POLYMERIZED PACKTECH INDUSTRY AND GROWTH FACTORS

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ABSTRACT

Polymerized Packtech industry cited NIC code 22203 as a specific derivate of polymerized packaging items for bags, lay flats, and woven sacks for the precise study of the Packtech industry. Among the wide variety of plastic polymers, the study focused on the Society of Plastic Industry codes 2, 4, and 5. These codes resemble the thermoplastic flexible packaging/Packtech products for user industries like food and grain industries, automobile, medical industry, clothing, and accessories industry, building and accessories industry, e-commerce industry and local venders, as high-density polyethylene (HDPE), low-density polyethylene(LDPE) and polypropylene(PP). The material HDPE, LDPE, and PP are versatile functional applications that comprise value addition through the packaging of user industry products. The study carries out the consumption growth of these materials in manufacturing units of the Packtech industry at the regional level, especially for Jaipur district. The study entails the industry growth attributes (IGA) for the industry to estimate opportunities and challenges within the industry to create a roadmap for the circular industry system to enhance the green production in Rajasthan, Jaipur, and minimize the Packtech waste as landfill. The industry growth attributes are selected on the basis of the bibliometry. To evaluate the significant difference between attributes in concern of consumption growth, Friedman test carried out for hypothesis testing further post hoc testing use for evaluating pair wise difference to identified most effective attributes for consumption growth of the Packtech industry. The primary and secondary data were used for the study. The total sample taken 21 manufacturing Packtech industry among them 18 responses evaluated for the study.

KEYWORDS: Polymerized Packtech Industry Structure, Material Consumption, Consumption Growth, Industry Growthpull & Push Factors

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INTRODUCTION

At the end of the 20th century, Packtech became one of the most universally-used and multipurpose product in the global economy. Today, Packtech is utilized in more and more industrial applications and they have become essential to our modern economy. The Packtech industry has served their product almost all other industry from agriculture to service industry. The product mix consider under Packtech industry are Bags, Layflats and woven Sacks of LDPE/HDPE/PP (Bindu Sharma, 2020). These product mixes are numerous applications in food and grain industry, building and construction industry, automotive industry, medical industry, agriculture industry clothing and accessories industry and retail & service sector (E-Commerce). Polymerized Packtech industry structure is covers. A) Polymer and compound/resin Supplier/ petrochemical byproduct manufacture. B) Packtech manufacturer. C) Packtech supplier.

The petrochemical industry is highly dominated by only a few players in Indian economy; however, Top 5 companies are listed as below (Compare Infobase Limited, 2011):1) Reliance Industries Ltd. 2) Haldia

Petrochemicals Ltd. 3) Indian Oil Corporation 4) Gas Authority of India Limited 5) National Organic Chemical Industry Ltd.

Top 5 players are RIL with 19%, IPCL 24%, HPL 19%, Gail 4% and Finolex 5% which acquire 70% polymer manufacture market share of total market. These are major supplier of plastic raw material for Packaging, consumer goods, pipe and sanitary fittings, medical articles for hygiene, cleanliness and flexible body parts industries in bulk.

Packtech manufacturers, NIC code 22203(National Industrial Classification, 2008), are only considered which manufacturing plastic bags, Layflats and woven sacks through LDPE/HDPE and PP for polymerized Packtech industry. Concentrations of these manufacturers are 22 in Jaipur among 52 in Rajasthan. Packtech suppliers have concentrated 30 units in Jaipur. The main objectives of the research identify the Packtech industry growth factors for create a roadmap for sustainable industry and minimize the adverse impact on society from the industry to develop circular system. The current research extents for regional level to Packtech industry cluster of Jaipur district to enhance the green production in the industry with minimization of Packtech waste and reduce the environmental impact.

MATERIAL CONSUMPTION

Material consumption (Lieber, 2016) has two indicators 1) Domestic Material Consumption (DMC) and 2) Raw Material consumption (RWC). The materials needed along the supply chains of traded goods not account in DMC, which has restriction from an analytical point of view. Alternatively, the indicator Raw Material Consumption (RMC), counts for the physical quantity of materials required along the supply chains of all goods and services finally consumed. The concept thinks globally and act locally (Collier, 1997) stressed in today's economic situation where sustainability (Feil, 2019) is major concern for industry and eco system. The material consumption growth(Giljum, 2014) indicates the growth of economy, in this study estimate the Packtech material consumption for Jaipur to analyzed the physical quantity HDPE/LDPE/PP used by micro and small Packtech industries, in amount and quantity (in metric tons).

Table 1: Analysis Cumulative Consumption based on 2018 in Amount (in caror) and Quantity (in metric tons)

Packtech Industry	Consumption in Amount	Percentage	Consumption in Quantity	Percentage
Micro Industries	10.33	5	1,730	5
Small Industries	198.17	95	30,606	95
Total	208.5	100	32,336	100

Source: Primary Data from PI by Author

This table shows the Packtech raw material consumption in metric tons by Packtech industries (based on 2018 in crore) data provided by the account section of each respondent manufacturing unit. Small scale Packtech industries have major consumption of raw material in both amount and quantity. It consist 95% of total consumption of Packtech Industry while micro industries have lesser consumption only 5% due to plant capacity.

Table 2: Analysis of Material Wise Consumption by Industry

Material	Micro Industry Used	Percentage	Small Industry Used	Percentage	Total Industry Used
HDPE	13	72	5	28	18
LDPE	2	29	5	71	7
PP	3	36	5	64	8

Source: Primary Data from PI by Author

This table shows the Material used status in reference of HDPE, LDPE and PP based on detail provided by Rajasthan Plastic association. HDPE has versatile material which used all manufacturing units while LDPE material used

only 39% manufacturing units in which only 29 % LDPE used micro industries and 71% used by small Packtech industries. PP material used 36% by micro industries while 64% used by small industries and total 45% pp material used at the industry level.

MARTIAL CONSUMPTION GROWTH

Domestic material consumption (Weisz, 2006) shows the local material flow within the industry, Packtech industry Jaipur product flow in various user industries as food and grain industry, automobile industries, textile and clothing industry, Medical industries, building and accessories industries E-commerce and local venders. Average consumption of Packtech industry shows the continues growth of polymerized Packtech raw material consumption.

Graph 1: Packtech Industry Raw Material Consumption Statuses (Jaipur District).

Source Primary Data

Interpretation Graph reveals that average consumption of raw material since 2012 is increasing continuously except year 2015. In view of age of sample units, 14 unit's consumption data is used in above graph. Graph line grows in right upward direction which shows that the manufacturing unit's productivity increases in comparison of 2012. Manufacturing units were using 1496 metric tons raw materials in 2012 while in 2018 using 2310 metric ton raw material.

MATERIAL AND METHOD

Data provided by Rajasthan Plastic Association total 22 manufacturing industries identified in Jaipur district. Complete 18 responses gather from the owner of Packtech manufacturing unit. 3 non-responses and 1 unit closed in 2005, subtracted from the total sample size. Data gathered through the questionnaire was subjected to frequency counts to find the response for each individual question. On the basis of General information of organization, researcher identified the micro and small Packtech industries. The analysis and interpretation of data is carried out in two phases. In first phase questionnaire analysis has compiled item wise frequency under MSME amendment bill 2018. This amendment bill amends section 7 of the Micro, Small and Medium Enterprises Development Act, 2006. It was introduced on July 23, 2018. The bill re-classifies micro, small and medium enterprises as given within the original act below.

Table 3: Reclassification of MSMEs

Change in Classification of MSME's			
Type of Industries	MSME Act, 2006		MSME Bill, 2018
	Investment in Plant and Machinery	Investment in Equipment	New Classification: Annual Turnover
Micro	25 lakh	10 lakh	5 crore
Small	25 lakh to 5 crore	10 lakh to 2 crore	5 to 75 crore
Medium	5 to 10 crore	2 to 5 crore	75 to 250 crore

Source: Medium, Small and Micro Enterprises Development (Amendment) Bill, 2018 (MSME, 2018)

The Classification based on annual turnover instead of investment to stagnation of industries to change business ecosystem and trends. On the basis of turnover Jaipur Packtech industry has consist of micro and small industries. There is no medium level industry exist within the Packtech industry. The growth of Packtech industry pulls by the adverse PESTEL factors while favorable factors push the industry for growth

Table 4: PESTEL Analyses

Categories	Industry Situation	Potential Impact
Political Impact	<p>Government policy Ministry of Textiles has undertaken several developmental activities that are oriented towards providing necessary support to promote growth of Technical Textile industry in India through FY plans and Funding schemes. GoI and federation of India Chamber of Commerce jointly organised the Technotex for increase research and development to specific sector of Packtech.</p> <p>Political stability Central and state governments supported in the form of establishment of textile parks, research centers, international collaboration with foreign institutes and laboratories, training facilities etc. is also playing a significant role in the sector's progress (Arora, 2019).</p> <p>Tax policy Government policy for Petro based Packtech Industry Investment Subsidy of 60% of State tax due and deposited, for ten years; and 6 Employment Generation Subsidy up to 10% of State tax due and deposited, for ten years (Government of Rajasthan (Finance Department), 2018) p.16.</p> <p>Funding grants and initiatives To promote Technical Textile sector Ministry of Textile has launched various schemes for funding grants and initiatives Technology Mission on Technical Textile (TMTT) and two mini mission for removal the impediments hampering the production of Technical Textile industry to meet the growing domestic demand (Ministry of Textile, 2018) p; 151-158.</p> <p>Trade Restrictions Packaging bags are now among the worlds most-banned. The United Nations counted 127 nations that have banned or taxed bags—and bag regulations have proliferated fast, especially at the local level (Parkar, 2019). The government's ban on polythene and plastic items (Beniwal, 2019) will disrupt the supply chain, raise the cost of goods from milk to biscuit packets, and impact the food processing and consumer goods auto industry and construction industries.</p> <p>Regulatory practices and governing bodies Plastic Packtech manufacturing regulated at National Level by- Central Pollution Control board and State level; State Pollution control Board and local bodies of Particular state (Ministry of Environment and Forests, 2016) p ;22 point 12 & 13.</p>	<p>There has been growth within the sector and this growth will continue.</p> <p>The Technical Textile industry in India is estimated to be valued at Rs. 73,688 crore in 2013-14 and is projected to grow to Rs. 92,499 crore by 2015-16 and Rs. 1,16,217 crore by 2017-18.</p> <p>The industry has witnessed a growth of 12.4% over the last five years driven mainly by the growth witnessed in Packtech.</p>

Economic Impact	<p>Economic Situation It is a multi-million industry and very competitive at domestic level. It was identified as an area of interest of other industries development. Packtech is the segment of Technical Textiles which has a share of 43% of the entire Indian Technical Textile market. According to the Packaging Industry Association of India, the Indian packaging industry was the fifth-largest in the world in 2016 (Wisconsin Economic Development Corporation, 2017).</p> <p>Growth There has been significant growth in this industry and estimated to grow by 11% which is higher than global growth of Packtech industry. The packaging industry is increasingly becoming technology-oriented with innovations driving the market; this is expected to lead to packaging that increases shelf life, reduces cost and is light weight (India Brand Equity Foundation (IBEF), 2018). This industry is highly sensitive to the prices of HDPE/PP granules which are its key raw materials constituting about 60% of the total input. Prices of polymer granules increasing sharply, the woven sack manufacturers are finding it increasingly difficult to maintain competitive prices of their bags (ICRA Management Consulting, 2015)p; 110.</p>	<p>The per capita consumption of polymers in India during 2014-15 was just 10.5 kg as compared to 109 kg in USA, 45 kg in China and 32 kg in Brazil. India is expected to be among the top ten packaging consumers in the world by 2016. The low level of per capita plastics consumption in India is indicative of the massive growth potential of the plastic industry (FICCI, 2016). There have been potential areas like circularity industry, through recycle, reuse and reproduce for sustainable business. Circularity industry of Packtech industry is economically beneficial for all stake holders from supplier to user as it's reduce the resource utilization in terms of raw material, energy and natural resources. Investment opportunities in recycled Packtech Industry to generate the employment to semiskilled persons. Circulatory industry reduces the cost of environmental problem; provide the solution of infrastructure development and waste management solution for thrust problem of waste management.</p>
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Social Impact	<p>Demographics of the Market Packaging industry represents the single-largest sector of plastics use and accounts for 35 per cent of plastic consumption (Toxics Link, 2014).</p> <p>Consumption Patterns Packtech applications area covers various industries including automobiles, civil engineering and construction, agriculture, healthcare, industrial safety and personal protection(Flexituff International Limited, 2016).</p> <p>Cultural Factors Busy lifestyles ensure the prevalence of eating and drinking on the go, and smaller pack sizes lend themselves to this trend for ready-to-eat meals which gaining high traction, owing to busy work schedules, rising number of working women, and shift toward on-the-go consumption, which is, in turn, expected to ascend the utilization of packaging (Mordor intelligent, 2018)</p> <p>Lifestyle Trends 2017 onwards, there has been a revived interest in sustainability focused specifically on packaging. This is reflected in central government and municipal regulations, consumer attitudes and brand owner values communicated via packaging (Smithers, 2018).</p> <p>Changes in Consumer Purchasing Habits In growing economy, rising incomes in the hands of a young population, expansion in the availability of products and services and easy availability of credit all has given rise to new consumer segments and a rising acceptability of debt, whether it is mobile phones, credit cards, organized retail, people clearly seem to be spending more, particularly on discretionary items, packed fast and ready-to-serve food, Beverages, Ready to eat food , Pre-cooked food due to nuclear family system (Dey, 2017).</p>	<p>The industry, which employs about 5 million people directly and three times more indirectly, will continue to grow due to rapid change across the industry. Organised retail and e-commerce boom, which offer huge potential for future growth of retailing, will continue to support the packaging industry (Aggarwal, 2018). Indian consumers are spending their money on various items has changed. The penetration of internet and social media has increased; as a result the purchasing behavior of Indian consumers has changed dramatically. Urbanization is a constant phenomena in India and is influencing the life style and buying behavior of the consumers (Dey, 2017) as well industrial consumption of raw material.</p>
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Technological Impact	<p>Industry-specific technological Innovations ;Increasing integration of IT and internet into business processes</p> <p>The history of manufacturing industry has been conquered by technological disruptions dating far back in the 18th century. The first industrial revolution when steam engines, water & steam power, machine tools, and factory system took the center stage. New manufacturing processes were coming in, the most dominant being modern production methods and final output for the textile industry. The second industrial revolution widely known as the technological revolution in the late 19th century brought mass production lines and invention of electric energy as its main features. It is said that the second revolution was a rough draft of the industry today. By the time, the third revolution came into focus; globalization was already on its way catalyzed by the invention of the first computer and subsequent discovery of the World Wide Web along with rapid digitalization and automation in the manufacturing industry with the convergence of new technologies such as intelligent software, novel materials, and a wide range of web-based services.</p> <p>Fast forward to today, the industry is going through another paradigm shift, popularly referred to as the “Fourth Industrial Revolution” or “Industry 4.0”. The future of the manufacturing industry lies with big data analytics, robots, automatons, and the internet of things. Manual labor will be replaced with digital factories containing advanced materials and artificially intelligent machines that run entire factories on its own. Not only that, cognitive manufacturing will enable manufacturers to forecast demand, carry out predictive maintenance, estimate problems and control the problems. New products, new features & characteristics, new methods, and processes have become the tool to fulfill the ever changing customer demand (Wazir Advisors, 2018) p; 13.</p> <p>Increasing popularity of e-commerce</p> <p>The online retail industry in India is leading the E-commerce growth as India has 243 million Internet users, which is more than the US but less than China which is one of the primary reasons for growth of e-commerce in India (Rhitabrata Kumar, 2018).</p> <p>E-commerce is rapidly transforming the way and creates the completely new sets of global and national trading relationships (Khan, 2016). In concern of India Z generation wide used E-commerce mode where logistic need more Packtech product for product safety.</p>	Packtech industry is highly capital intensive and labour force is required highly skillful to handle automation process of manufacturing.
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Environmental	<p>Global Problem Governments around the world are increasingly awake to the scale of plastic (LDPE/HDPE/PP) packaging pollution. More than 60 countries have introduced bans and levies to curb single-use plastic packaging. Nearly 50% of the plastic waste generated globally in 2015 was plastic packaging. (United Nations Environment Programme, 2018)</p> <p>Environmental pollution Plastic derivatives waste is a global problem, but with regional variability. It is a transboundary problem which is not respected by plastic waste and necessary to propose locally tuned responses for waste control (University of the West of England, 2011). Each year, an estimated 500 billion to 1 trillion plastic bags are consumed Worldwide. That's over 1million plastic bags used per minute! It takes 100-500 years for a plastic bag to disintegrate (depending on the type of plastic) and hence They continue to exist, harming our environment. Plastic bags have emerged as an unsustainable option and constitute one of the most critical waste issues globally (Toxics Link, 2014). Environmental damage resulting from improper disposal of used packaging materials – including their residues (FP& M and SETA, 2014) Plastic pollution is caused by excessive plastic production and inadequate waste management. Global production of plastics is now up to around 300 million tons and non-degradable plastic accounts for 73% of litter in any aquatic habitat with roughly 50% disposed of after a single-use (Tan, 2018) India generated 26,000 tons per day (TPD) of plastic waste in 2017-18, required 2600 truck loads per truck 10 tons for transport the plastic waste. (Seetharaman, 2019)</p> <p>Government environmental organizations Globally, U N Environment estimates that more than 8.3 tons of plastic has been produced since 1950's. About 60% of the plastic in from of packaging product has ended up in either in landfill or the natural environment (U N environment, 2018). In India pollution control Board plans comprehensive programme for prevention, control or abatement of pollution, lay down, modify or annul effluent standards, advise the State Government on any matter concerning prevention, control or abatement of pollution and collect and disseminate information relating to pollution (ICED, 2016).</p> <p>Attitudes towards 'green' products Consumers have a high preference for 'green' products, but the consistency between consumer attitudes and behavioral measures is rather low (Uusitalo, 2008) which influence the industrial product.</p>	<p>More prudent actions need to be considered rather than an outright ban (Sundaresan, 2015)</p> <p>Recycling would go a long way to sustain the Packtech industry Need to take EPR solution for channelize the industry. Extended Producers Responsibility for the establishment of waste Management system and green production (Govt. of India, 2016) to prevent the plastic leakage in environment, pricing of carry bag is not as effective as consumer pay higher for their comfort.</p>
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Legal Impact	<p>Trade regulation The Expert Committee on Technical Textiles (ECTT) constituted by the Ministry of Textiles has also recommended mandatory prescriptions for certain items. One of the major deterrents for the expansion of usage of many technical textiles products is absence of standards and regulatory legislation in India (Mintstry of Textile, 2012). Government of India has recently notified 207 HSN Codes from Technical Textiles and working on standards formulation.</p> <p>Environmental laws In February 2011, the Ministry of Environment and Forests banned the use of plastic materials in sachets for storing, packing or selling. New rules stipulate that plastic carry-bags must not be less than 40 microns thick less than 8 inches x 12 inches in size revised 50 microns; earlier, the minimum thickness required was 20 microns. Thinner plastics are more difficult to dispose off. Plastic carry-bags cannot be made available to consumers free of cost; the municipal authorities have been asked to determine suitable price for these bags (India Brand Equity Foundation(IBEf), 2018).</p>	The legal environment is barriers towards this venture due to the banning of Packtech Product. In most parts of India, the bans have been ineffective due to various reasons, ranging from slack enforcement by the administration to lack of cost-effective alternatives (Toxics Link, 2014) p; 5
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Source Secondary Data

On the basis of PESTEL analysis Packtech industry pull and push factors identified through the intense interview of the Packtech manufacturer. Eight factors have selected amongst 38 factors based on bibliometry. The factors are raw material, skilled man power, technology, value addition government policy, research development, quality product and design of packaging which influence the growth of micro and macro Packtech industry

Table 5: Pull & Push Factor of Packtech Industry

Factors	Pull Factors	Push Factors
Raw material	1) Life spun of HDPE/LDPE/PP500-1000years creates environmental issue. 2) Land fill problem 3) Plastic waste collection challenge 4) Non degradable for long time 5) In India, there are three common ways of getting rid of plastics: by dumping them in landfills, by burning them in incinerators or by littering them cause Environmental problem.	1) Inexpensive ,non-polar ,hydrophobic Polymer , HDPE,LDPE and PP are wide applications 2) high strength to weight ration, stiffness and toughness, safe & hygiene, energy saving and material recycling 3) Versatility, low cost and high chemical stability 4) Versatile applications 5)highest use of raw material in packaging as PE 30% and PP 18% strength, Stress resistance, flexibility and durability
Skilled man power	1) Automation of industry has less employment for semi and unskilled manpower	1) Automation of industry developed skilled manpower through technical institutions.
Technology	1)Customization very costly, heavy investment required for automatic machines and plant 2) Single use and environmental issue	1) Automation solutions and IT equipment that can enable the industry to become leaner and more agile. 2) Blow fills seal process, mass encoding and production, anti counter feit Packaging Technology.
Value addition	1) Creates complications for life cycle and increase toxicity in environment	1) Increase the strength of Packtech product, pliable and flexible, fire retardants to discourage ignition and burning, and UV stabilizers to prevent degradation when exposed to sunlight
Government policy	1) Increasing politicization towards the latter end of the life cycle, that is, plastic as waste and pollution	1) Plastic crisis: attempts to construct (a) a circular plastics economy and (b) global plastics conventions or treaties.

Research & Development	1) Plastic waste reduction and end-of-life issues	1) New packaging solutions bio packaging and eco friendly packaging
Quality Product	1) Environmental pollution through Polymerized polymer Packtech	2) Safety and hygiene of polymers
Design of Packaging	1) Design for Environmental (DfE) 2) Less eco friendly	1) Design for Sustainability 2) Useful in retailing and business sustainability

Source Secondary Data

The life span of polymerized Packtech material is 500-1000 depends on the additive and quality of polymers with functional application in various industries. These polymerized Packtech has single usage which causes the environmental pollution as landfills while the Packtech is essential for various industries growth.

RESULT ANALYSIS

To measure the pull and push factors of industry growth, data was collected through Likert scale which measures 1-5 scale. The graph represents the responses of Packtech manufacturers for pull & push industry growth factor.

Graph 2: Responses for Pull & Push Factors of Industry Growth.

Source Primary Data by Author

Friedman test is used to test for differences between pull and push dependent factors of industry growth. This test is the non-parametric alternative to the one-way ANOVA with repeated measure and used since sample is small & observations are collected on Likert Scale.

Table 6: Friedman Test

Friedman Test	
N	16
Chi-Square	48.898
df	7
Asymp. Sig.	.000

Table 7: Friedman Test Mean Rank

Ranks	
Attributes	Mean Rank
Raw Material Affinity to Product	5.06
Skilled Man Power	3.66
Technology	5.84
Value Addition	4.31
Government Policy	1.38
Research Development	4.66
Quality of Product	6.25
Design of Packaging	4.84

The chi-square value is 48.898 and p-value is 0.000. This result is significant at the level of 0.05 p-values. Hence, null hypothesis is rejected and there is a difference in importance of attributes is exists. Post hoc testing using; Wilcoxon Signed-Rank Test is required to find out the pair wise differences.

Table 8: Wilcoxon Signed –Rank Test

Wilcoxon Signed-Rank Test							
Attributes	Skilled Man Power	Technology	Value Addition	Government Policy	Research Development	Quality of Product	Design of Packaging
Raw Material Affinity to Product	.057	.154	.343	.001	.458	.142	.564
Skilled Man Power		.024	.244	.001	.127	.001	.083
Technology			.061	.000	.099	.854	.101
Value Addition				.001	.936	.010	.366
Government Policy					.001	.000	.001
Research Development						.071	.685
Quality of Product							.013

Result shows Raw material is more important than skilled man and Government policy while Technology, Research Development, Quality of Product and Design of Packaging is more important than Raw Material. Similarly the each row shows the importance than other comparative factors. The yellow areas show the significant negative difference with the comparative factors.

CONCLUSIONS

This study evaluated dimension of PESTEL analysis to determine to what extent macro environmental conditions is appropriate to realize the goals and targets of industry. In the present study, pull and Push factors are identified on the basis of nature of industry product .Direct relationship carried out between the PESTLE factors and pull & push factors of industry growth. The material consumption growth and the nature of polymerized Packtech material product both increase the environment problems. The study provide the road map for the balance between the pull and push factors through suitable solution as recycling, circular industry and awareness among user. This study further extended for Packtech green production and awareness level within the industry.

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