position of the Respondent in the Organization*

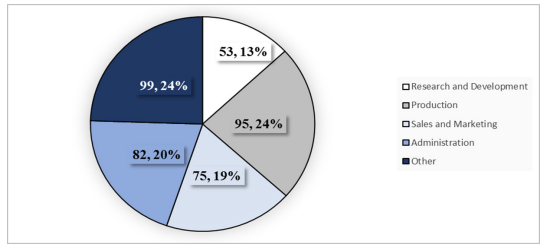

Figure 5: *Departmental Participation of the Respondents*

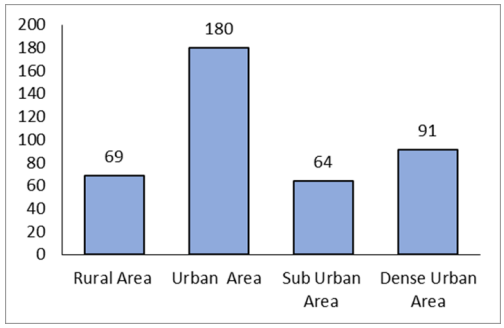

Figure 6: *Location of the Office as per the Respondents*

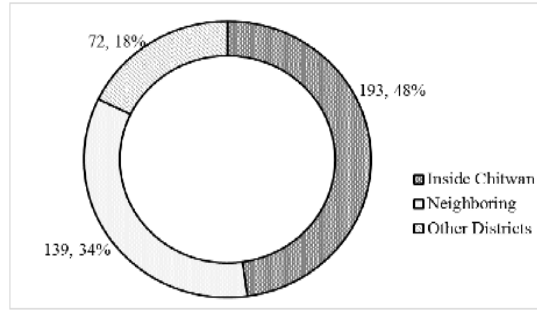

Figure 7: *Respondent's Organizational Location as per their Submitted Form*

Knowledge and Practices on New Product Development

To know whether the respondents have knowledge on different stages of new product development, different questions are asked, the respondents responses are closed to three options yes, no and have partial knowledge. Ilori et al. (2000) have stated stages that generation of new idea, screening and, concept development and testing, market strategy, business analysis, product development test marketing and commercialization are the stages of new product development. Most respondents agreed that different stages of new product development are important, indicating a widespread belief in these strategies in Chitwan and neighboring districts. A small percentage (8.4%) felt that generating new ideas wasn't crucial, while a large majority (85.9%) believed that new ideas are vital for trends. Interestingly, around a quarter didn't see concept development and testing as essential. This suggests that most respondents understand product development stages, but it's concerning that a significant portion in managerial positions lack this awareness. Upon calculating the knowledge scores of the respondents, an average value of 5.38 was determined, accompanied by a standard deviation of 0.67, within a total possible score of 8. This outcome suggests that, on average, respondents possess a moderate level of theoretical understanding regarding new product development, or there might be a tendency to overlook certain stages of the process (Table 2).

To know the opinion of respondents related to new product development different questions were asked, the responses were bounded to five point Likert scale 1 to 5 strongly agree. The percentage of respondents for each response category (Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree) is provided along with the corresponding number of respondents in parentheses. The statements cover aspects such as the extension of the product development life cycle, the importance of product research, feasibility reports, manpower requirements, the role of meetings and discussions, and the exchange of ideas for innovation in new products (Table 3).

The findings reveal compelling insights. A significant portion (53.8%) of respondents strongly supports the extension of the product life cycle (PLC) for higher product quality—a sentiment in line with established research emphasizing the value of prolonged PLCs. Moreover, 53.3% of participants agree that the practice of research and development is pivotal for effective product outcomes, reinforcing the prevailing understanding of R&D's significance in new product development. Notably, 52.1% acknowledge the necessity of feasibility studies before embarking on new product ventures, aligning with established wisdom. The study underscores the unanimous belief (over 80%) in the need for technically proficient personnel for successful product development. Evidently, these findings align with existing research underlining the pivotal role of feasibility assessments and skilled personnel. A striking consensus (over 80%) on the effectiveness of regular interdepartmental meetings in fostering novel ideas and products reinforces the criticality of collaboration, mirroring established research on the significance of cross-functional collaboration and innovation.

Table 2: *Opinion of Respondents on NPDS*

Stages	Responses		
	Yes	*No*	*Partial*
Generation of New Idea	347 (85.9%)	33 (8.4%)	23 (5.7%)
Screening and Evaluation	264 (65.4%)	82 (20.5%)	56 (14.1%)
Concept Development and Testing	245 (60.7%)	101 (25.2%)	56 (14.1%)
Market Strategy	261 (64.7%)	97 (24.2%)	44 (11.1%)
Business Analysis	276 (68.5%)	86 (21.5%)	40 (10.1%)
Product Development	258 (64%)	100 (24.9%)	44 (11.1%)
Test Marketing	245 (60.7%)	88 (22%)	69 (17.3%)

Commercialization	278 (68.9%)	61 (15.1%)	64 (16%)

However, a small minority (less than 10%) downplays the value of idea exchange between organizations, diverging from the broader perspective. In sum, this study's findings affirm the importance of structured approaches, research and development, feasibility studies, skilled human resources, and collaborative endeavors in the pivotal role of feasibility assessments and skilled personnel. A striking consensus (over 80%) on the effectiveness of regular interdepartmental meetings in fostering novel ideas and products reinforces the criticality of collaboration, mirroring established research on the significance of cross-functional collaboration and innovation. the realm of new product development, consistent with prior research and highlighting their enduring significance (see Table 3).

Table 3: *Responses towards statements related to New Product Development*

Statement	Responses				
	Strongly Agree	*Agree*	*Neutral*	*Disagree*	*Strongly Disagree*
Product Development Life Cycle must be Extended to get quality products.	217 (53.8%)	141 (35.1%)	29 (7.2%)	10 (2.5%)	6 (1.5%)
Practice of product research is key to New Product Development	123 (30.6%)	214 (53.3%)	46 (11.6%)	10 (2.7%)	6 (1.7%)
Feasibility report is necessary before developing a new product.	108 (26.9%)	210 (52.1%)	63 (15.6%)	16 (4.2%)	4 (1.2%)
Proper Technical and Qualified Manpower is required for new product.	144 (35.8%)	194 (48.1%)	44 (11.1%)	17 (4.4%)	2 (0.5%)
Regular meeting and discussions among departments will help bring innovation in new product	163 (40.5%)	176 (43.7%)	46 (11.6%)	14 (3.7%)	2 (0.5%)
Exchange of ideas among organization will help bring innovation in new product.	105 (26.2%)	191 (47.4%)	66 (16.5%)	27 (6.7%)	12 (3.2%)

Conclusion

The findings of this study underscore the significance of various stages within the new product development (NPD) process. The majority of respondents expressed a shared conviction in the importance of these stages, attesting to a prevailing belief in their efficacy not only within Chitwan but also in the neighboring districts. While a minority held reservations about the criticality of generating new ideas, a substantial majority recognized their pivotal role in driving trends, aligning with the broader industry perspective. Additionally, a noteworthy aspect arises from a quarter of respondents seemingly underestimating the necessity of concept development and testing, shedding light on potential gaps in awareness. The implications of these insights are profound, as they reveal a collective comprehension of product development stages, albeit with an alarming dearth of understanding among a significant segment of managerial personnel. The calculated knowledge scores, reflecting an average of 5.38 with a standard deviation of 0.67 out of a maximum score of eight, further corroborate this observation. This average underscores a moderate theoretical grasp of new product development, though it suggests the potential overlooking of certain crucial stages. The study reveals that adherence to NPD processes and strategies are crucial for successful product launches and sustained business operations.

The research focuses on understanding the mindset and practices of manufacturing and service oriented organizations in Chitwan District, Nepal, highlighting their positive attitudes towards NPD and the importance of research and development in extending the product life cycle. However, the study has limitations such as limited data, the impact of the ongoing pandemic of Covid-19, and the scope of the study only within Chitwan District.

Future research could explore different organizational types, broader contexts, alternative NPD models, and incorporate customer perspectives to enhance the generalizability and reliability of the findings. In essence, this study reinforces the need for targeted awareness initiatives to enhance understanding, particularly among managerial ranks, thus fostering more robust and comprehensive approaches to new product development in both Chitwan and its neighboring districts.

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