

Simulated Product Development: A Novel Inroad Into Sensorial Food Science

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Abstract:-Simulated product development is the new innovation in the field of Food science and Food technology. It is an armchair science that accurately estimates the pulse of consumer preferences. The product is developed in reference to an imaginary framework based on fixed attributes. The simulated attributes are usually product attributes, which are of prime importance to both the manufacturer and the consumer. In this technique, acceptability of a product conceived virtually in space via detailed analysis of the data obtained from a well-formulated questionnaire. The questionnaire developed focuses on consumer awareness, recipe development and product value for money (VFM). Expert panelists who have the proficiency to predict its organoleptic acceptability usually evaluate the product's viability via their ability to transcend the product idea as if it's a tangible entity. Simulated product development is one of the most cost-effective and sophisticated technique of appraising the effectiveness of a product idea. In this publication, the effectiveness of simulated product development as an integral tool is evaluated by analyzing the responses of trained panelists to a questionnaire. This questionnaire developed focused around the merits, effectiveness and applications of simulated product development in the realm of emergent novel products. The results of this exercise affirmed the superiority of Simulated Product development as an integral tool in the arena of novel product development.

I. INTRODUCTION AND BACKGROUND:

Food is considered to be the cradle of human sustenance and serves as the basis of life. It fulfills the need of nourishment and enriches our well-being. The evolution of the human species was considered complete when mankind attained the knowledge of procuring and producing food. The cornucopia of edible plants in nature has contributed to the nourishment of mankind across ages and cultures. Thus across all borders of culture, food is revered as the integral medium of nourishment for the body, mind and the soul. Hence, human beings associate with food not only physically, but also emotionally and spiritually. Humans as psychosomatic beings associate their emotions with food. Therefore, since ancient times, there was investment of significant amount of time and resources in planning, procuring and processing of food for its consumption. Age-old recipes formulated around incorporation of seasonal produce for the supply of adequate nutrients were the prerequisite at mealtimes. Mealtimes with family members aimed to increase bonding and strengthen relations within and across families. Festivities and religious occasions also have a strong association and are almost synonymous with specific foods. Thus, food for us humans is always viewed as a medium to enhance the physical, social, emotional and spiritual quotients of all individuals in a family and or a community.

II. PERSPECTIVES OF SIMULATED PRODUCT DEVELOPMENT:

Food is also considered as the extension of human creativity for catering to the need for satiety of human hunger and promoting wellness. The cornucopia of various food recipes across geographical borders is the realization of human instinct to effectively utilize the benefits of available ingredients so as to satiate hunger and promote wellness. In other words, it is the human mind and its creativity that is translated into tangible food products and recipes. This capability of the human mind is harnessed effectively in the formulation of novel recipes in industries, especially through the technique of Simulated Product development. Novel products like Convenience foods are usually developed in the industry using the technique of Simulated Product development. This is the advanced technique by which the manufacturer or food producer conceives a product in virtual space. The various attributes of the product are made concrete using 'out of the box' thinking combined with the knowledge and expertise of food and nutritional sciences.

III. LOGISTICS OF SIMULATED PRODUCT DEVELOPMENT:

Simulated Product development is the new innovation in product development because it is a more efficient technique of product development. It easily bridges gaps between the concept of the product and its translation into reality. This technique is more favored in the industrial scenario since it is a profitable venture. The cost associated with translating a virtual product into reality is much lower than developing tangible products with ultimately no market value. The product idea is first evaluated by expert panels [usually Descriptive Flavor Assessment Panel (DFAP)] capable of conceptualizing and grading the product solely on the detailed description of its attributes. DFAP consists of individuals who are experts in Sensory evaluation techniques. They are chosen to assess and constructively suggest constructive alterations to introduce further innovations in the product idea so as to make it a unique and tangible venture. The product idea can also be evaluated using this technique by utilizing panels of naïve consumers after thorough briefing to ascertain the mass acceptability, demand and market share of the conceived product even before it is translated into reality.

IV. ADVANTAGES OF SIMULATED PRODUCT DEVELOPMENT:

Following are the major advantages of simulated product development as a technique for novel product development:

1. **Cost effective:**The technique of simulated product development aids in analyzing the novelty and feasibility of a product idea into reality. The only tool needed is a well-formulated questionnaire. The exercise of analyzing the data from the detailed questionnaire reflects the tangibility of a product idea into reality. Thus, the manufacturer obtains a real-time understanding of the acceptability of the product idea even before it is translated into reality. This procedure thus saves costs as only successful product ventures are translated into reality.
2. **High accuracy:**The data obtained from a simulated product development procedure is a real-time accurate estimate of consumer preferences. Hence, this technique is a precise assessment of the efficacy of a product in real-time.
3. **Optimal Flexibility:**The questionnaire designed for the exercise of evaluating a product idea can be customized to essentially accommodate and evaluate specific product attributes. In addition, either expert DFAP Panelists or naïve consumer panels can carry out the evaluation of the product idea. Thus a single exercise of analyzing data obtained from a questionnaire can provide greater insights for execution of the logistics of product development.
4. **Legally compliant:**The questionnaire for this exercise is always extended in accordance with legal premises of food safety. The top priority in these questionnaires is the assessment of the compliance of the product idea with consumer safety norms by expert panelists. Only a thoroughly safe product idea that complies to all food safety norms will be logistically approved for execution. Also, all details of the manufacturing process are aimed at delivering a safe and wholesome novel food product to the consumer.

Applications of Simulated Product Development:

- Novel product development
- Formulation of diets for wellness management in various anthropometric groups.
- Formulation of diets for the management of various lifestyle diseases.
- Constant evolution of existing marketed food products.
- Testing of newer manufacturing technologies for reinventing food products.
- Consumer feedback and product market share assessment studies.
- Benchmarking of food product acceptance from the perspective of consumer safety.

Methodology of the study:

A carefully structured questionnaire was formulated which enlisted the distinguishing features of Simulated Product development as a technique for evaluating a product idea. This questionnaire was circulated to 30 semi-trained panelists who understand the nuances of product development. The responses of the panelists were then biostatistically analyzed to assess the outcomes of this study.

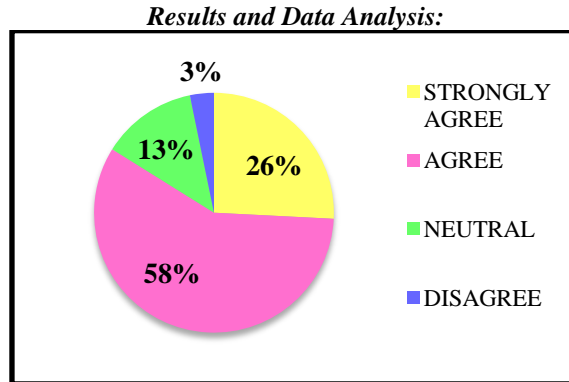


Figure 1: Panelist opinions on whether Simulated Product Development is the precursor to Novel Product Development.

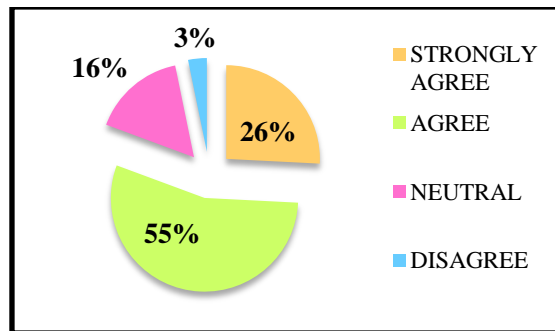


Figure 2: Panelist opinions on whether Simulated Product Development is logically and scientifically viable.

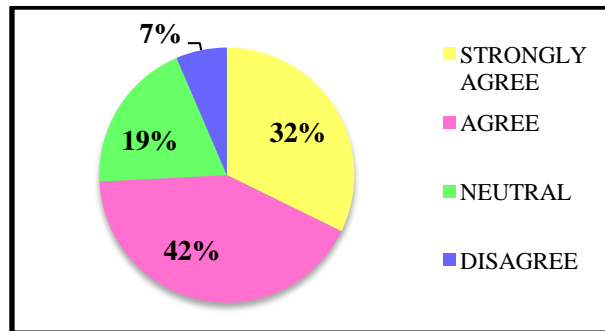


Figure 3: Panelist opinions on whether Simulated Product Development is the accurate benchmark of non-invasive sensory evaluation.

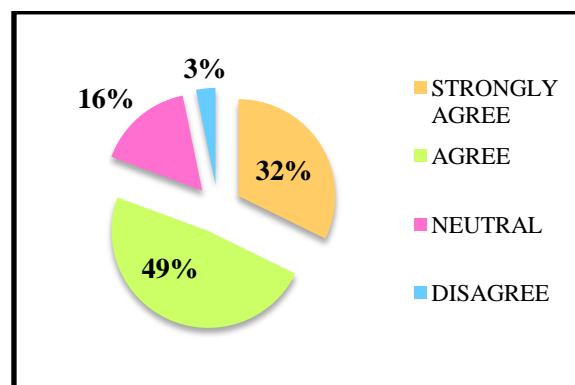


Figure 4: Panelist opinions on whether Simulated Product Development aids in product development and evolution

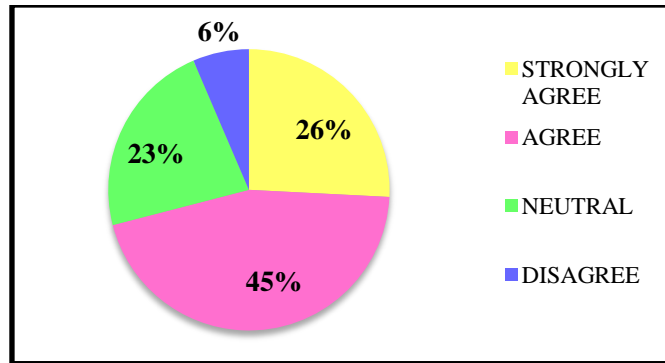


Figure 5: Panelist opinions on whether Simulated Product Development exploits the 5 tangible senses and 1 non-tangible sense.

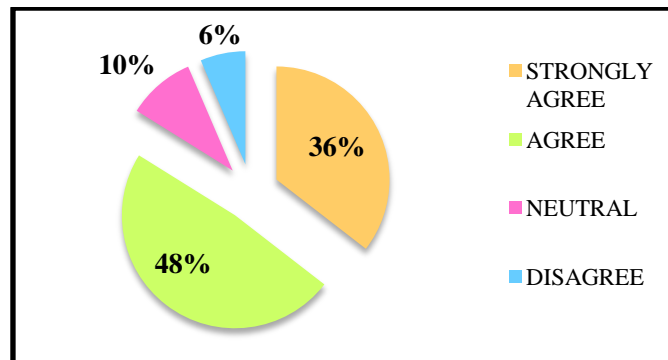


Figure 6: Panelist opinions on whether Simulated Product Development effectively outlines the pulse of consumer trends and preferences.

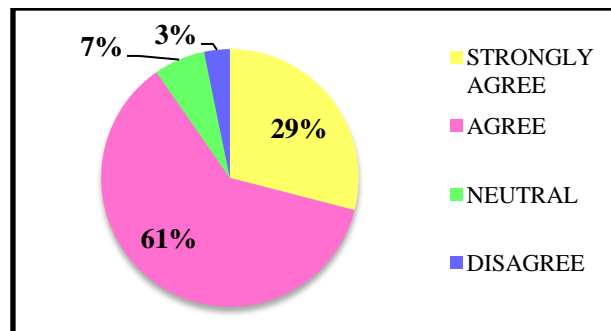


Figure 7: Panelist opinions on whether Simulated Product Development aids in successfully translating a product idea into reality.

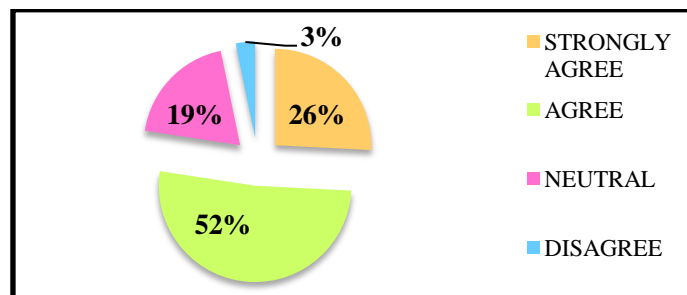


Figure 8: Panelist opinions on whether Simulated Product Development integrates consumer preferences with sensory output.

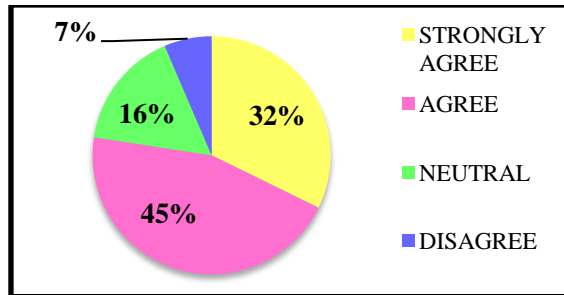


Figure 9: Panelist opinions on whether Simulated Product Development helps manufacturers to proficiently cater to consumer expectations.

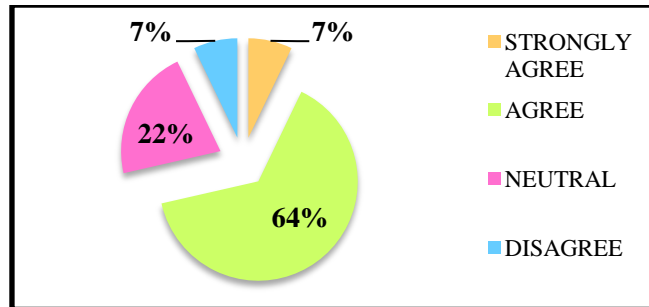


Figure 10: Panelist opinions on whether Simulated Product Development aids in emerging products with a competitive edge over similar products in the market.

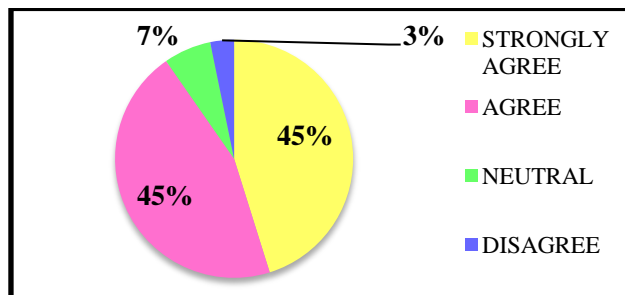


Figure 11: Panelist opinions on whether Simulated Product Development aids in standardizing product manufacturing and quality control protocols.

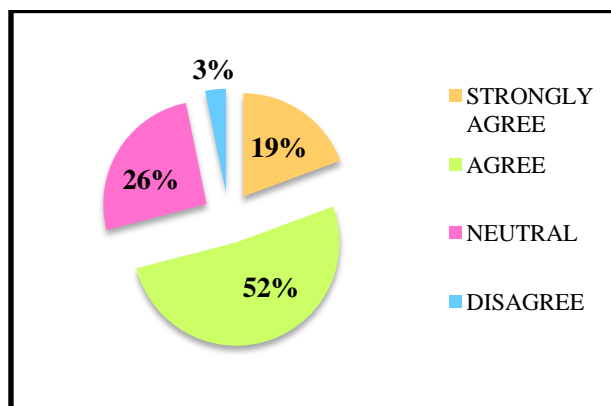


Figure 12: Panelist opinions on whether Simulated Product Development aids in executing consumer safety at every step in the venture of product development.

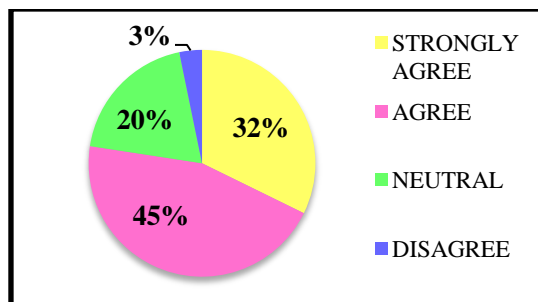


Figure 13: Panelist opinions on whether Simulated Product Development aids in developing products with high Value for money (VFM).

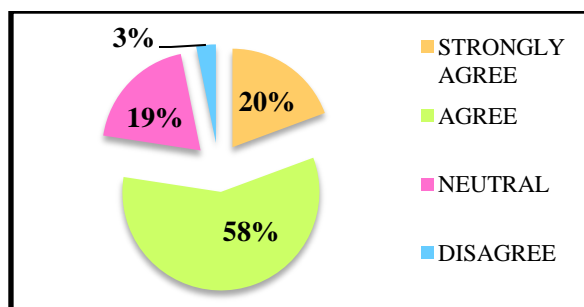


Figure 14: Panelist opinions on whether Simulated Product Development efficiently evaluates the role of psychosocial factors in the ventures of product development.

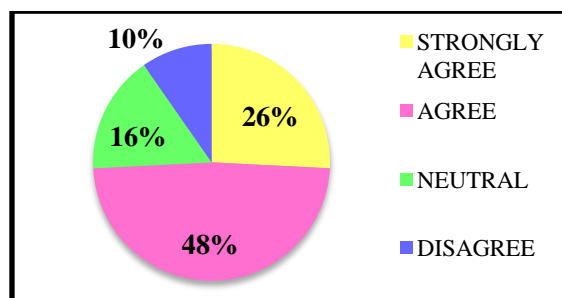


Figure 15: Panelist opinions on whether Simulated Product Development is a cost-effective procedure.

V. RESULTS:

- [1] **84%** panelists agreed that Simulated Product Development is the precursor to Novel Product Development.
- [2] **81%** panelists agreed that Simulated Product Development is logically and scientifically viable.
- [3] **74%** panelists agreed that Simulated Product Development is the accurate benchmark of non-invasive sensory evaluation
- [4] **81%** panelists agreed that Simulated Product Development aids in product development and evolution.
- [5] **71%** panelists agreed that Simulated Product Development exploits the 5 tangible senses and 1 non-tangible sense.
- [6] **84%** panelists agreed that Simulated Product Development effectively outlines the pulse of consumer trends and preferences.
- [7] **90%** panelists agreed that Simulated Product Development aids in successfully translating a product idea into reality.
- [8] **78%** panelists agreed that Simulated Product Development integrates consumer preferences with sensory output.
- [9] **77%** panelists agreed that Simulated Product Development helps manufacturers to proficiently cater to consumer expectations.
- [10] **88%** panelists agreed that Simulated Product Development aids in emerging products with a competitive edge over similar products in the market.
- [11] **90%** panelists agreed that Simulated Product Development aids in standardizing product manufacturing and quality control protocols.

- [12] **71%** panelists agreed that Simulated Product Development aids in executing consumer safety at every step in the venture of product development.
- [13] **77%** panelists agreed that Simulated Product Development aids in developing products with high Value for money (VFM).
- [14] **78%** panelists agreed that Simulated Product Development efficiently evaluates the role of psychosocial factors in the ventures of product development.
- [15] **74%** panelists agreed that Simulated Product Development is a cost effective procedure.

VI. CONCLUSION:

This study highlights the superiority of simulated product development as a scientific expertise to ascertain consumer acceptability of a novel or innovative product idea. Resources to be invested in a Simulated product development exercise are minimal. The simple exercise of circulating a well-structured questionnaire yields substantial information regarding the originality, consumer acceptance and marketability of a novel product idea. This assessment by expert panelists and naïve consumers can be carried out beyond the realms of geographical margins, expertise, attitudes towards food and socio-cultural influences. Hence, technique is highly suitable in the small-scale as well as industrial scenario because it is cost-effective and functions as the scientific foundation of recipe development. Elaboration of novel recipe ideas utilizing this technique aids in attributing unique features to the product in accordance with the pulse of consumer preferences. Thus, the evolved product establishes integration of consumer preferences along with innovation in manufacturing and marketing strategies. This entire exercise is always carried out in utmost compliance to the regulations of consumer protection and food safety guidelines. It is this unique feature of simulated product development, which aids in carving a niche in the market for the novel recipe. This research endeavor also aims to increase awareness about the benefits of the exercise of simulated product development and to change insights on the marketability and mass manufacture of novel food products.

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