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A Study on Applying Stages of Innovation

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ABSTRACT:

The key to organisational success and competitive advantage is innovation. Understanding the phases of innovation may provide important insights into how new ideas are developed and put into practise. The main phases of invention are examined in this abstract, starting with idea creation and investigation, then concept development, and finally feasibility evaluation. The process of turning ideas into practical solutions, known as prototyping and testing, follows. It also discusses continual monitoring and improvement of creative projects, as well as the phases of implementation and commercialization. Organisations may develop a methodical approach to innovation, improve teamwork, and successfully handle the challenges of bringing new ideas to fruition by recognising and navigating these phases. Organisations may foster an innovative culture, promote continuous development, and adjust to the changing demands of their stakeholders and markets by embracing the phases of innovation.

KEYWORDS:

Development, Innovation, Invention, Implementation, Phases.

I. INTRODUCTION

In today's dynamic and competitive business environment, innovation is essential to an organization's success and longevity. It entails the process of turning concepts into worthwhile goods, services, or procedures that satisfy changing consumer demands and provide an edge over rivals. For organisations to successfully traverse the challenging process of bringing new ideas to life, an understanding of the phases of innovation is crucial.The innovation phases provide a well-structured framework outlining the sequential actions needed for invention. There are similar themes and stages that arise across numerous theories and approaches to innovation, despite the fact that different models may differ in their precise classification or vocabulary.Idea creation and investigation are the initial steps in the innovation process. During this phase, new ideas are actively sought for and generated through a variety of techniques, including brainstorming, market research, consumer insights, and technical developments. Organisations foster a flow of ideas from many sources during this period of curiosity, innovation, and open-mindedness[1], [2].

Idea creation is followed by the concept development and feasibility evaluation step. During this stage, chosen concepts are honed, appraised, and evaluated for their viability, potential market effect, and compatibility with organisational objectives and available resources. Market research, feasibility studies, and assessments of the advantages and risks related to each proposal are all part of this stage.Prototyping and testing, the next phase, involves turning chosen ideas into real prototypes or models. In this stage, organisations may experiment and iteratively develop their ideas in order to improve them in light of user testing and feedback. Testing and prototyping make it easier to find possible design faults, usability problems, and performance gaps, all of which can be fixed before continuing[3], [4].

The emphasis switches to the implementation and commercialization stage once the prototypes have been improved and proven. In this phase, the prototypes are turned into services or goods that are ready for the market, distribution systems are set up, and marketing plans are created to spread the invention to the intended audience. In addition, infrastructure setup, personnel training, and easy integration of the innovation into current systems and procedures are all included in implementation.The phases of

invention also include continuous monitoring and improvement. During this phase, the performance and effect of the innovation are regularly assessed, user input is gathered, and any required corrections or improvements are made. Organisations work to maximise the invention and guarantee its long-term success throughout this period of learning, adaptation, and ongoing development.It is essential to remember that the phases of invention are not necessarily linear and may entail parallel processes, iteration, or backtracking. External variables including market dynamics, technical improvements, and consumer input may have an impact on the innovation process. To effectively navigate the phases of invention, flexibility, agility, and adaptability are essential[5], [6].

The phases of innovation provide an organised method to lead businesses through the process of turning ideas into worthwhile results. Each step of the innovation process, including idea creation and exploration, concept development, prototyping and testing, implementation and commercialization, and continuing monitoring and improvement, adds to the entire process. Organisations may encourage a culture of creativity, promote continuous development, grab chances for growth, and achieve success by understanding and successfully managing the phases of innovation. There are some more factors to take into account throughout the invention process in addition to the key phases of innovation that were previously stated. The importance of cross-functional cooperation and collaboration is one crucial element. Diverse viewpoints and knowledge from many organisational divisions are often needed for innovation. Synergy, inventiveness, and a feeling of shared ownership may all be fostered via collaborative efforts in the innovation process[7], [8].

Organisations must also deal with any obstacles or difficulties that can appear at any stage of innovation. These difficulties might be caused by a lack of resources, a reluctance to change, a fear of taking risks, or a lack of support from important stakeholders. Organisations may traverse the phases of innovation more successfully and guarantee a smoother transition from concept to execution by recognising and proactively tackling these issues.Additionally, outside variables like market trends, rivalry, and legislative changes may have a big impact on the innovation process. To match their innovations with consumer expectations and maintain a competitive edge, organisations must keep informed and modify their plans as necessary. And last, it's critical to promote an innovative culture. Companies that promote taking risks, learning from mistakes, and recognising creativity may foster an atmosphere that supports innovation at all levels. Building a culture that encourages and celebrates innovation may be accomplished via the cultivation of an innovative mindset, the provision of resources and training, and the celebration of achievement. organisations may use the phases of innovation as a framework to manage the challenging process of turning ideas into successful inventions. Organisations may improve their capacity to develop and put into practise beneficial solutions that promote development, competitiveness, and long-term success by comprehending and actively controlling each step. Organisations may maximise their capacity for innovation and maintain a competitive edge in a business environment that is always changing by embracing cooperation, tackling issues, keeping an eye out for outside influences, and developing an inventive culture[9], [10].

II. DISCUSSION

The development and use of a novel concept is innovation. A technology innovation (new technical artefacts, gadgets, or products), a process innovation (new services, programmes, or production techniques), or an administrative innovation (new institutional policies, structures, or systems) may be the subject of the new concept. The concept may be a fresh amalgamation of well-known concepts, a creation that questions the status quo, or a brand-new method or strategy. An concept qualifies as an innovation as long as it is seen as original and involves a novel shift for the participants. The originality, scale, complexity, and temporal patterns of development of innovations may vary greatly. Some inventions are the result of lone workers' little, rapid, incremental efforts. They happen by chance, accident, or afterthought and are unplanned. On the other hand, this entry's advances are bigger in size and breadth. They are deliberate, focused efforts to create and implement novel ideas that reflect significant organisational, technical, and market uncertainty; they take a long time to complete; and they require more resources than those involved have. The majority of research on innovation has been on its causes and effects. Few studies have looked at the evolution of innovations from conception through

implementation or termination. Entrepreneurs and managers who seek assistance in creating their inventions must have a solid understanding of the innovation process. In reality, the vast majority of novel and ostensibly helpful technologies are abandoned throughout the innovation creation process and never come to fruition. Some of these concepts are dropped for valid reasons, such as the fact that they weren't successful, workable, or offered a solution at the time they were being developed. However, due to the dynamism and complexity of the innovation process that is, the series of events and difficulties that arise throughout the inception, development, and implementation of an inventive idea many excellent ideas are never put into practise. Understanding the innovation process offers practitioners and academics crucial insights. The steps of idea generation, development, and execution across the innovation process are modelled in this entry.

Fundamentals

Everett Rogers' concept of the invention process is perhaps the most well-known. It includes a compilation of more than 4,000 published studies on innovation as well as four decades of Rogers' personal study. According to this model, innovation occurs in three basic stages: (1) the creation or invention of a novel idea, which results from an understanding of market or user needs and advancements in fundamental science or technology; (2) its development, or the series of actions that turn the new idea from an abstract concept into an operational reality; and (3) implementation, or the adoption and diffusion of the innovation by users. The Minnesota Innovation Research Programme (MIRP) carried out a significant longitudinal research that followed how these phases developed in a broad range of innovative technologies, goods, services, and programmes. In this study, Andrew Van de Ven and his coworkers identified 12 common traits that occurred in the initiation stage (dealing with innovation gestation, shock, and plans), the development stage (proliferation, setbacks, shifting assessments, fluid participation of organisational personnel, relationships with investors/top managers and others, infrastructure development), and the implementation stage (adoption by integrating the new into the old, and Processes at each stage of invention are further described in the section that follows.

Idea Creation or Invention Stage

According to research on the innovation process, the early stage is marked by planning, shocks, and gestating ideas. Typically, innovations are not started by a single spectacular event, an individual entrepreneur, or on the spur of the moment. Before innovations are started, there is a long gestation period during which apparently random occurrences take place, often spanning many years. Many occasions may not have been planned to spark an idea. Some cause the need for change to become apparent, while others bring to light the technological possibilities. Some of these occurrences "shock" business owners into putting plans and resources into place for creating an invention.Amabile summarises a number of studies showing that people are more likely to be innovative (create and execute new ideas) and creative (generate fresh ideas) in organisations that support and encourage innovation. The structure, culture, and practises of an organization's design affect the possibility that creative ideas will emerge and that, if they do, they will be nourished and developed until they are realised. Empirically, a number of organisational structure characteristics are linked to creative activity. The potential number of sources from which new ideas might emerge increases in direct proportion to how complex and varied the organisation is, as well as how simple it is to transcend barriers.

Organisations do, however, have a tendency to divide activities into smaller subsets and create bureaucratic processes as their size and complexity expand. Unless certain processes are put in place to encourage and facilitate inventive behaviour, they often restrict innovation.Providing a mix of inner and extrinsic incentives for creative behaviours is one of the main driving aspects. Incentive pay, or financial awards based on performance and in addition to base pay, seems to be a generally ineffective motivator for innovation; it often acts as a stand-in for appreciation. Group awards tend to encourage innovation implementation and incremental innovations, while individual prizes tend to boost idea development and radical ideas.

The following elements have also been discovered to permit and restrict creative behaviour in organisations, in addition to these motivational factors:

(1) Resources for innovation (e.g., financial, technical, human resources)
(2) Frequent communications across departmental lines, among people with dissimilar viewpoints
(3) Moderate environment uncertainty and mechanisms for focusing attention on changing conditions
(4) Cohesive work groups with open conflict resolution mechanisms that integrate creative personalities into the mainstream
(5) Structures that provide access to innovation role models and mentors
(6) Moderately low personnel turnover
(7) Psychological contracts that legitimate and solicit spontaneous innovative behaviour.

Innovation Development Stage

The initiation stage often ends with the formation and funding of an innovation (or entrepreneurial) team to develop the idea in accordance with a strategy and budget agreed by resource controllers (top).venture capitalists or management). Proliferating innovation is a characteristic of this developmental process.occurrences, setbacks, changes in evaluation standards, shifting organisational staff engagement, divergent investor/top management involvements, shifting interpersonal dynamics, and involvements in building an industrial infrastructure to commercialise or deploy the invention. In-depth real-time research on innovation creation by the MIRP revealed that as soon as work on the venture starts, the process quickly evolves from a straightforward unitary sequence of tasks into divergent, parallel, and convergent progressions. While many of these tasks lack any observable functional interconnectedness, some of them are linked via the division of labour among functions. When the innovation concept or conditions change, ideas and routes that were formerly seen as pertinent and coherent are now seen as separate and disjunctive. As these growth routes are followed, issues, errors, and failures constantly arise, giving opportunity for either learning or quitting the developmental endeavours.

Managing these fundamental elements of the innovation creation process emphasises the value of leadership and learning. Learning is essential for following courses of action that seem to succeed and for avoiding or stopping those that don't work or seem to lead to failure. Before learning via a process of trial-and-error testing whether courses of action accomplish desired objectives in various settings, an innovation team must first understand what innovation goals, courses of action, and contexts are achievable during the early phase of development.In addition, four separate leadership roles a sponsor, mentor, critic, and institutional leader direct the innovation development process. These four leadership positions often act as a check and balance on one another when managing innovative entrepreneurs.

A sponsor is often a senior management who has the authority and resources to advance an innovation concept and who buys and promotes the invention. A mentor is often a seasoned and accomplished inventor who takes on the role of mentoring and counselling an entrepreneur. A critic, on the other side, acts as the "devil's advocate" by criticising innovation investments, objectives, and advancement. An executive who is less engaged in the innovation is sometimes referred to as an institutional leader. This executive mediates conflicts between the pro-innovation leaders (such as the sponsor, mentor, and entrepreneur) and the critic.

Innovation Implementation (Adoption) Stage

When initiatives are taken to adopt and put an invention into practise, the implementation stage starts. Implementation methods include putting the invention into the market, moving it to functioning locations, or disseminating it to prospective adopters once it has been produced and generated inside the organisation. If the innovation was created somewhere else, the host organization's efforts to promote and embrace the innovation are the focus of the implementation phase. Through diffusion, an invention is disseminated over time among consumers in an adopting market or community through communication channels (such as the media, experts, and peers).

According to Rogers, it is incorrect to believe that an innovation's development is finished at the implementation phase since a lot of reinvention takes place throughout this phase. Adopters often

reinvent innovations to suit their own local implementation context. It makes it easier for innovators to transfer ownership of their work to implementers. This is true regardless of whether the invention was created inside the company that employs it or was brought in from outside. In any case, implementation entails adapting an invention to the unique local demands and limits of the organisation.Researchers discovered that combining and integrating the "new" with the "old" throughout the formative phase of innovations in "homegrown" organisations is more common than substituting, altering, or replacing the old with the new. An key consequence of this study is that adding innovations to established organisational programmes is seldom possible due to restricted organisational resources. It's also often impossible to replace the old with the new due to political constraints.Implementation goes more easily when the "new" overlaps and gets incorporated into current organisational arrangements because people are hesitant to change established organisational programmes because of the history of investments and commitments they have made to them.

Evolution

The invention, development, and implementation phases of the innovation process were first thought to follow a linear order that may be managed by managers or entrepreneurs.Recent research has shown that the innovation process is far more complicated than the widely held belief that a core original idea is created, developed, and implemented by a stable group of full-time employees working in a stable environment. In general, the process is linear since it proceeds from the conception of an idea through to its development and execution. But a deeper look at what happens throughout each of these steps shows more intricate nonlinear processes. For instance, the central inventive concept often multiplies into other ideas throughout the innovation development stage. Along with innovation, there is also reinvention, in which some ideas are shelved and others are given new life. There are many people participating in innovation, but the majority of them only contribute in part because of their incredibly hectic schedules from taking on several responsibilities unrelated to innovation. The network of participants in transactions is always being updated. An innovation's different participants provide a multi-enacted setting. We see several tracks, spin-offs, and the like instead of a straightforward, unifying, and progressing course; some of these tracks and spin-offs are connected and coordinated, while others are not.

We see many, in-process evaluations as opposed to a single, post-event evaluation of the result. As the new and the old are combined, the distinct character of innovation may become muddled.These data imply that the majority of innovation processes do not develop in a sequential manner and follow a set path. The procedure is often quite unexpected and out of our control. But it's also not a chance procedure. The innovation journey, according to Van de Ven and colleagues, is a nonlinear dynamic cycle of divergent and convergent actions that take place across time. The phases of new product development, such as idea screening, concept development, product design, testing and validation, and product launch, are often managed by organisations using stage gate procedures. While stage gate methods provide a helpful discipline for examining and investing in the various periods that are often needed to generate breakthroughs, they do not always make the process more predictable. In fact, research on the nonlinear innovation process suggests that managers cannot manage innovation; nevertheless, they may learn to navigate the trip by putting their new skills to use and developing routines for handling obstacles and setbacks as they appear.

The external environment of innovation is also being studied in more recent studies on innovation management. Researchers may analyse the causes of technical heterogeneity across enterprises and the rates of innovation emergence through time using the population (of organisations) in an industry.A societal or industrial infrastructure for innovation is shown to be heavily reliant on the creation and spread of inventions. The fundamental resource endowments of scientific knowledge, financial resources, and qualified human capital are included in this infrastructure, along with supporting institutional rules, standards, and norms, market demand, and informed prospective users of the invention.Diverse views from specialised areas of study have been used to analyse the phases of invention.

Researchers in psychology study creativity in both individuals and groups, motivation for innovation from both internal and external sources, and cooperative work environments. Sociologists investigate the social networks that facilitate information exchange, as well as their effects on the impetus for innovation and the pressure to comply to societal norms. To follow trends and fashion in its population and to look legitimate, for instance, an organisation may incorporate innovations or copy other organisations. In contrast to "demand pull," economists use "technology push" to describe how innovation begins. Additionally, they contend that rational actors must execute successful innovation or risk becoming ineffective and being eliminated from the population.

Importance

Numerous research have investigated enabling and limiting variables based on the three phases of innovation. Organisational age, size, tenure, and interorganizational networks have both enabling and restricting influences on innovation, according to studies. Organisations produce more innovations as they become older (or file more patents), but these improvements in competences and efficiency come at the expense of a declining alignment across organisational capabilities.environmental requirements when organisations become older.The scale of the research initiatives insideBecause the benefits large firms realise from economies of scale and scope (such as diverse portfolios of research projects that capture internal and external knowledge spillovers) outweigh the efficiency losses attributable to market power of large firms, larger firms are significantly more productive than rival programmes located within smaller firms. Regarding incumbent businesses, inertia in the decision-making processes brought on by significant consumers prevents them from implementing innovative technology. However, established firms typically overcome their disadvantage of introducing inferior or competence-enhancing product designs in comparison to rival or competence-destroying designs of new entrants thanks to their advantages over them in terms of investment resources, technical capabilities, and complementary assets.

By granting access to important data and knowledge for the commencement or development of innovations as well as by disseminating the finished invention across the networks, the location and connections of an innovation within wider social networks may both assist and hinder innovation. In a related line, cluster theory-based study discovered that innovation diffusion is spatially constrained inside a firm's cluster. Studies have demonstrated that in order to develop and commercialise a technology, complementing advances in technical and institutional frameworks are often necessary. Studies of advances in fields as varied as agriculture, cement, minicomputers, glass, biotechnology, and medicinal devices have shown this. The establishment of an industrial infrastructure for innovation has also been shown to depend significantly on the roles played by public and private sector players.

Directions for Future Research

Since Schumpeter's groundbreaking work brought management practitioners and academics' attention to the value of innovation, there have been several studies on innovation.However, there is still a tonne of potential for theoretical and methodological study on the invention process. Studies that take these connections into account are uncommon, despite the fact that multilevel or cross-level interactions happen throughout the innovation process. Cross-cultural analyses are also necessary in innovation research given the rise in global innovation partnerships. Future research should also be devoid of the widespread favourable bias that affects the study of innovation. Because the new concept must be beneficial profitable, helpful, or fix a problem it is often seen as a positive thing.

New concepts that are not deemed valuable are sometimes labelled as "mistakes." But after the invention process is through and a new concept has been put into practise, its usefulness may be assessed.It is challenging to empirically study innovation from the point of inception through implementation, particularly with large-sample data, due to the complexity of the innovation process and the wide range of each invention (i.e., length, size, scope, etc.). Only a small number of research have so far covered all phases; the majority of studies have concentrated on one step or the other. Nevertheless, case studies and simulation models are used to conduct some worthwhile research. Additionally, research on patents and patent citations has shown that information and resources

important to the creation of many breakthroughs go outside the confines of certain companies, sectors, and countries.

III. CONCLUSION

The phases of innovation provide organisations a road map for navigating the process of turning ideas into useful results. Each step of the innovation process, including idea creation and exploration, concept development, prototyping and testing, implementation and commercialization, and continuing monitoring and improvement, adds to the entire process.Organisations may take a methodical approach to innovation by recognising and comprehending each step and using the skills of their staff, resources, and market knowledge. The phases of innovation assist businesses in organising and controlling the complexity of the innovation process, resulting in more completely developed, tested, and successful ideas that are implemented.The phases of invention also highlight the value of cooperation across teams and across other organisational roles. Collaboration allows for the blending of many viewpoints, areas of expertise, and ideas, resulting in outputs that are more substantial and creative.

Organisations must also be ready to solve problems and get through obstacles that might appear at any point during the innovation process. Resource limitations, opposition to change, or market uncertainty may be some of these difficulties. The capacity of organisations to successfully traverse the phases of innovation may be improved by proactively recognising and resolving these issues.Additionally, the external environment, which includes market trends, rivalry, and legislative changes, may have a big impact on the innovation process. To connect their innovations with market needs and preserve a competitive advantage, organisations must remain nimble, regularly monitor the external environment, and alter their plans in line with those changes.And last, it's crucial to create a culture that values and promotes innovation. People feel emboldened to contribute their original ideas and try out novel strategies in organisations that promote a culture of innovation, risk-taking, and learning from mistakes. The value of innovation inside the organisation is further emphasised by celebrating and recognising successful inventions.Organisations may encourage a culture of creativity, promote continuous development, and adapt to the ever-changing demands and expectations of consumers and markets by embracing the phases of innovation. In a highly competitive and dynamic corporate environment, innovation becomes a key capability that enables organisations to remain ahead of the competition and eventually achieve sustainable development and success.

REFERENCES

[1] R. Price, J. Matthews, and C. Wrigley, “Three Narrative Techniques for Engagement and Action in Design-Led Innovation,” *She Ji*, 2018, doi: 10.1016/j.sheji.2018.04.001.

[2] D. Szutowski, “Abnormal market valuation and new product announcements: the role of advancement stage and innovativeness,” *Innov. Organ. Manag.*, 2018, doi: 10.1080/14479338.2018.1428104.

[3] A. Andriani and E. Qurniati, “Sistem Informasi Penjualan Pada Toko Online Dengan Metode Rapid Application Development (RAD),” *J. Speed – Sentra Penelit. Eng. dan Edukasi*, 2018.

[4] D. Barbieux and A. D. Padula, “Paths and challenges of new technologies: The case of nanotechnology-based cosmetics development in brazil,” *Adm. Sci.*, 2018, doi: 10.3390/admsci8020016.

[5] H. Hampel *et al.*, “Revolution of Alzheimer Precision Neurology. Passageway of Systems Biology and Neurophysiology,” *Journal of Alzheimer’s Disease*. 2018. doi: 10.3233/JAD-179932.

[6] M. V. G. da Silva, C. F. Rocha, V. Pagnoncelli, and L. A. A. de Lima, “Ecosystem of Innovation in Industry 4.0,” *Int. J. Innov. Educ. Res.*, 2018, doi: 10.31686/ijier.vol6.iss12.1248.

[7] M. V. G. da Silva, C. F. Rocha, V. Pagnoncelli, and L. A. A. de Lima, “Ecosystem of Innovation in Industry 4.0: the case of collaborations in Startups in Brazil,” *Int. J. Innov. Educ. Res.*, 2018.

[8] R. Kumar, A. K. Sharma, And K. Agnihotri, "Stability and bifurcation analysis of a delayed innovation diffusion model," *Acta Math. Sci.*, 2018, doi: 10.1016/S0252-9602(18)30776-8.

[9] E. Hurley, J. Trischler, and T. Dietrich, "Exploring the application of co-design to transformative service research," *J. Serv. Mark.*, 2018, doi: 10.1108/JSM-09-2017-0321.

[10] B. Pohrishchuk and H. Khvichiia-Duve, "Research and innovation field as an area for creating an innovation infrastructure for the development of today's society," *Her. Ternopil Natl. Econ. Univ.*, 2018, doi: 10.35774/visnyk2018.03.035.