

## “A LITERATURE STUDY ON ACADEMIC RESEARCH INTO COMMERCIALIZATION”

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### ABSTRACT

It has rightly said that for any product which has been innovated should be marketable. The Marketable process will bring novelty in product and services. Many products have been founded in laboratory. Marketable process is quite bigger act which consider, Producing, transacting, promoting, and sales, customer support and other key roles. The products which is good and innovated but somehow, they just remain in the thesis and remain unfold due to lacking of skills which will not able to convert that laboratory product into Marketable or may be thinking that he/she will miserably fail. In this research paper researcher has tried to know that what could be the reason that the products which are good for society but not reaching to the public or into the market? Researcher will use applied statistics as per the findings. Researcher will use the exploratory method for research.

**Key words:** Marketable product, Conversion of laboratory Research into Commercialization, Commercialization, Novelty.

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### Introduction

A review of related literature helps the researcher gain a thorough knowledge about the area of the study and enables him to get a clear picture of the various aspects of the study. Various studies carried out elsewhere by other researchers on the related aspects could also be reviewed and the researcher could understand the various dimensions of the particular study undertaken. It would also help in filling the gap in a particular research area and would also help the researcher to explore the possibilities of further research on the related aspects of the subject of study. The literature on Laboratory research and commercialization is relatively a new research area where the available literature is moderate. This chapter reviews the various empirical and conceptual studies available on Laboratory research and Commercialization. Researcher has observed the 50 literature reviews.

The concept of commercialization refers to the process of introducing a product, service, or innovation into the market with the goal of generating profit and achieving financial success. It involves taking an idea, technology, or intellectual property and transforming it into a viable and marketable offering.

Commercialization encompasses a series of activities aimed at maximizing the commercial value of a product or innovation. These activities may include market research, product

development, manufacturing, branding, marketing, distribution, sales, and customer support. The ultimate objective is to create a sustainable business model that can generate revenue and deliver value to customers.

The commercialization process typically involves several key steps:

1. **Idea Generation:** Identifying new ideas, concepts, or technologies with potential commercial value.
2. **Market Research:** Assessing market demand, identifying target customers, and understanding competitors and market dynamics.
3. **Product Development:** Transforming the initial idea into a tangible product or service through design, prototyping, and testing.
4. **Intellectual Property Protection:** Securing patents, trademarks, copyrights, or other forms of legal protection to safeguard the innovation from imitation or infringement.
5. **Business Planning:** Developing a comprehensive strategy that outlines the commercialization approach, pricing, distribution channels, marketing tactics, and financial projections.
6. **Manufacturing and Operations:** Establishing efficient production processes, sourcing raw materials, and ensuring quality control to meet market demand.
7. **Marketing and Sales:** Creating a compelling brand, advertising, promoting the product or service, and establishing distribution networks to reach customers effectively.
8. **Launch and Distribution:** Introducing the product to the market, managing inventory, and ensuring a smooth supply chain to fulfill customer orders.
9. **Customer Support:** Providing after-sales support, addressing customer inquiries, and maintaining customer satisfaction to build loyalty and generate repeat business.
10. **Scaling and Growth:** Monitoring market feedback, adapting the product or service based on customer needs, and expanding the business to new markets or customer segments.

Successful commercialization requires a combination of market understanding, innovation, strategic planning, effective execution, and adaptability. It involves navigating challenges such as competition, changing market trends, regulatory requirements, and customer preferences. A well-executed commercialization strategy can result in revenue generation, profitability, market leadership, and long-term business sustainability.

#### **Concept of Commercialization.**

- Christen (2001) defines commercialization as having three essential elements: profitability, competition and regulation. (Woller, G. (2002). The promise and peril of microfinance commercialization. *Small Enterprise Development*, 13(4), 12-21.)
- Isabelle (2004) provides an integrative definition of commercialization as the “process of translating research knowledge into new or improved products, processes and services, and introducing them into the market place to generate economic benefits.” (McCoy, A. P., Thabet, W., & Badinelli, R. (2008). Towards establishing a domain specific commercialization model for innovation in residential construction. *Construction Innovation*, 8(2), 137-155.)

#### **Review of Literature**

##### **Narrative Review**

A narrative review of literature is a type of research article that summarizes and synthesizes existing studies, theories, and concepts on a particular topic. Unlike systematic reviews or meta-analyses, which follow a structured and rigorous methodology, narrative reviews provide a more subjective and interpretive analysis of the literature. In a narrative review, the author typically conducts a comprehensive search of relevant sources, such as research papers, books, and other scholarly publications, to gather information on the topic of interest. They then analyze and interpret the findings, identify common themes, and provide an overview of the existing knowledge in the field. The structure of a narrative review can vary depending on the author's preference and the requirements of the publication. However, it usually includes an introduction that outlines the purpose and scope of the review, a method section describing the literature search process, a synthesis of the main findings, and a conclusion that summarizes the key points and highlights any gaps or limitations in the literature. One advantage of narrative reviews is that they allow the author to provide a broader perspective on a topic by incorporating various types of evidence, including empirical studies, theoretical frameworks, and expert opinions. They can also help identify areas of consensus or controversy within the literature and suggest directions for future research.

The reviews have been divided in major four broad areas viz,

1. Challenges and Opportunities of Commercialization
2. Models for Commercialization
3. Academic Entrepreneurship
4. Supply Chain Management

### **1.2.1 Challenges and Opportunities of Commercialization.**

**Amaia Zurutuza and Claudio Marinelli (2014)** in their paper's objective was to identify and discuss the key factors that could affect the speed of commercial deployment of graphene, by using pilot method researcher have found that progress towards the commercialization of graphene has been considerable, especially in the past 5 years. The outstanding growth in the number of organizations developing graphene applications and in the number of patents filed, may suggest an opportunity for a further acceleration of graphene commercialization.

**Hugh Willmott and Prem Sikka (1997)** in their article titled on the commercialization of accountancy thesis: A review Essay discuss to study how accounting firms have been able to undertake and present the audit in the ways that enabled them and to attract consultancy and associated forms of business. They reviewed and found that researcher has to study in detail the many ways of accountancy is central to the flexible accumulation regime and expansion of its commercial segment and the demise of its bureaucratic segment have been shaped by opportunities and incentives.

**Mariateresa Torchia and Andrea Calabro (2019)** in their paper titled Open Innovation in Small medium enterprise: A systematic literature review where the aim was to assess the current state of research on open innovation in Small Medium Enterprise and to understand why and how Small Medium Enterprise do open innovation. The findings of research review paper was open innovation in family SME compared to non-family SME, e.g. in terms of the objectives, process, the practices used and the performance they have also mentioned that more

research is also concerning the question why SME apply open innovation, most of the SME focused technology related innovations and products, attention should be given to organizational and marketing innovations.

**P.Sreeramana Aithal and Shubhrajyotsna Aithal** discussed in their research title Nanotechnology Innovations and Commercialization- Opportunities, Challenges and Reasons for delay, the purpose of this paper was to analyze advantages, benefits, constraints and disadvantages of progress in nanotechnology for the society also discuss the opportunities for nano technology commercialization and to find common commercialization challenges faced by nanotechnology. The findings that authors have given that find amicable solutions at micro level and expanding it to macro level. Nanotechnology commercialization is lagging behind due to many reasons and hence failed to follow the expected generations in its growth stages. Nanotechnology is developing to solve almost all problems of human life by 2050.

**Sharon A. Simmons and Jeffrey S. Hornsby (2014)** in their paper titled Academic Entrepreneurship: A stage Based Model having the objective of Conceptualized the governance and competitiveness of the commercialized and to conceptual and empirical support for the model are derived from a theory driven synthesis of articles related to academic entrepreneurship and findings of is to focus on building better connectedness between industry, faculty and university, industry body should help to Ph.D. Students, faculty and students should take time to intern with industry partners to gain better understanding of the importance and opportunities available with sponsored research. Advisory boards for academic programs could help bridge the gap between faculty, university and industry partners.

**Philip Shapira and Jue wang (2009)** in their paper titled from lab to Market? Strategies and issues in the commercialization of nanotechnology in china. The objectives of the study were to examine China's capabilities to move closer to frontier of technology-led economic development and to explore the evolving Chinese innovation system and to assess the effectiveness of policy strategies to modernize and add-value to research and industry in China. The researchers have used the pilot study and they found that bridging foreign enterprise and domestic enterprises appears to be another practical way to improve R&D capabilities of this nanotechnology, while the importance of university-industry cooperation has been recognized and emphasized, little attention has been devoted to the collaboration between domestic enterprise and foreign enterprise.

**Imran Sajjad, Lyndsay S. Baines, Prem Patel, Moro O. Salify, Rahul M. Jindal (2008)** in their paper titled Commercialization of Kidney Transplants: A systematic Review of outcomes in recipients and donors. The objective behind this study was to identify unique surgical, medical, infectious and immunosuppressive protocols for the recipients and donors and to improve emotional and psychological support to both the recipient and the donor. The findings of this paper are that medical, socioeconomic and emotional outcomes for both recipients and donors are poor. Despite motivations for donation being financial, the negative behavior and apparent lack of gratitude of the recipients toward the donor could be major contributing factor.

**Ulrich Lichtenthaler (2005)** in his paper title of External Commercialization of knowledge: Review and Research Agenda. The aim of the paper is to establish a detailed overview of the literature on external knowledge exploitation and to identify external commercialization opportunities and the findings of this paper are that there are severe limitations in the literature on external knowledge exploitation. This lack of research contrasts with the detailed findings

in other fields. There are great opportunities for future research at both theoretical and empirical level.

**Harin S. Ullal , Kenneth Zweibel and Bolko G. von Roedern (2000)** in their research titled Polycrystalline thin film photovoltaic technologies: from the laboratory to commercialization, the purpose behind this research was to report on the many technical advances made in materials research and early commercialization efforts. The researchers have used the manufacturing and technical process which gives the findings like; significant technical progress has been made in the past few years in the area of polycrystalline thin film photovoltaic technologies. Several multi megawatt manufacturing plants varying in capacity from 2 to 25 MW are currently being installed, could potentially result in low- cost thin film products.

**Antonia Madrid Guijarro, Domingo Garcia, Howard Van Auken (2009)** in their research titled barriers to innovation among Spanish manufacturing SMEs, the objective of the paper was to examine the relation between Product, Process and Management innovation and other objective was where 15 Obstacles to innovation which limit a firm's ability to remain competitive and profitable. The authors have used the questionnaire method with which they found that innovation affects firm's ability to compete successfully in an increasingly global market. They also found that Government policies that encourage and support innovation among all firms, especially small firms, can help countries remain competitive in a global market. Due to the same source was used to gather data for both dependent and independent variables, which was a limitation of the study.

**V.Kumar and P.K.Jain (2003)** in their research paper titled Commercialization of new technologies in India: An empirical study of perceptions of technology institutions, the aims of this study were to study the status of new technology commercialization practices in the country and to focus is on the parameters that influence the decision regarding commercialization of new technologies. The research instrument was used questionnaire which found and provides a well-researched and in depth studied material for researcher's and scholars working in the area of commercialization of new technologies in particular and technology management in general. The study also has brought to the four the important parameters that influences the decision of commercialization of new technologies, their success as well as the significant features of the development phase of commercialization of new technology in India.

**V.Kumar and P.K.Jain (2002)** in their research paper titled, Commercializing new technologies in India: A perspective on policy initiatives, the goal of this study was to provide wider perspective that encourage an entrepreneurial spirit that nurtures new technologies in an enabling environment through appropriate policy initiatives. The authors have used the survey method and they found that a broader perspective of new technology development and commercialization needs to be assumed by every stakeholder's agency. The research that authors have conducted in India and the results presented here reaffirm that the supportive facilitation that is required for technology development and commercialization is virtually the same across all countries, although the means and their impact may vary.

**Markus A. Kirchberger and Larissa Pohl (2016)** in their paper titled, Technology Commercialization: A literature review of success factors and antecedents across different contexts. The purpose of the study was to establish a foundation for the following empirical

and theoretical contributions and to focus on the different interactions channels through which technology commercialization occurs. The findings of the literature reviews were to help researchers to achieve an overview of previously published studies focusing on technology developers and recipients as well as their interactions in order to commercialize newly developed technologies. There is much research in the early stage of technology commercialization, but not that much in the later stages.

**E. Juanola-feliu, J. Colomer-Farrarons, P. Miribel-Catala, J. Smitier, and J. Valla-Pasola (2012)** in their research titled, Market Challenges facing academic research in commercializing nano-enabled implantable devices for in-vivo biomedical analysis. The objectives of this research paper were to examine the high-tech activities involved in the development of this nano-enabled device and to describe the technology and innovation management process within the value chain conducted in a university-hospital-industry-administration-citizens framework. They have used Case study Approach and finds that despite the somewhat limited availability of information discussing the safety of medical nanomaterials, the study presented in this paper. The process described offers an efficient method for performing experiments at large test and clinical facilities, within an innovative framework that takes advantage of new scientific tools and discoveries. The design of generic in-vivo implantable biomedical device capable of detecting threshold values for targeted concentrations has been presented.

**Fang Zhao (2014)** in his research titled Commercialization of Research: A case study of Australian Universities, the aims of this study were, what are the recent major policy changes affecting the commercialization of University research in Australia? How much have Australian universities done in research commercialization over past few years? What are the key barriers to the achievement of higher levels of commercialization university research? The findings of the case study were that it requires adequate financial support from governments, industries and other stakeholders. It also required effective innovation management with academic entrepreneurship.

**Shahadat Hossain (2013)** in his research titled Is Commercialization of Microfinance Responsible for over-Indebtedness? The case of Andhra Pradesh Crisis. The objective of the study was to analyze whether commercialization of Micro finance institutions is responsible for over-indebting their poor borrowers taking into account the recent Andhra Pradesh Incidence. The findings of the case study were the diagnosis of AP incidence indicates that commercialization is not solely and directly responsible for over-indebting their clients. It is the outcome of internal inefficiencies, unethical operations and malpractices of MFIs. It is indirectly responsible for over-indebtedness when profit-seeking MFIs start unethical practices to maximize their profit.

**Afewerk Hagos, Endrias Geta (2016)** in their review titled, Review on Small holders' agriculture commercialization in Ethiopia: What are the driving factors focused on? The objectives of this review are to explore the conceptual developments in Small holder commercialization, measurement in the degree of commercialization, and the major determinants of small holder commercialization and other objective is to investigate policy recommendations made by different authors aimed at facilitating the smooth process of smallholder agriculture from subsistence to the market-oriented system. The review provides an overview of recent evidence on what factors affect small holder farmers Commercialization in Ethiopia and what factors contribute to the improvement of rural livelihoods, thus the

recommendations given here are meant to stimulate consideration and exploration of innovative policy options and solutions to improve rural livelihoods through promotion and strengthening of smallholder farmers.

**Rakesh Tuli and C.R.Bhatia (2005)** It is general article on Accelerating the commercialization of home-grown genetically engineered crops, the objectives behind this article were to accelerating the conversion of such leads in to field crops, to evolve efficient managerial approaches for developing and advancing genetically engineered cultivars into Indian Agriculture and to identify the most promising transgenics and genes available in the country. The suggested approach would facilitate and expedite conversion of laboratory accomplishments into crop cultivars/hybrids for the Indian farmers in short term and perhaps open new overseas markets for the seed industry in future.

**Magesh Nandagopal (2013)** in his general article titled, Commercializing technologies from universities and research institutes in India: Some insights from the US experience, the purpose behind was to improve the technology transfer process in the Indian context. In this author has used the comparative analysis and the findings he draws out where research institutions have been allowed to hold equity in startups in lieu of technology only recently as well. All said, there are definite trends and pointers that Technology transfer offices in India.

**P.Balachandra, Hippu Saik Kristle Nathan and B. Sudhakara Reddy (2010)** in their research paper titled, Commercialization of Sustainable energy technologies, the objectives behind this paper were to identify the issues, barriers and stakeholders in the process of SET commercialization and to integrate the processes of market transformation and entrepreneurship development with innovative regulatory, marketing, financing, incentive and delivery mechanisms leading to SET commercialization. After reviewing the findings was at present, the SETs in India are at a very low level of commercialization. Barring a few SETs like solar water heaters, wind energy, small hydro and solar PV, most of the SETs in India have fallen inside the valley of death, where the cost of production is high and scale of production is low.

**Cong Cao, Richard P. Appelbaum and Rachel Parker (2013)** in their research paper titled, Research is high and the market is far away? Commercialization of nanotechnology in China. The objective behind this study was to examines the commercialization of nanotechnology in China from the inter twined perspectives of academia-industry relations, government support and policy, role of venture capital, and international connections, while also taking into account the views of Chinese nano scientists. The results show that despite tangible success in publishing, patenting and the creation of dedicated nanotechnology science parks, China's effort to commercialize nanotechnology has been much slower than anticipated by nano scientists and political leadership.

**Timothy Caulfield, Shawn He Harmon, Yann Joly (2012)** in their research title open science versus commercialization: A modern research conflict? The objectives of this case study were to collaborate, share data and disseminate new knowledge quickly and to foster scientific progress, meet humanitarian goals, and to maximize the impact of their research. The study gives the finding that we need to collectively and collaboratively forge a middle path that uses the best elements of both policy trends, how best to integrate the various policy approaches to innovation into a single coherent and measurable framework that would encompass both open

scientific collaboration and commercialization into the more global and flexible approach.

**Billie-Jo Hardy, Beatrice Seguin, Peter A. Singer, Abdallah S. Daar, Federico Goodsaid and Gerado Jimenez-Sanchez (2008)** in their review paper titled, the next steps for genomic medicine: Challenges and Opportunities for the developing world, the idea behind was to embark on the path to medical and health applications of genomics, and to benefit economically and resulted in Current and future initiatives and investments in R&D capacity will further enable countries in the developing world to participate as equal R&D partners with more developed countries, instead of merely facilitating access to local biological resources.

**Anna S. Nilsson, Henrik Friden and Sylvia Schwaag Serger (2006)** in their research titled Commercialization of Life-Science Research at Universities in the United States, Japan and China, The objective behind this study was to identify current challenges experienced by actors involved in commercialization of university research, along with efforts which have been implemented to overcome those challenges. The finding of the case was, the main commercial mechanisms for transferring discoveries from universities to the market are licensing agreements, research joint ventures, and university spin offs.

**Einar Rasmussen, Odd Jarl Borch and Roger Sorheim, Are Gjellan (2006)** in their research paper titled, Government initiatives to support the commercialization of research- an international benchmarking study, the objective was to provide insights and good ideas about how government programs can stimulate the commercialization of publicly funded research from universities and other public research organizations. The findings of the study were the interest in the commercialization of research as a tool for economic development has increased exponentially in recent years, and the number of initiatives and government programs has followed suit. Commercialization of research is a young field, hence most of the initiatives are rather new and few have been thoroughly evaluated. Among the older initiatives, most have undergone significant changes during the last few years, and there seems to be a lot of experimentation going on.

**Allison Bramwell, Nicola Hepburn and David A. Wolfe (2012)** in their research titled, Growing Innovation Ecosystems: University-industry knowledge transfer and regional economic development in Canada, the objective behind was to discuss the critical role of universities play in harnessing the full innovation potential of their local economies, and to obtain access to the university's facilities, customized training courses, and research results. The findings were one of the challenges facing university technology transfer is the weak linkages between the knowledge generation process in institutions of higher education and the capacity of private firms to adapt the knowledge being generated for commercial purposes. A key issue is the lack of receptor capacity that is capable of making full use of university-generated research.

**Brent Goldfarb and Magnus Henrekson (2001)** in their research paper titled, bottom up vs top down policies towards the commercialization of university intellectual property, the objective of the study was to evaluate the policy pursued in Sweden and the US, two countries that put a great deal of resources into university R&D. The findings of review paper were Sweden is country putting a great deal of resources into R&D, in some key fields, Sweden is producing large absolute amounts of scientific output as well.

### **1.2.2 Model for Commercialization**

**Lauma Zihare, Indra Muizniece, Kriss Spalvins and Dagnija Blumberga (2018)** in their review paper titled Analytical framework for commercialization of the innovation: Case of thermal packaging material, the objective behind was to analyze and innovate in packaging material and to economic assessment for validation. The findings, there can be more precise evaluation on this product packaging and to reduce the cost product.

**M.R. Wertheimer, H.R. Thomas, M.J. Perri, J.E. Klemberg-Sapieha, and L.Martinu (1996)** in their title Plasmas and polymers: From Laboratory to large scale commercialization, the objective behind this study was to modify of polymers and plasma coating where pilot scale have been tested by the authors and finding was for lack space, authors could describe only results from our own experience in the university and industrial environment.

**L. Suganthi, and A Williams (2000)** in their research titled, Renewable energy in India- a modeling study for 2020-2021, the purpose behind this study was to determine the optimum allocation of renewable energy in various end uses 2020-2021 and to analysis the critical parameters for utilization of renewable energy source. The findings were the optimization model indicate that for minimizing the cost efficiency ratio the renewable energy distribution is around 41% by solar, 55% by bioenergy and the remaining by wind energy. The study would aid planners and policy makers in visualizing the future and planning for renewable energy commercialization. The present model is top-down optimization model, which requires renewable energy requirements as a prerequisite.

**Santannu Roy (2006)** in his research paper titled, Networking as a strategy for technology transfer and commercialization from R&D laboratories, the goal behind this paper was to argue for the adoption of networking strategy, the findings of this case study was networking or the consortium approach in the commercialization of scientific innovation as the lessons from these case studies of technology transfer project CSIR laboratories indicate, such a strategy leads to the better management of technological innovation and greatly enhances a project's chances of success.

**Tim Minshall, Stuart seldon, and David Probert (2007)** in their research titled Commercialization a disruptive technology based upon university IP through open innovation: A case study of Cambridge Display Technology, the aim of this study was to bring potentially disruptive technology to market and to focus for how a pin out can build a technology ecosystem, the findings of the research was CDT is now being taken forward to investigate further how applicable the partnership ecosystem model is for other technology and business areas, as well as different geographic contexts.

**Andrew P.McCoy, Walid Thabet and Ralph Bainelli (2008)** in their paper titled, Toward establishing a domain specific commercialization model for innovation in residential construction. The objective behind is to offer a commercialization framework that outline and conational areas for technical and business practices in getting innovative products to market. The model aims to benefit future entrepreneurial business ventures in the commercialization of construction products. Another future research goal is a classification scheme of construction products based on the optimal sequence of steps for different product types.

**Lara Kasnitz (2017)** in his thesis titled, building a biorefinery Business, the purposes behind this study were to analyze how biorefineries have addressed commercialization challenges and system weaknesses in practice and to contributes with novel insights into the role of agency and individual actors as system builders within the technological innovation system

framework. By taking expert interview author has identified that business partnerships are found in practice to be highly relevant and deployed, yet not horizontally and careful attention needs to be both the ability to mobilize resources and establish supply and demand at the same time, a collaborative approach towards developing and commercializing biorefineries, focusing on markets where the price pointing is accessible can help, has proven a viable strategic approach.

**J. Robbert Baum and Edwin A. Locke (2004)** in their research paper entitled, the relationship of entrepreneurial traits, skill and motivation to Subsequent venture growth, the objectives of this research paper were self-efficacy and communicated vision had direct effects on venture growth, the relationship between entrepreneurial traits and skill and situationally specific motivation to subsequent venture growth, and the findings are the most important finding of this study is that specific component variables of entrepreneurs' traits, skills and motivation categories are significant direct or indirect predictors of venture growth for a period of 6 years following initial measurement and vision in authors study was measured in terms of growth aspirations or imagery-which were most logically related to the dependent variable.

**Viatcheslav Dmitriev, Geoff Simmons, Yann Truong, Mark Plamer and Dirk Schneckenberg (2014)** in their research paper titled, An exploration of business model development in the commercialization of technology innovation, where the purpose of this study were to explores business model development during the commercialization innovations, provides empirical evidence that adds new insights to literature on sequential and more interactive processes of business model development and contribute to literature on business model development and particularly how it relates to the commercialization of innovations. Future research could extend this research with larger scale studies that are directed toward differentiation of configurations of the ex post conceptual model for different cases- such as cases of innovation commercialization at B2B market or at B2c market, start up.

**Richard C. Dorf and Kirby K.F. Worthington (1987)** in their research paper titled, models for commercialization of technology from universities and research laboratories, the objective is to examine selected organizational and policy arrangements for achieving the optimum commercial value. While technology transfer federal laboratories is complicated task fraught with difficulties, a taxonomy of transfer models assists the managers in the selection of an approach.

**Antonin Benyacar, Annabelle Didier and Shyama V. Ramani (2008)** in their paper titled commercializing an innovation in an invisible market: Case of Ecosan toilets, the objective behind this study were seems highly likely that the population that has no access to toilets contains a majority of the underprivileged living in marginalized zones. The findings were analyzing the features of ecosan toilets, it is possible to claim that this technology corresponds to a model of society that seems radically different from our current model of society in an increasingly globalized world. The ecosan compost toilet is a simple technology that everyone can understand it, create it and reap benefits from it or modify it.

**Mariekie Gericke (2015)** in his research paper titled, Base metal tank bioleaching: from laboratory test work to commercialization, the purposes behind were focused on the treatment of complex polymetallic concentrates containing contaminants such As, Bi, Pb as niche application for tank bioleaching processes, development of base metal tank bioleaching processes for the treatment of chalcopyrite and polymetallic concentrates. The findings of the

research were the feasibility study showed that bioleaching, combined with a Ni and co precipitation process, is an economically viable option for Mondo to derive value from the concentrate.

**P. Balachandra, Hippu Saik Kristle Nathan and B. Sudhakara Reddy (2010)** in their research paper titled, Commercialization of Sustainable energy technologies, the objectives behind this paper were to identify the issues, barriers and stakeholders in the process of SET commercialization and to integrate the processes of market transformation and entrepreneurship development with innovative regulatory, marketing, financing, incentive and delivery mechanisms leading to SET commercialization. After reviewing the findings was at present, the SETs in India are at a very low level of commercialization. Barring a few SETs like solar water heaters, wind energy, small hydro and solar PV, most of the SETs in India have fallen inside the valley of death, where the cost of production is high and scale of production is low.

### 1.2.3 Academic Entrepreneurship

**Riccardo fini and Rosa Grimaldi** in their research paper titled A multi country, process-based approach to academic entrepreneurship, the basic purpose of this paper was to contribute to the conversation on how to effectively commercialize university research. By qualitative measures the findings were to advance knowledge in diverse disciplines, such as organizational theory, sociology, psychology, geography, and institutional and evolutionary theories, we still see room for advancing management studies by using academic entrepreneurship as a laboratory to test general management theories.

**Lena Abrahamsson, Yiva falthoim, Eva Kallhammer, and Asa wikberg-Nilsson (2010)** in their research titled, Academic Entrepreneurship-Gendered Discourses and Ghettos, the objective behind was to explore how local discourses of academic entrepreneurship are constructed and gendered. The research findings said that Global entrepreneurial discourse is met by both counteracting and contributory discourses in academia. In texts promoting academic entrepreneurship pictures of men address both women and men, while pictures of women are only targeted to women, often found in entrepreneurial ghettos at the university and conceptualized in need of support, as less risk-willing and less willing to commercialize their research.

**Rose DeVol and Armen Bedroussian, Anna babyan, Meggy frye, Daniela Murphy, Thomal J. Philipson, Lorna Wallace, Perry wong, and Benjamin yeo (2006)** in their research paper titled Mind to market: A global Analysis of University biotechnology transfer and Commercialization, where the objective behind was to examine the process of university technology transfer for its strengths and vulnerabilities in order to facilitate the commercialization process and ensure the greatest possible returns on public investment. Authors have used regression modeling technique by which the findings were U.S. universities are the world leaders in transferring intellectual property to the private sector. The united states retain a large lead in biotech research at its top universities. An important aspect of the university-based commercialization process that technology transfer office survey data doesn't capture is the numbers of successful large companies that grew from startups.

**Markus Perkmann, Valetina Tartari, Maureen Mcklvey, Erko Autio, Anders brostrom, Pablo D'este, Riccardo fini, Aldo Geuna, Rosa Grimaldif, Alan Hughes, Stefan krabel, Michael Kitsonj, Pratrck lierenak, francesco lissonil, Ammon Saltera, Maurizio**

**sombrero**, in their paper titled Academic engagement and commercialization: A review of the literature on university industry relations. The objectives were to identify the individual, organizational and institutional antecedents and consequences of academic engagement, and then compare these findings with the antecedents and consequences of commercialization. The findings of the review paper were, government agencies and universities themselves have made concerted efforts to increase academic engagement, for reasons ranging from generating societal legitimacy for publicly subsidized scientific research, stimulating economic activity to raising revenue for universities.

**Donald S. Siegel and Philip H. Phan (2004)** in their research paper titled, Analyzing the effectiveness of university technology transfer: Implications for Entrepreneurship Education, the objective of this study was to establish priorities and also relates to choices regarding technological emphasis for the generation of licensing opportunities. The review paper indicates that institutional incentives and organizational practices both play an importance role in enhancing the effectiveness of technology transfer.

#### **1.2.4 Supply Chain Management**

**Per Hilletofth, Dag Ericsson, Oli-pekka hilmola and Philip hedenstierna (2009)** in their research titled, New product Development in a Manufacturing Company- A Challenge for supply chain management, the objective of this study was to illustrate how product development is structured and executed in an international manufacturing company, seeking to realize an innovative, predictable, and efficient product development and to increase the understanding of how product development and product life-cycles are connected to Supply Chain Management (SCM) and the findings are the case company after implementing a strategic and structured Product Creation Process (PCP) has improved the efficiency and effectiveness of product development and Findings also reveal that the case company has not yet developed any linkages between product development and SCM.

#### **Conclusion**

After studying the literature in different field, it has been observed that many academic research which had done in past may be getting commercialize however, many innovators faced so many challenges and factors which had helped them to convert their product into commercialize. Here are some factors which have been identified through literature review i.e., Idea generation workshops / bootcamps, Preincubation support, Facility to develop prototype, Availability of labs, Facility for Material testing, Equipment's to develop a prototype/product, Availability of technical expertise, Mentoring support (industry expert), Mentoring support (Incubation manager/team), Co-working space.

There are some challenges which have been faced by innovator during the commercialization are, Knowledge regarding market demand, meet customer expectations, Formulation of marketing/ promotion strategy, Scepticism about product / offerings, Willingness of customer to pay, Delayed responses from key contact persons and other stakeholders, Language barriers, Communicating across different time zones, Talent Acquisition, Team Members.

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