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Scaling Sustainable Packaging in International Market

A case study from Nepal

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Abstract

Global sustainable packaging market is projected to expand in huge volumes by 2030 which is driven by tightening regulations like PPWR and growing consumer demand. This situation creates real opportunities, but also serious structural difficulty for SMEs in landlocked developing countries like Nepal. Despite the fact that Nepal has natural advantages in indigenous fibres, fast regenerating plant resources and traditional craft skills, prevailing deep institutional and logistical barriers block international market access.

This study examines how Nepalese sustainable packaging firms navigate barriers to internationalisation and scaling. For this, data came from the semi structured interviews with representatives from ten firms. The firms work with different materials including biopolymers, natural fibres, biocomposites, recycled materials and leaf based tableware and one logistics firm was also included to capture export infrastructure constraints. The analyses is based on GVC theory and Sustainable Entrepreneurship theory with SBMC as organizing structure for cross comparison.

Three findings emerge from this study. First, barriers are not isolated. Economic, technical, institutional and logistics constraints form compounding loops whose severity depends on a firm's material type. Second, material choice functions as meta-strategy producing three distinct archetypes: heritage craft positioning, technology-dependent scaling and circular systemic positioning, each with a different barrier profile and growth pathway. Third, a willingness-to-pay paradox characterises the domestic market: consumers accept modest price premiums, but actual sustainable production costs are far higher, pushing viable firms toward international premium markets. The binding constraint on scaling is not entrepreneurial capacity. It is the gap between firm-level achievement and institutional ecosystem support. This requires shared certification infrastructure, coordinated logistics, growth-stage financing and integrated policy coordination.

Keywords: sustainable packaging, SME internationalisation, Nepal, Sustainable Business Model Canvas, sustainable entrepreneurship, compounding barriers

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Abbreviations

Abbreviation	Full Term
3Rs	Reduce, Reuse, Recycle
B2B	Business-to-Business
BMI	Business Model Innovation
EN 13432	European Standard for Compostable Packaging
EPR	Extended Producer Responsibility
EU	European Union
EUROPEN	European Organisation for Packaging and the Environment
GDP	Gross Domestic Product
GVC	Global Value Chain
LLDC	Landlocked Developing Country
NGO	Non-Governmental Organisation
NTF	Non-Tariff Barriers
PET	Polyethylene Terephthalate
PHA	Polyhydroxyalkanoate
PLA	Polylactic Acid
PPWR	Packaging and Packaging Waste Regulation
R&D	Research and Development
RO	Research Objective
SBMC	Sustainable Business Model Canvas
SDG	Sustainable Development Goal
SME	Small and Medium Enterprise
SPA	Sustainable Packaging Alliance (Australia)
SPC	Sustainable Packaging Coalition
TBL	Triple Bottom Line
USA	United States of America
USD	United States Dollar

AI Use Disclosure

This thesis was solely researched, analyzed and written by the authors. Given the first language of the authors is not English, AI tools were used at certain points for checking spelling and sometimes to improve the clarity of the expression. All the research design, data collection, interviews conducted online, the analysis of the interviews, interpretations of the findings and conclusions drawn are entirely the author's own work. AI was not used to generate arguments, findings or any other substantive content. The authors are fully responsible for all the contents of this thesis.

1 Introduction

The basic idea of not sacrificing the ability of future generations to meet their needs while meeting our own was first defined in *Our Common Future* (Burton, 1987). Since then, sustainability has moved from an abstract policy idea to something that is now part of actual supply chains, production systems and packaging.

Packaging plays a very important part in this process of modern sustainability. It protects products and extends shelf life. It also prevents contamination and keeps global trade moving (Ibrahim et al., 2022). But traditional packaging, particularly plastic follows an unsustainable take-make-discard approach. In total 8300 million tonnes of plastic have been produced since large-scale plastic manufacture commenced and only 600 million tonnes have been recycled (Geyer et al., 2017). These numbers reflect that the problem is not a small side effect. It is a basic lack in a packaging system that prioritises cost and convenience over environmental considerations.

1.1 The Global Shift to Sustainable Packaging

The worldwide transition to sustainable package is accelerating as people are beginning to be more conscious towards environmental protection. This kind of packaging is designed in such a way that fewer new resources are used and materials that can be recycled, reused or come from biological sources are prioritized.Sustainable packaging is governed by different frameworks. Frameworks from groups like the Sustainable Packaging Coalition, the Australian Sustainable Packaging Alliance and EUROPEN highlight five connected pillars (Figure 1): environment, society, economy, time and development (Kozik, 2020). So sustainable packaging isn't just about swapping out materials. It is about completely rethinking the system and making sure progress happens across all these areas and at the same time.

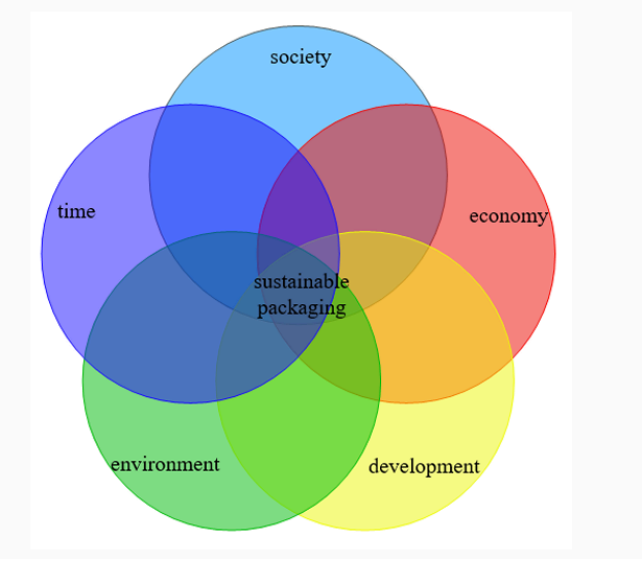

Figure 1: The five pillars of sustainable packaging that are interdependent (Kozik, 2020)

Different laws and regulations around sustainability have also pushed this new type of packaging forward. For example, the EU's Packaging and Packaging Waste Regulation (PPWR) says that by 2030, all packaging in the EU has to be recyclable or compostable. At the same time, Extended Producer Responsibility programs are spreading around the world. These sort of programs are forcing manufacturers to take care of their products' entire life cycle. These rules act like trade conditions that directly affect whether companies can export their goods.

Market trends are also helping to keep this momentum going. The global biodegradable packaging market was worth about 452.7 billion in 2021 and now it is expected to hit 812.4 billion by 2030. That is a growth rate of about 6.71% (Petrenko et al., 2024). This creates real opportunities for exporters in developing countries where natural materials are more available and labor costs are lower. These conditions give them a competitive edge. But not everyone gets to take advantage of these opportunities equally. Getting into international markets takes more than just being able to produce goods. Companies also need to meet certification standards, keep quality consistent, figure out logistics and customs and build relationships with buyers. These challenges are especially tough for small and medium-sized businesses in landlocked developing countries.

1.2 Nepal's Position: Structural Constraints and Natural Advantages

Nepal is entering this global shift toward sustainable packaging from a difficult position. As a landlocked developing country, it has to face trade costs that are about 50% higher than those countries with sea access. Its export volumes are also 30 to 60% lower compared to other similar countries (Paudel, 2014). Because of landlockedness, the negative impact of distance on exports is much stronger. Nepal's export to import ratio (1:14.61) shows that its trade situation has been getting worse over time (Sainju, 2021). Merchandise exports fell sharply from nearly 15% of GDP in 2000 to only about 3% by 2019. This drop is specific to Nepal and did not happen in other similar countries in South and East Asia. During the same period, remittance inflows rose from 2% to 24% of GDP (Sharma, 2023). As shown in Figure 2, this shift from exports to heavy dependence on remittances has made Nepal's manufacturing sector rely more on imported inputs without any real growth in export capacity.

Nepal's geography raises logistics costs. At the same time, it helps protect the country's biodiversity and traditional knowledge. This rich biodiversity offers good potential for sustainable packaging. Nepal has many natural resources that can be used to develop new packaging materials. These include Lokta fibres from wild Daphne plants which can regrow in four to five years without replanting. Other useful resources are sal leaves, hemp, nettle and agricultural waste. Using these materials, Nepalese companies can make packaging alternatives without relying on expensive synthetic chemicals.

Local communities have applied their indigenous knowledge to manage these resources and extend product life for hundreds of years. However, this knowledge has not yet received official recognition (Melles et al., 2025). Several new companies are now working in this area. Examples include Biobags Nepal which produces biodegradable polymers; LeafPlus Nepal which makes sal leaf tableware; Natural Fiber Nepal which focuses on hemp and jute packaging; and Biocom Nepal which creates biocomposite materials from agricultural waste. These businesses are trying to solve Nepal's structural challenges while responding to the global demand for sustainable packaging. The availability of these natural resources and the rise of such companies both inside and outside the country provide the background for this research.

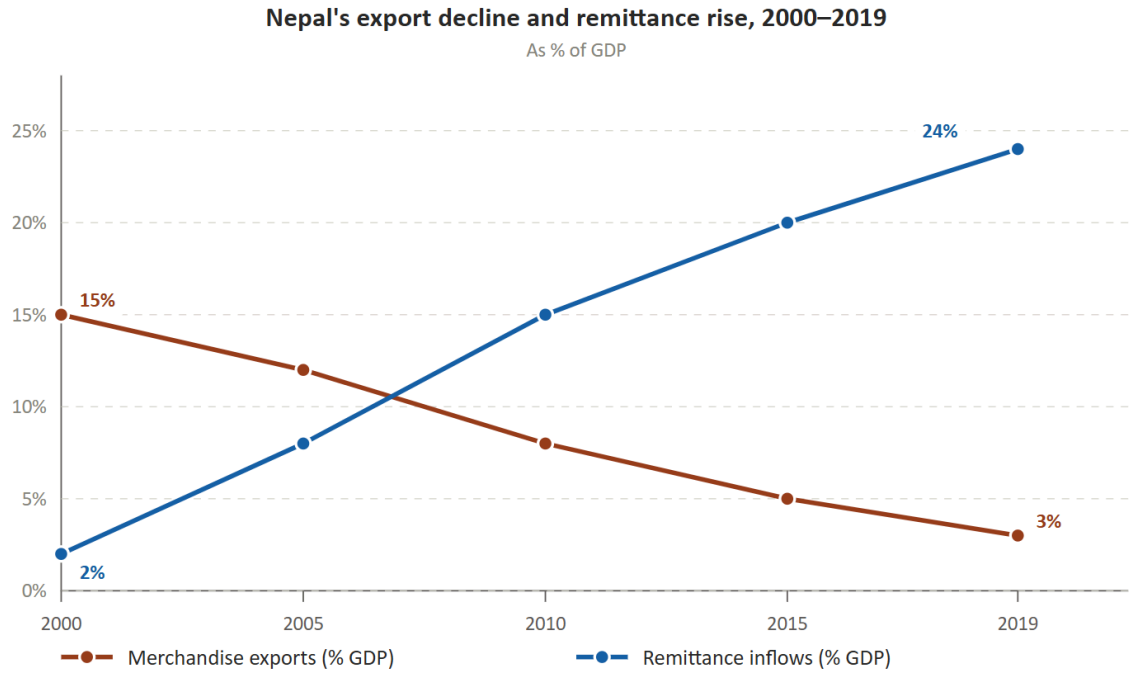

Figure 2: Nepal's merchandise export decline and remittance rise as percentage of GDP, 2000–2019. After Sharma (2023)

1.3 Institutional Constraints and the Entrepreneurial Challenge

Problems in institutions and policies are mainly the two reasons which slow down Nepal's sustainable packaging sector. Most circular economy projects running in the country still focus only on the 3Rs (reduce, reuse and recycle). They do not have enough policy support, proper integration between institutions or the financing needed to create real circular systems (Melles et al., 2025). The informal sector handles a large part of Nepal's recycling but does not get any official recognition for it. Consumer knowledge about sustainable packaging is still very low. Government policies look good on paper but in reality they are not well monitored and are applied unevenly. For SMEs, the cost of shifting to sustainable materials becomes even higher because circular business models need long periods of investment before any returns come (Kharel & Dahal, 2020).

Getting access to international markets brings more difficulties because buyers around the world now expect certifications, better quality, large enough production volumes and dependable logistics. These things need money and strong organisation and most Nepalese SMEs do not have all of these. According to Melles et al. (2025), even sending goods through Indian ports can take more than 60 days and customs rules are complicated. Poor logistics infrastructure also adds extra costs that coastal countries simply do not face.

Even with all these obstacles, some Nepalese companies have succeeded in growing. A few sustainable packaging firms have managed to enter foreign markets, win export orders and build good relationships with buyers while some of them still only sell inside Nepal. To understand why some companies succeed while others do not, it is necessary to look closely at individual firms rather than just broad national or sector level studies. This means looking at how these firms create, deliver and capture value even when facing many limitations, how they choose their business models and how they build the skills needed to grow. These findings are important for entrepreneurs, government policymakers and development workers involved in sustainability efforts in developing countries.

1.4 Research Objectives and Questions

This study focuses on a gap that has not been properly looked at yet. There are studies about trade at national and sectoral level, research on packaging materials and surveys about what consumers think. Each of these gives some piece of the picture but there is no proper in depth study that looks closely at the actual barriers and strategies of Nepalese sustainable packaging firms at the firm level and in the Nepalese context specifically.

The objective of this study is to examine how sustainable packaging firms in Nepal navigate barriers to internationalisation and scaling. This is guided by the following main research question:

What barriers hinder the internationalisation and scaling of sustainable packaging among Nepalese firms and what entrepreneurial strategies and business model innovations enable these firms to overcome such barriers?

Three research objectives guide this:

- **RO1**: To map the economic, technical, institutional, market and logistics barriers that constrain Nepalese SMEs from scaling sustainable packaging for international markets.
- **RO2**: To identify the entrepreneurial strategies and business model innovations that help Nepalese firms overcome those barriers.

- **RO3**: To analyse how international regulatory frameworks and GVC dynamics shape firm level sustainability choices and market positioning.

1.5 Scope, Relevance and Intended Impact

This research is useful for three different groups of people.

For entrepreneurs and enterprise development workers in Nepal, it gives a clear picture of the scaling challenges and shows what strategies can help overcome them. This offers practical advice for business planning and resource allocation.

For policymakers and development organisations, the study points out bigger systemic barriers that individual firms cannot solve alone. It also suggests possible solutions in certification, logistics, finance and policy coordination.

For academics and researchers, it adds new knowledge about how business models, entrepreneurial strategies and institutional conditions work together during sustainable transitions in resource constrained settings.

The study has three important limitations. First, it only covers sustainable packaging enterprises in Nepal. Second, it focuses on scaling into international markets rather than domestic market growth. Third, it uses a qualitative case study method which gives rich detailed information but findings cannot be statistically generalised to all companies.

1.6 Thesis Structure

Chapter 1 (Introduction) introduces the topic, explains the global context for sustainable packaging, places Nepal within its structural constraints and natural advantages and states the research objectives and questions clearly.

Chapter (Literature Review) brings together existing studies on sustainable packaging, sustainable entrepreneurship, sustainable materials, business model innovation and global value chain theory and identifies the specific gaps this research addresses.

Chapter 3 (Theoretical Framework) describes the integrated analytical framework combining the Sustainable Business Model Canvas, Global Value Chain theory and Sustainable Entrepreneurship theory and explains how these three frameworks guide data analysis and interpretation.

Chapter 4 (Methodology) describes the qualitative multiple case study design, covers the semi structured interview process, the selection of ten firms, data analysis procedures and ethical considerations.

Chapter 5 (Findings and Analysis) presents empirical data from ten case studies of Nepalese sustainable packaging enterprises organised around the Sustainable Business Model Canvas

and uses interview evidence to show cross case patterns and differences based on material types.

Chapter 6 (Discussion) compares empirical findings with existing literature, identifies theoretical contributions and develops managerial and policy implications for entrepreneurs, policy-makers and development institutions in Nepal and similar developing countries.

Chapter 7 (Conclusions) briefly summarises what the study did and found, acknowledges limitations and suggests directions for future research.

2 Literature Review

This chapter is organised around mainly six topics that are directly relevant for scaling sustainable packaging in a country like Nepal. It begins by establishing what sustainable packaging actually means from the very basic definition of it. Then it discuss materials and innovations related to sustainable packaging practiced in Nepal. After that, it analyses the barriers that SMEs regularly face followed by a discussion of business models capable of navigating those barriers. The final two sections locate Nepal within global value chains and examine the structural realities that shape what is and what is not possible on the ground.

2.1 Sustainable Packaging: Definitions, Frameworks and Global Context

Sustainable packaging is broadly understood as that type of packaging that is designed to reduce environmental impacts across the full lifecycle of the product. It is done either by using fewer materials drawing on renewable resources or incorporating recycled inputs (Kozik, 2020). The scale of the problem that motivates this shift towards sustainable packaging is considerable because the global packaging industry generates over 360 million tonnes of plastic annually and yet worldwide only 2% of that plastic is ever recycled (Ibrahim et al., 2022). These figures have driven a fundamental rethinking of how packaging is designed and produced.

At the international level bodies such as the Sustainable Packaging Coalition (SPC), EUROPEN and the Sustainable Packaging Alliance (SPA) have converged on five criteria that packaging must satisfy to be considered genuinely sustainable. These cover environmental performance (minimising lifecycle impacts), social function (ensuring the needs of the users are met), economic viability (cost efficiency), intergenerational responsibility (safeguarding future generations) and developmental value (enabling innovation and enterprise growth) (Kozik, 2020). What this framework makes clear is that sustainability cannot be reduced to environmental considerations alone. Firms are expected to satisfy economic, social and developmental requirements at the same time and for SMEs operating with constrained budgets, those requirements can pull them in opposite directions. Investing more in materials may produce better environmental outcomes while simultaneously squeezing margins to the extent that it makes firms very unviable.

While the definitional developments have been made constantly, regulatory pressure is also reshaping the landscape of international trade at the same time. The European Union's Packaging and Packaging Waste Regulation (PPWR) requires that all packaging be either recyclable or compostable by 2030 and this standard affects exporters from every country (Cerqueira et al., 2021). Extended Producer Responsibility (EPR) schemes compound this pressure by holding manufacturers accountable for their packaging long after the point of sale. Amid such regulatory backgrounds, the biodegradable packaging market has managed to expand with

notable speed: valued at USD 452.7 billion in 2021, it is projected to reach USD 812.4 billion by 2030 with an annual growth rate of 6.71% (Petrenko et al., 2024). The Asia-Pacific region alone was expected to account for USD 382 billion of that total by 2025. For Nepal, this trajectory represents both a burden and an opening. Compliance and certification costs are rising but so too is international demand for locally sourced, natural and sustainable packaging solutions.

2.2 Bio-based Materials and Innovation Frontiers

According to Ibrahim et al. (2022), the selection of a packaging material is ultimately governed by three factors: how well it protects the product, what the target market expects and what environmental consequences its production and disposal involve. In the context of Nepal, bio-based and biodegradable alternatives represent the most credible frontier for innovation.

Polylactic Acid (PLA) and starch-based polymers reduce dependence on petroleum-derived inputs and allow packaging to be composted at end of life. Such nature of these bio-based materials aligns them closely with circular economy principles. Natural fibre-based packaging which are made by materials such as hemp, jute, nettle and sal leaf converts agricultural by-products and renewable raw materials into functional packaging without the resource-intensive extraction that conventional plastics would require. Hemp and Lokta plant fibre deserve particular attention in the context of Nepal because both of them grow abundantly throughout the country. They also require minimal agricultural inputs and have been woven into traditional farming and craft practices for centuries (Arya, n.d.; Shrestha et al., 2025).

The problem with PLAs is their high cost. The cost of PLAs is as high as five times as compared to conventional plastic and it is because of this reason, PLAs are not commercially viable given the scale at which Nepalese SMEs operate (Guillard et al., 2018). As a result, sustainable packaging in Nepal is more geared towards natural fibre and leaf-based approaches. They combine low material costs with craft knowledge that is already embedded in local communities and does not need to be imported or expensively acquired.

2.3 Barriers to Sustainable Packaging Adoption at the SME Level

The world collectively agrees on the importance of sustainable packaging but adoption among SMEs still remains limited. Guillard et al. (2018) identify three principal categories of barriers that provides barriers to adoption of sustainable packaging at SME level, and all of these are directly applicable to Nepal.

2.3.1 Technical Barriers

Bio-based materials present processing challenges that conventional plastics do not. Many of them require precise conditions of temperature during manufacture. And many developing countries are not equipped to maintain such conditions. In case of Natural fibres, their quality

fluctuates with the season and varies between suppliers which makes it genuinely difficult to achieve the consistency that buyers expect.

2.3.2 Economic Barriers

Sustainable packaging as well as raw materials cost more to produce. Polyhydroxyalkanoate (PHA), for example, costs about €5 per kilogram but as compared to it, regular plastic costs much less (Guillard et al., 2018). Small businesses can't buy in more volumes, and as a result, they can't get lower prices. In addition to this, they also need new machines, quality control systems and certifications. All of that costs money which they don't have.

2.3.3 Institutional Barriers

Small businesses and companies in Nepal do not have access to packaging experts. For such small scale firms, they find the regulations very complicated and difficult to meet international standards. These days, buyers are also skeptical because they have seen too much greenwashing and they do not trust the sustainability claims. At the same time, they get confused (Boz et al., 2020). The problem in Nepal is that, in Nepal, technical support is weak and industry associations do not have much power and government bodies don't coordinate well with each other (Rajgarhia, 2026). As a result, the whole process gets complicated.

Without access to improved technology, maintaining consistent quality of the product is quite difficult. Geographic and social constraints restrict the base of the customer to local or at best regional markets and many business owners who are genuinely committed to sustainable practices lack the training or peer networks needed to translate that commitment into operational change and finally the production of sustainable packaging (Rajgarhia, 2026). Besides, Shrestha (2025) found that the most significant barriers Nepalese SMEs face were external rather than internal with inadequate infrastructure and unreliable electricity supply beyond skill or knowledge gaps. High upfront costs and restricted access to finance further accelerate these difficulties.

SMEs want to do more for sustainability than they actually do, but they only do the cheap and easy things like route optimisation and efficient warehousing. Researchers like Guillard et al. (2018) and Kharel & Dahal (2020) study each barrier type seperately. Nobody has studied how these barriers affect each other inside one firm and nobody knows if that interaction changes depending on what material the firm uses.

2.3.4 Market Barriers

Sustainable packaging firms in Nepal also face barriers when trying to reach the right markets. International buyers often demand proof of sustainability through certificates and lab testing. Without these, firms cannot even enter the conversation. Nepalese firms also struggle with limited brand recognition abroad. On top of that, minimum order volumes required by large

buyers are often too high for small Nepalese firms to meet. This makes it very hard to get a first order, let alone build a long term relationship with an international buyer.

2.4 Business Model and Product Innovation for Sustainable Scaling

Business Model Innovation (BMI) is about changing how a firm creates, delivers and captures value. It is different from product innovation. For sustainable packaging firms in resource constrained countries like Nepal, BMI is just as important as product innovation for successful scaling. These firms can not compete on price because cheap plastics will always win on price alone. They succeed by serving many needs at once such as social benefits, economic value, environmental benefits and empowerment (Rajgarhia, 2026).

In Nepal, sustainable entrepreneurs often bundle several value creation methods. They not only make packaging but also engage with the community, train people with new skills and engage in environmental restoration. They do this because they don’t have much capital and bundling helps them out. As a result, it helps them to compete in markets where people are sensitive to price.

According to Rajgarhia (2026), a common problem that limits how far Nepalese sustainable enterprises can grow is that many of them rely too heavily on NGO grants and seed capital instead of commercial financing. The distribution channel they use is local and regional, not national or international and they often lack access to critical value-chains services, such as logistics support, quality certification or the facilitation of market linkage or the combination of all. These services rarely work together in Nepal and that is why scaling is difficult.

2.5 Sustainable Entrepreneurship and Internationalisation

Instead of treating environmental and social objectives as supplementary, sustainable entrepreneurship integrates these objectives into the main business model. In developing countries, sustainable entrepreneurs work with very limited resources. They lack capital and modern technologies as well as also lack strong supply chains thereby helping entreprenuers in search of new ideas and they create solutions that help in the wise use of the resources (Rajgarhia, 2026). They use local knowledge and community assests, and these kind of solutions are not usually visible in developed countries.

Greenpreneurship combines nature and business growth with social change but it works by focusing on many goals at once. But money is the biggest problem, so small companies and the ones owned by women have the hardest time to get their loans approved as compared to the large ones , eventually they rely on tiny loans or grants from NGOs (Rajgarhia, 2026).

In simpler terms, internationalisation is the international expansion of a SME when a company starts working outside its own country. Modern theory shows that being green and social is

now a key part of internationalisation and not just a side effect. Companies focusing on green ideas are found doing great in global markets, even with stricter environmental regulations. Good green work improves public reputation and helps with following gloabl rules, which in turn helps the companies in the easier competition at the international market (Geyer et al., 2017).

Regulatory body such as PPWR directly affects Nepalese sustainable packaging firms because it blocks exporters using old packaging but helps firms that are already making compostable products. Whether it is a barrier or advantage is debatable and depends on how early a firm prepared. Gereffi & Fernandez-Stark (2011) in their study studied GVC growth paths and Rajgarhia (2026) also explored green business models in Nepal but neither of them studied how material choice shapes everything, and that is what this study is intended to do.

2.6 Nepal's Sustainable Packaging Sector, Trade Context and Systemic Barriers

Traditionally, the packaging sector of Nepal has been dominated by conventional plastic and similar materials, but in recent times, because of growing environmental awareness and tightening regulatory requirements, some green packaging enterprises have begun to emerge. Companies such as LeafPlus, Biobags Nepal, Natural Fiber Nepal and Biocomp Nepal each have their own niche and they serve different market segments. Some conventional manufacturers also try to incorporate sustainable practices in their manufacture. Besides, export facing logistics companies have become part of this broader ecosystem as well.

What makes Nepal's position unique and distinctive in this sustainable packaging sector is the combination of deep traditional knowledge about local fibres as well as growing interest in modern bioplastics. Hemp, jute and Lokta paper bring centuries of craft expertise to face sustainability challenges. Giri & Chaulagai (2024) in their study among 546 consumers in the Kathmandu Valley found that 95% were willing to pay more for sustainable packaging, which shows demand is real. The problem is not demand, but it is that companies cannot produce enough to meet the consumer demand.

Lokta paper, which is derived from the Daphne plant found in the hill forests of Nepal is a good example of local innovation because, first of all, it regrows its source material within four to five years and second, it has been handmade for generations (Shrestha et al., 2025). Modern studies also found that Lokta paper outperformed expensive imported test papers for detecting waterborne contaminations, meaning it is useful beyond the decorative or achival uses. So, lokta paper can bargain premium pricing based on its authenticity and usefulness (Shrestha et al., 2025)

2.6.1 Nepal's Structural Trade and Export Constraints

In order to understand what difficulties the sustainable packaging firm face in Nepal, it is essential to understand the structural trade constraints that affect all the export sector in the country. Nepal, being a landlocked developing countrry (LLDC) faces more trade costs, approximately 50% higher as compared to other countries who have access to the seas. This reality, i.e., the impact of distance on exports is much stronger for Nepal if comparison is made with other similar countries.. Besides the export volumes of Nepal is somewhere 30 to 60% belows as compared to countries with similar economy (Paudel, 2014). The result is that Nepal imports 14 times than it exports (Sainju, 2021)

Exports were a major part of Nepal's economy in 2000. Today, they make up only a very small share (Sharma, 2023). Other neighbouring countries did not experience the same decline. This shift occurred because of the sharp rise in remittances sent by Nepali workers abroad. As a result, the country began to focus more on importing goods rather than producing items for export. Most factories now depend heavily on imported parts and have very limited capacity to export. Transportation costs are very high and account for around 25 percent of the total product cost. In comparison, this figure is only 13 percent in India. There is also a shortage of testing and certification laboratories in Nepal. Many trade difficulties arise from technical regulations and health standards (Kharel & Dahal, 2020). In addition slow customs procedures and poor coordination between government agencies create major problems for exporters.

Green packaging companies face two pressures at the same time. First, international sustainability rules and the other one, high trade costs. It is true that NGOs in Nepal have helped different firms to develop and bring products to the markets but their support alone has not been enough to make these firms commercially self sustaining. So, the gap between a small project and a real export business is still wide (Rajgarhia, 2026)

2.6.2 Institutional Constraints and the 3Rs Gap

The gap between the ambitions that Nepal as a green country has aimed to achieve and the actual achievements is actually very wide. There has been existence of policies but their enforcement by individual firms is inconsistent. The firms do not materialise the financial commitment that is needed to build a functioning circular economoy (Melles et al., 2025). Most recylcing that happens in Nepal happens informally. The involved workers doing this job usually have no official recognition, no job protection and also no safety rules covering them. On one hand, the consumer awareness of sustainable packaging overall remains limited and on the other hand, it takes a long time for small firms to shift to green materials and actually make profits (Kharel & Dahal, 2020).

2.7 Research Gap and Study Motivation

The review of relevant and exisitng literature described in chapter points some gaps in the exisiting knowledge pertinent to the research objectives of the study. Macro-level studies document global packaging trends and look at regulatory frameworks. They also look at regional market dynamics. Material science research evaluates technical properties of materials and if they are suitable alternatives of sustainability. General SME export literature identifies structural trade constraints which affect Nepalese manufacturers. Sustainable entrepreneurship research documents successful models like local models, com munity-based scaling models across various sectors. Nepalese consumer research confirms that demand for sustainable packaging is real and substantial.

However, no existing research systematically looks at the firm level experience of sustainable packaging companies in Nepal. It is not known how individual companies in Nepal deal with so many problems and constraints at once. They must face money problems and technical issues. They also deal with weak rules and market barriers. There is no study on how these firms use Business Model Innovation (BMI) to grow. It is also not known how they design their value to survive in a developing economy. Existing literature fails to show how these firms sit within the Global Value Chain or GVC. There is little information on what strategies companies use to move up the chain. It is unclear what factors stop them from taking on higher roles like design. Research does not explain how firms handle power gaps when dealing with global buyers. Furthermore, it is necessary to understand how international rules like the PPWR actually change a firm's plan. No data shows if knowing these rules leads to more success abroad. The costs for small firms to follow these rules without help are also unknown. Finally, there is a lack of evidence on how working together in a local system helps a firm grow.

The present study addresses these gaps through a qualitative multiple case study examination of sustainable packaging enterprises in Nepal. It draws on semi structured interviews with f irm founders, managers and ecosystem stakeholders. The aim is to produce an empirically grounded understanding of barriers, strategies and enabling conditions for sustainable pack aging in Nepal. The findings are intended to be analytically generalisable to comparable developing economy contexts. This is particularly relevant to South Asian landlocked devel oping countries (LLDCs) where sustainable packaging transitions are urgent but structurally constrained.

3 Theoretical Framework

This chapter explains the three frameworks used in this study and how they work together as one analytical system. The Sustainable Business Model Canvas (SBMC) looks at how firms are built from the inside. Global Value Chain (GVC) theory looks at how international trade networks shape what firms can do. Sustainable Entrepreneurship theory looks at how founders think and act when resources are limited. Together they cover three levels: firm, system and agency all connected by one central process: internationalisation. Figure 3 shows this integrated system. Each section below explains one component of it.

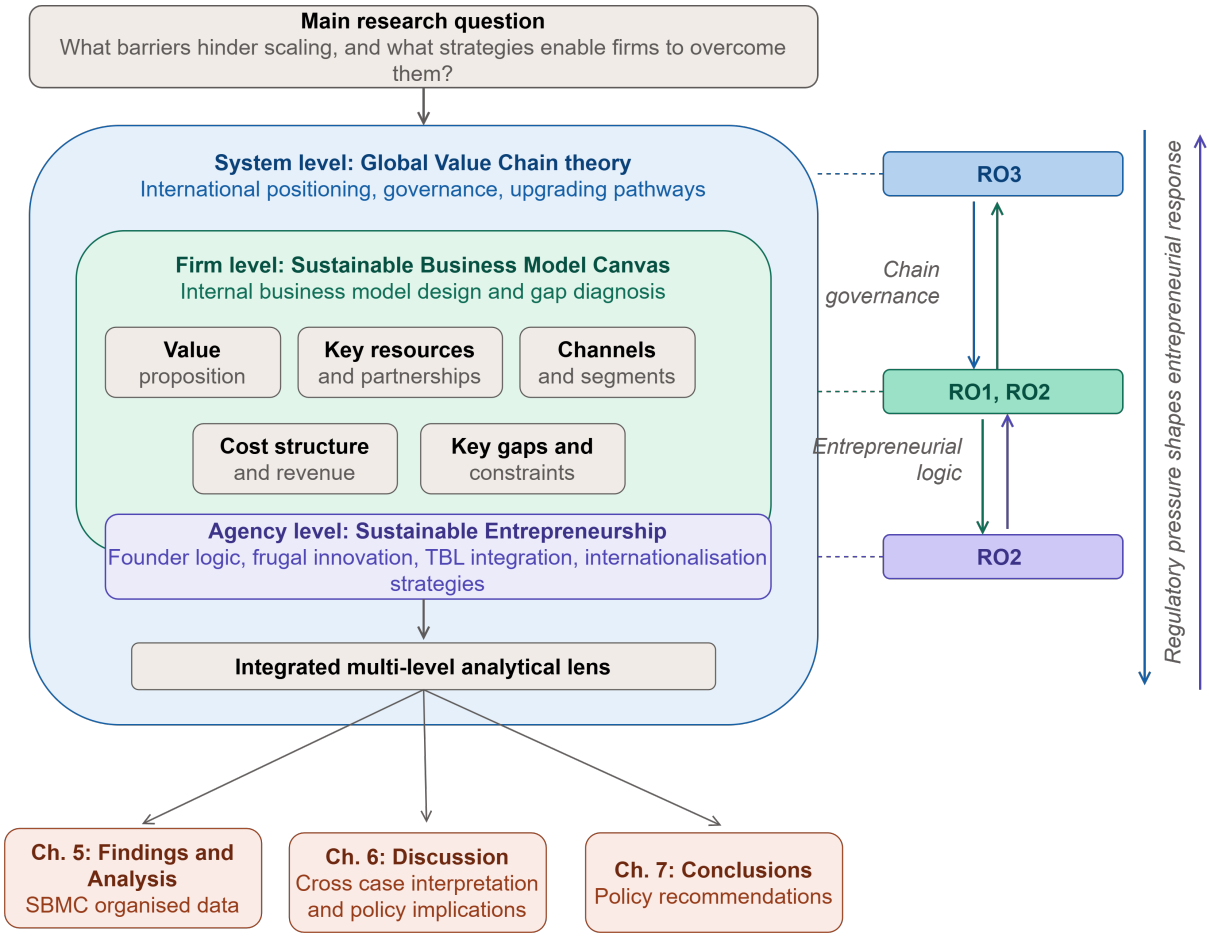

Figure 3: Integrated three-level conceptual framework: SBMC (firm level), GVC theory (system level), and Sustainable Entrepreneurship theory (agency level) and their alignment with the research objectives.

The outermost layer (blue in color) in Figure 3 is the GVC theory which captures international production networks, buyer governance structures and regulatory pressures that Nepalese companies work under. Inside GVC layer, there is SMBC layer (green in color) which analyses different components of SMBC like value propositions, key resources, channels, cost structure and revenue and what the gaps and barriers exist for scaling. And finally at the centre(purple in color), there is sustainable entrepreneurship theory which focuses on the founder and

their way of thinking and dealing with scarce resources conditions while balancing economic, social and environmental goals simultaneously. On the right hand side of the Figure 6, there are badges which indicate which research objectives each theoretical layer adress rather than being any single theory.

3.1 The Sustainable Business Model Canvas

3.1.1 Origins and Rationale

The Business Model Canvas developed by Osterwalder & Pigneur (2013) is used in this study. It shows and explains how organisations create, deliver and capture value. It does this via 9 interwoven components. These components are value propositions, customer segments, channels, customer relationships, revenue streams, key resources, key activities, key partnerships and cost structure.

The Sustainable Business Model Canvas is just an extension of the original Business Model Canvas by adding environmental value and social value in addition to economic value. The main point is that it puts the concept of sustainability at the centre and it does not treat sustainability as an add-on. This is very much relevant for Nepalese sustainable packaging firms because sustainability is very much central to what they do. It makes them different from other competitors in the market, benefits local communities and at the same time creates positive environmental impacts.

3.1.2 The Nine Components Applied to Sustainable Packaging

1. Value propositions:

   In sustainable packaging value proposition cover many sides such as functional performance, social benefits like farmer livelihoods and craft heritage. They also include environmental certification such as biodegradability, compostability and recyclability. Proving environmental claims through certification is critical for Nepalese firms to access international markets.

2. Customer segments

   The rules that a firm has to follow are determined by customer segments. A company selling to big food services faces strict rules on safety and volume as compared to a firm selling to small shops. This is crucial because the decision to choose which rules to adopt influences the needed certificates and the way of the supply chain. Choices of this nature are an very much central component of RO2 for the Nepalese firms.

3. Channels

   In Nepal, one of the largest scaling issues is the channels that the firms use. Nepal is landlocked and this geographical location and barrier creates high logistics costs. Companies then have to rely on intermediaries, trade fairs and networks of NGOs to reach international

buyers. The stance of indiviudal firms in GVC and their internationalisation stage is truly reflected by the channel strategy the firms adopt.

4. Key resources

   For Nepal, key resources are raw materials such as hemp or sal leaves but they come with various tools and skilled resources as well as their spatial and temporal availablity. Their availablity also depends on how good the firms have maintained the realtionship with local community. Overall, the resource configuration reflects potential growth or pitfall and this is directly relevant to RO1.

5. Key partnerships

   Key partnerships are very essential because of scarcity of resources in Nepal including suppliers and shipping companies. Dealing with NGOs or large purchasers is not easy if there is no proper partnership, which is also explicitly stated by the SBMC. It shows which relationships are advantageous to a firm and which ones hold a firm back.

6. Cost structure

   Sustainable materials always cost more than conventional plastics and in Nepal, getting international certifications is very expensive for small firms. Poor roads and landlocked status of Nepal also make logistics pretty expensive. This connects to RO1 established in chapter 1.

7. Customer relationships

   For Nepalse firms, in order to attract foreign customers and develop proper trust with buyers, they have to display the ethical sourcing and tangible environmental impact. It helps them to retain international buyers for long term.

8. Revenue streams

   Revenue streams show how a company generates revenue from its value proposition. Some firms earn through direct export sales while some rely on wholesale orders. Some of them also employ contracts from trade fairs.

9. Key activities

   These are the main tasks that a firm must carry out. For sustainable packaging companies, this includes locating and obtaining raw materials, maintaining high quality and consistency in the raw material and handling the paperwork required for exporting goods.

3.1.3 SBMC as a Diagnostic Tool

Throughout this study, SMBC is used as a dianostic tool by showing where gaps appear across the nine components and by identifying whether these gaps are firm specific or shared across

different sectors. Doing this, it makes possible not only to describe, but also to compare. It is also important to note that SMBC was used as an analytical lens after data collection and not before that. Full application of SMBC to all the selected 10 firms is presented in Chapter 5.

3.2 Global Value Chain Theory

3.2.1 The governance framework, upgrading opportunities and barriers for entry

The theory of GVC examines production that is distributed between different countries and between different organisations. It discusses how value is created, captured and shared within the firms in the value chain. This analysis does not look one company alone, but it follows the whole path of a product. This path consists all the relevant processes such as the design, procurement of raw material, manufacturing, quality inspection, delivery and distribution. The three GVC concepts that are very important for this study are briefly described below:

1. Chain governance

   Chain governance explains the use of power by big buyers and brand owners over their suppliers. For sustainable packaging, this power can be found in green standards embedded in the buying process. These include rules like EN 13432 for compostability, proof of material origin and carbon reports. These rules direct firms in Nepal what they should do to go and find buyers. But the buyer determines the rule and the supplier is responsible for the expenses of complying with it. The PPWR is a clear example of this. It introduces the need for new products with its 2030 rules and constructs a wall because of the higher costs and this is a main part of RO3.

2. Upgrading pathways

   The term upgrading of pathways refers to the improvement of firms' position in their GVC over time. Gereffi & Fernandez-Stark (2011) show four pathways:

   - Process upgrading means more efficient production.
   - Product upgrading means upgrading into higher value categories.
   - Functional upgrading means adding design, branding or direct distribution.
   - Chain upgrading means adding in adjacent value chains.

   Nepalese firms are currently positioned in basic production roles. Upgrading is the pathway through which better internationalisation and improved margin capture becomes possible.

3. Entry barriers

   Entry barriers are the requirements a company has to fulfil to become part of a worldwide value chain. For sustainable packaging, these include cost competitiveness, quality consistency and compliance with green packaging standards as well as other factors.

PPWR and carbon tracking are some of the rules. These regulations were intended to be applied to big factories. The cost of adhering to them is very high for small enterprises in a developing economy.

3.2.2 Relevance to This Study

The three ideas of chain governance, upgrading pathways and entry barriers are linked to RO3. But they also connect to RO1 and RO2 because the barriers firms face and the strategies they use are shaped by where they sit in the global chain. How these concepts play out across the ten firms is examined in Chapters 5 and 6.

3.3 Sustainable Entrepreneurship Theory

3.3.1 Frugal Innovation and Resource-Constrained Contexts

Sustainable Entrepreneurship theories examine how entrepreneurs recognize, assess and leverage opportunities for sustainable entrepreneurship that generate economic value but also minimize environmental damage and generate social benefits. (Dean & McMullen, 2007). This theory is different from the normal entrepreneurship theory in two main aspects. First, it treats environmental and social goals as equal to profit goals rather than as limits on profit. Second, it acknowledges that a second entrepreneur in developing countries has issues that normal theory based on developed countries does not cover. These include limited resources, weak institutions and poor infrastructure.

In resource-constrained developing countries like Nepal, a different approach to innovation is used. Local knowledge, community relationships and indigenous materials are used rather than large amount of imported materials and this sort of innovation is referred to as frugal innovation. These are simply not cheaper versions of methods found in the developed countries rather, they are entirely distinct models that make use of the local assets. That cannot be accessed by the large industrial producers (Rajgarhia, 2026). This approach is directly relevant to Nepal's sustainable packaging sector, where firms compete not on price or volume but on material authenticity, traditional craft skill and community-based production that industrial competitors cannot replicate.

The Triple Bottom Line (TBL) is the principle for measuring success with frugal innovation. It considers economic, environmental and social value at the same time. For firms in Nepal, TBL is more than just a reporting tool. It is a way of marketing. Creating all three kinds of value simultaneously is their main competitive strength in international premium markets.

3.3.2 Greenpreneurship and the Scaling Ceiling in Nepal

Greenpreneurship combines environmental sustainability with business innovation and socioeconomic development (Rajgarhia, 2026). This is a way of thinking that is compatible with Nepal's sustainable packaging sector well. All businesses in this industry generate products,

generate employment in a community, create skills and help in the restoration of the environment. This creates multiple types of value at once rather than focusing on profit alone. But there is also a big issue which is known as the scaling ceiling within the Greenpreneurship framework. Many green firms in developing countries start well with NGO support and local networks, but when they try to grow into commercially viable international businesses, they face a certain ceiling. This is due to the lack formal financing mechanisms, global logistics access and help with certification. How firms try to break through this ceiling is a central question in this study and it directly connects to RO2.

The framework can also be used for companies in various stages of sustainability transition. Not all firms in this study, all of those who identified as entrepreneurs are considered as green entrepreneurs. Some are traditional manufacturers making their transition toward sustainable practices. Including such firms helps show the difference between firms built on a sustainability mission from the start and those that are transitioning under pressure from regulations and market demand. Both have to deal with internationalisation challenges, yet through different mechanisms.

3.4 Integrated Conceptual Framework

Internationalisation is the main process linking the three frameworks introduced in this study. The very starting point of this study is that the companies in Nepal are striving to expand their businesses into the international market for sustainable packaging. The different frameworks will touch on different aspects of that process.

GVC theory is concerned with the external structure of global markets firms who are seeking to invest in. It identifies those firms' current position in global trade networks, the governance pressures that buyer-driven trade chains impose on them and the upgrading pathways open to them for advancing to higher value roles. The SBMC provides an explanation of how firms set up their internal organisation to make the internationalisation possible. Internationalisation success or failure is explained at the firm level by the gaps in a firm's canvas, in resources, in partnerships, in channels or in cost structure. The agency dimension is explained from the Sustainable Entrepreneurship theory. It illustrates the worldview of the founders in resource-poor environments, such as Nepal and how they internationalise differently from business start-ups in more developed economies. They are thrifty innovators, they relay local information and local resources to create internationally competitive products that cannot be imitated by industrial producers.

A single framework is insufficient on its own. It is not possible to answer these questions by using the SBMC alone: why some gaps arise and why some companies are not able to enter foreign markets at all. These internal dynamics cannot be captured by GVC theory. Neither

framework can explain the special innovation logic that is typical of Nepalese sustainable packaging entrepreneurs without Sustainable Entrepreneurship theory.

Table 1: Integrated conceptual framework: analytical levels and research objective alignment.

Framework	**Level of analysis**	**Research objectives addressed**
SBMC	Firm level: internal business model design and gap diagnosis	RO1, RO2
GVC theory	System level: international positioning, governance, upgrading and internationalisation pathways	RO3
Sustainable Entrepreneurship	Agency level: founder logic, resource constraints, TBL integration, internationalisation strategies in resource-constrained contexts	RO2

Table 1 presents how all the three frameworks address all the research objectives. The SBMC focuses on the barriers and configuration of the business model in the firm. GVC theory is about global positioning and internationalisation pathways. Sustainable Entrepreneurship theory examines the practices of resource-poor entrepreneurs' adaptation and innovation. This mix depicts how all three levels would interact to decide if a company in Nepal is capable of international expansion.

4 Methodology

In this chapter, the research design that has been chosen for this study is explained. The decisions made here are based on the research questions established in chapter 1 and the theoretical framework introduced in chapter 3. The main research question, i.e., what barriers stop Nepalese sustainable packaging firms from growing internationally also asks how entrepreneurial strategies help firms overcome those barriers and these are not a simple yes or no questions, but rather about real real experiences, real decisions and real constraint. They cannot be answered with numbers alone. A research approach that can go deep into what firms actually do and why they do it is needed.

Figure 4 shows how the research design flows from start to finish. Each step builds on the one before it. The research philosophy shapes the design and the design guides the sampling. Consequently, the sampling determines how data is collected and finally the data collection feeds into the analysis and findings. It is made sure that quality checks run through every step.

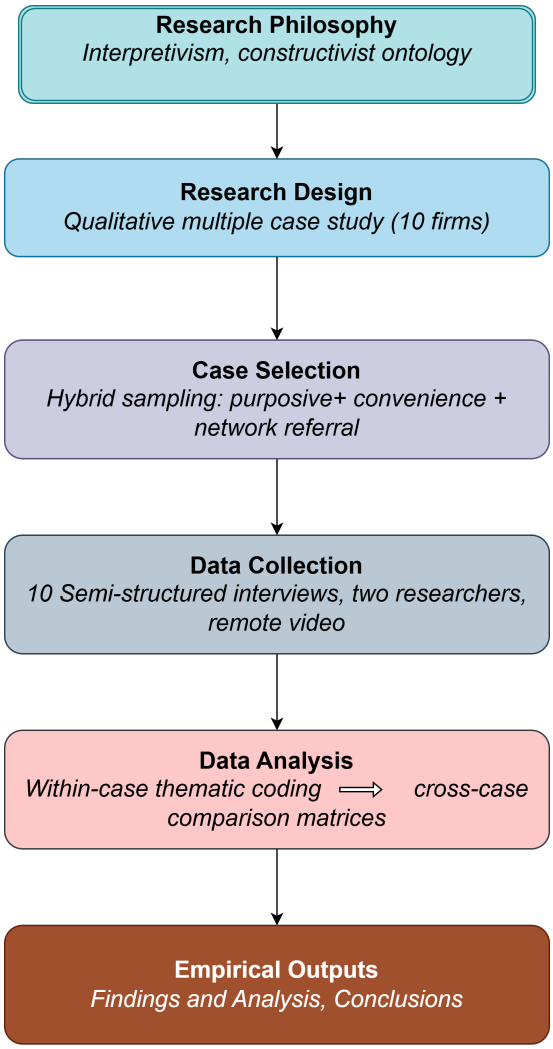

Figure 4: Research design overview: from philosophical orientation through data collection and analysis to empirical outputs.

4.1 Research Philosophy

This study, first of all, takes an interpretivist philosophical orientation. Interpretivism philosophy means that social phenomena cannot be understood without looking at the meaning people give to them (Burrell & Morgan, 2019; Saunders et al., 2011). The barriers faced by sustainable packaging firm are not simple facts. They are felt, interpreted and responded to in different ways depending on the person and the situation. One firm might see certification costs as something impossible. Another might see them as something to work toward. Understanding this kind of difference requires methods that go into how people think and act, not just methods that count outcomes (Packard, 2017).

This study also adopts a constructivist ontological position. The picture of barriers, strategies and ecosystem dynamics that comes out of this study is built from the views and experiences of the people interviewed. It is shaped by the analytical frameworks used and by the specific time and place of the fieldwork (Guba et al., 1994). This does not make the findings less useful or less valid. It means the conditions that produced the findings need to be clearly explained, which this chapter does.

One thing needs to be made clear here. The SBMC was used as an analytical lens to organise and interpret what firms said, not as a data collection framework. When barrier patterns, cost structures or firm archetypes appear in the findings, these reflect an interpretive reading of the interview data. They are not ratings or scores that interviewees were asked to give. This is consistent with how qualitative research in the interpretivist tradition works, where meaning is constructed through analysis rather than extracted directly from responses (Braun & Clarke, 2006). Comparisons across firms, groupings by material type and pattern descriptions are all researcher-level interpretations grounded in interview evidence.

It is also important to note that using structured tables and classifications in the findings does not mean this study takes a positivist position. In qualitative interpretivist research, typologies and comparison matrices are tools for organising and communicating researcher interpretations (Patton, 2014). They do not measure or score reality. They reflect the researcher's reading of what interviewees described. The classification labels, comparison matrices and strategic archetypes used in Chapter 5 are all researcher constructions built from interview evidence. They are not objective categories that exist independently of the analysis.

4.2 Research Design: Qualitative Multiple Case Study

This research uses a qualitative multiple case study design (Figure 4). Case study research is the right approach when research questions ask how and why something happens (Yin, 2018). It is also right when the researcher does not control the situation being studied and when the focus is on something happening in the real world right now. Using this knowledge, this study asks

the selected firms how they navigate through the barriers and why certain strategies work. It is made sure that the firms are observed rather than controlled. Sustainability transitions that are happening in Nepalese sustainable packaging sector right now are the focus of this study.

For this study, 10 different firms were selected because using multiple cases instead of one makes the findings and analysis stronger. A single case study is hard to separate from that one firm's unique situation. Multiple cases allow patterns to emerge across firms. They also show meaningful differences across product types, firm stages and market orientations. This is directly needed to answer RO1 and RO2.

4.3 Sampling Strategy

Case selection used a mix of three approaches. The first was purposive selection based on clear criteria. The second reflected geographic convenience. The third used network referrals. Together these three approaches balanced systematic comparison with the practical realities of doing fieldwork in a developing economy.

4.3.1 Purposive Dimension

The main sampling approach was purposive. Four clear criteria guided the selection.

First, material and product diversity: The cases cover the full range of sustainable packaging materials found in Nepal. These include bioplastics (Biobags Nepal), recycled and waste based packaging (Paramendo Nepal, Bottlers Nepal Limited), natural fibres (Natural Fiber Nepal, Nepal Felt Craft Industry, Nepal Art Shop Export and Import), biocomposites (Biocom Nepal) and leaf based tableware (LeafPlus Nepal). This makes sure the findings reflect the full range of technical and market challenges across material types.

Second, variation in export orientation and firm stage: The cases range from early stage export oriented firms (LeafPlus Nepal, Biocom Nepal, Biobags Nepal) to established international exporters (Natural Fiber Nepal, Nepal Art Shop) to domestic firms just beginning sustainability transitions (Quality Roto Packaging). Development stage classifications used in Chapter 5 were assigned by the researchers based on three observable criteria drawn from interview content: the interviewee's own description of the firm's current growth trajectory and the firm's reported level of export activity. These classifications are made by the researchers and they were not explicitly reported by the interviewees, which eventually allows the study to examine the barriers and strategies and how they change as firms grow and develop in the international market.

Third, firm type and scale diversity: The cases selected in this study consist of a wide variety of firms ranging from small social enterprises to medium sized producers as well as a conventional industrial firm transitioning toward sustainability. Additionally a large multinational subsidiary

and a logistics company is also selected. Such a mix helps to give a complete picture of this packaging sector.

Fourth, ecosystem coverage: Cargo Nepal is not a packaging firm but rather a logistics one but including it in this study helps to capture the export logistics constraints from the inside of the logistics system. Firms with NGO connections were also included. Overall, this captures institutional dimensions that producer firms alone can not fully explain.

4.3.2 Geographic Dimension

Most of the selected firms are mostly centred around the Kathmandu valley while some extend to Bhaktapur (Biobags Nepal), Bhairahawa and Rupandehi (Quality Roto Packaging) and eastern Nepal and Jhapa (LeafPlus Nepal). This reflects where sustainable packaging firms are actually located and also the practical difficulty of carrying out fieldwork in a landlocked and geographically challenging country.

4.3.3 Network Referral Dimension

Some cases were identified through existing NGO and sustainability network relationships. Biocom Nepal, Natural Fiber Nepal and LeafPlus Nepal were found this way. This is a common and accepted approach in qualitative research in developing economies. Specialised firms are often found through collaborative intermediaries rather than through random sampling (Yin, 2018).

Table 2 lays out the full case portfolio from a sampling standpoint, showing the reasoning behind why each firm was brought into the study. The ten firms together represent a significant part of Nepal's currently active sustainable packaging ecosystem. They cover the major material types, firm stages and market orientations found in the sector. While they are not a complete census, they form a strategically diverse and theory relevant case portfolio as summarised in Table 2.

The ten case sample also proved analytically sufficient. The core barrier categories were consistently confirmed across the later interviews without introducing new themes. This provided confidence that theoretical saturation had been reached (Fusch Ph D & Ness, 2015; Guest et al., 2006).

4.4 Data Collection: Semi-Structured Interviews

Primary data were collected through semi-structured interviews. One representative from each of the ten firms was interviewed. This gave a total of ten interviews. Each interviewee was selected because they had the most direct knowledge of their firm's packaging strategy, export activities and barrier experience.

Table 2: Case portfolio: ten firms representing material types and ecosystem roles.

Firm	Type / Material	Primary Role in Study
Biobags Nepal	Producer: biodegradable polymers	Core sustainable producer; biopolymer innovation
Paramendo Nepal	Producer: recycled and upcycled plastics	Waste-centric circular model; ecosystem actor
Nepal Art Shop	Producer: Lokta paper and hemp products	Cultural heritage and sustainability integration
Nepal Felt Craft	Producer: handmade wool felt products	Traditional craft company; fair trade and women's empowerment
Quality Roto	Producer: conventional flexible plastics	Conventional firm beginning sustainability transition
Biocom Nepal	Producer: biocomposites from agricultural waste	Innovation model; agricultural waste valorisation
Bottlers Nepal	Producer: PET and recycled plastic bottles	Large-firm systems perspective; recycling infrastructure
Natural Fiber Nepal	Producer: hemp and jute fibres	Scaling through network model; social impact
Cargo Nepal	Logistics and freight forwarding	Ecosystem enabler; export logistics constraints
LeafPlus Nepal	Producer: sal leaf tableware	Social enterprise; natural material innovation

In practice, the interviewees held a range of roles. These included an operational director at Natural Fiber Nepal, a company representative with direct waste management knowledge at Paramendo Nepal, a production manager at Biobags Nepal, a product manager at LeafPlus Nepal, a logistics operations officer at Cargo Nepal, a production supervisor at Nepal Felt Craft, an employee with product and operations knowledge at Quality Roto Packaging and Biocom Nepal, and senior operations representatives at Bottlers Nepal and Nepal Art Shop. In smaller firms, operational staff often hold direct strategic knowledge that in larger firms would sit at the executive level. In all cases, interviewees were confirmed to have first hand knowledge of the topics before the interview began.

Semi-structured interviewing was chosen for three reasons. First, it allows the same core topics to be covered across all ten cases so the findings can be compared. Second, it allows flexibility

to follow new insights that come up in each specific firm. Third, it draws out the expertise of operational staff in a way that a fixed questionnaire cannot.

All interviews were conducted remotely via video conferencing in English. Each interview lasted between 30 and 45 minutes. Both researchers, Janaki Devi Chaudhary and Sagar Shrestha, took part in all ten interviews. Questions were shared across interview guide sections. This allowed real time probing from two analytical perspectives. Interviews were audio recorded with explicit prior consent from all participants. Two interviewees requested that their cameras remain off. This preference was respected and had no impact on the content of either interview. Full transcripts were produced from all ten recordings. Field notes were also kept during and after each interview to capture observations that the audio record alone could not capture. No secondary documents were used as formal data sources in the coding process. However, publicly available information such as company websites, registration details and publicly accessible product descriptions was consulted informally to verify basic firm details such as founding year, product range and market presence. This contextual verification supported the interview data but did not form part of the analytical coding. All analytical findings and interpretations are based on the ten interview transcripts.

The interview guide had five thematic sections. The first covered company background and packaging products. The second covered sustainable practices and raw material sourcing. The third covered barriers to scaling and internationalisation, which connects to RO1. The fourth covered opportunities and strategic responses, which connects to RO2. The fifth covered future vision and ecosystem support needs. The full guide is provided in Appendix A.

The SBMC was applied as an analytical lens after data collection, not as a data collection framework. Most SBMC components were addressed through the interview questions either directly or indirectly. For example, cost structure was explored through financial challenge questions in Section 3, key partnerships through collaboration questions in Section 4, and value proposition through product differentiation questions in Section 4. However, some components such as revenue streams and customer relationships were not systematically asked about in every interview. Where these gaps exist, the findings reflect what interviewees raised naturally rather than responses to direct questions. Where SBMC components were not addressed in a given interview, those cells are omitted from the comparison tables in Chapter 5 rather than inferred.

Data relating to business model components such as channels, customer segments and cost structure was not always collected through direct questions. In many cases this information emerged naturally as interviewees described their operations, markets and challenges. The SBMC was then used as a lens to organise and interpret what was said. In Appendix B, a detailed coding document can be found which shows the coding trail and makes this study transparent.

It maps every SBMC component and barrier classification in Chapter 5 to the specific transcript evidence and interview guide section it came from. Moreover, the interview guide which can be found in Appendix A was designed by focusing RO1 and RO2 and no questions were asked explicitly how barriers interact or compound as well about GVC positioning or upgrading pathways. So, the barrier interaction patterns and strategic archetypes described in Chapters 5 and 6 are analytical inferences drawn from cross-case comparison and not from the direct responses of the interviewees. It is also according to how qualitative thematic analysis works, where patterns emerge from interpreting data across cases (Miles et al., 2014). These gaps are acknowledged as limitations of the study and are discussed further in Chapter 7.

4.5 Data Analysis

Data analysis moved through two levels. The first was transcript coding. The second was cross case synthesis.

Transcripts were read in full and coded by theme. The coding scheme came from the three theoretical frameworks in Chapter 3. Initial codes were grouped under five barrier categories. These were economic, technical, institutional, market and logistics barriers. Logistics was retained as a distinct category because it came up consistently across nine of ten cases and works through mechanisms that are separate from institutional constraints, including landlocked geography, transit taxation and customs delays. Four strategy categories were also used. These were business model innovation, operational adaptation, partnership development and GVC positioning. This deductive coding framework gave structure to the analysis. At the same time it stayed open to new codes that came from the data itself, making the overall approach inductively informed.

Coding moved through two cycles according to Cooper (2009). Codes were assigned line by line to each transcript making sure to capture the specific language, examples and concerns of each interviewee in the first cycle. While in the second cycle, the codes obtained from first cycle were grouped into pattern codes that linked individual observations to the deductive framework categories. In the cases when new codes appeared which did not fit existing categories, they were kept separate and were checked across cases before being included. These two cycles kept the coding grounded completely in the data as well as maintained structure for cross case comparison.

Cross case analysis followed after the coding of the transcript. Patterns were examined across all ten cases through comparison matrices. These were organised by barrier type, strategy employed, export orientation, material category and GVC positioning. This matrix approach is recommended by Miles et al. (2014). It helps identify universal patterns versus firm specific ones. This directly addresses the comparative dimensions of RO1 and RO2.

The SBMC served as the primary organising structure for cross case comparison. Mapping interview data onto each firm's Canvas helped identify where barriers clustered and where firms had developed responses. This gives the analytical foundation for Chapter 5 and the interpretive discussion in Chapter 6.

Throughout the analysis, attention was paid to distinguishing systemic barriers from firm specific ones. Where the findings describe barrier patterns across firms, these reflect an interpretive reading of what interviewees described. Labels such as frequently mentioned or consistently raised reflect how often a theme appeared across the ten cases, not numerical scores or ratings that interviewees were asked to provide. Where an interviewee used strong language such as major barriers, very hard or very expensive, the barrier is described as strongly constraining. Where a barrier was mentioned but appeared manageable, it is described as partially constraining. Where a barrier was not raised or described in neutral terms, it is described as not prominently raised. It should be noted that not prominently raised does not mean the barrier is absent. In some cases, particularly Quality Roto Packaging, barriers were simply not discussed in the interview rather than being reported as non-existent. This distinction is important when reading the barrier tables in Chapter 5. Firm archetypes and cost pattern descriptions in Chapter 5 are researcher constructions built from qualitative evidence, not measurements (Braun & Clarke, 2006). This approach is consistent with the interpretivist position of the study and with how thematic analysis works in qualitative case research (Miles et al., 2014).

4.6 Quality and Rigour

Qualitative research quality is assessed through four criteria adapted to the interpretivist approach. These are credibility, transferability, dependability and confirmability (Anney, 2014).

Credibility was established in several ways. Cases were selected purposively to make sure interviewees had direct and substantive knowledge of the topics. All interviews were audio recorded and fully transcribed. Three theoretical frameworks were used to cross check interpretations. Two researchers took part in all ten interviews and analytical observations were compared after each one.

Transferability is supported by detailed description of the research context, the case characteristics and the analytical procedures. The goal is analytical generalisation rather than statistical generalisation. The findings are meant to be transferable to comparable sustainable packaging contexts in developing economies, especially South Asian landlocked developing countries. Readers can judge applicability based on how similar their context is (Yin, 2018).

Dependability is supported by the consistent use of the same interview guide across all ten cases. The theory informed coding framework also ensures analytical consistency throughout.

Confirmability was addressed by grounding all interpretive claims in direct interview evidence. Representative quotations and case specific examples are presented in the findings chapter to show where the interpretations come from.

4.7 Ethical Considerations

This study followed the ethical principles that are generally followed in academic research which involves human participants. Before each interview was conducted online, they were informed about the interview by explaining their rights, the purpose of the interview and how the data would be used. All the ten participants from each firm gave the informed consent before the start of the interview. They were also informed that the interview and the participation was completely voluntary and they could withdraw at any time.

To ensure data security, all recordings and transcripts are kept securely and are accessible only to the research team. Firm names are used in the analysis with participants' knowledge and consent. The firms are the analytical units of interest. Anonymising them would make cross case comparison impossible. Data will be retained for the duration required by the institution's research data management policy and will not be shared with third parties without explicit participant consent.

5 Findings and Analysis

This chapter presents and analyses empirical findings from ten case studies of Nepalese sustainable packaging enterprises. The findings are organised around the Sustainable Business Model Canvas (SBMC) framework developed in Chapter 3. Rather than describing each firm one by one, findings are presented through comparative tables and structured synthesis. This approach reveals which barriers are universal, which vary by material type or firm stage and where strategic variation occurs. Analysis is embedded throughout. It draws on interview evidence to interpret patterns at the firm and sector level. The SBMC is used here as an analytical lens to organise and compare what firms described in their interviews, consistent with how it was applied in Chapter 4.

The ten firms span four material categories. These are biopolymers (Biobags Nepal), recycled and waste based systems (Paramendo Nepal, Bottlers Nepal Limited), natural fibres (Natural Fiber Nepal, Nepal Felt Craft, Nepal Art Shop Export and Import) and biocomposites (Biocom Nepal). Three additional cases provide ecosystem perspective. Quality Roto Packaging is a conventional plastics firm that is beginning a sustainability transition. Cargo Nepal is a logistics enabler whose operations reveal the export infrastructure constraints that all firms face. LeafPlus Nepal produces sal leaf tableware and bridges natural materials with technology innovation. Together these cases capture the full range of material types, firm development stages and market orientations present in Nepal's sustainable packaging sector.

The barrier patterns described in this chapter are based on an interpretive reading of the interview data. Interviewees were not asked to rate or score barriers directly. Instead, each firm's description of its challenges across economic, technical, market, institutional and logistics dimensions was analysed and an interpretive judgement was made about how prominently each barrier featured in that firm's experience. Where a barrier was raised repeatedly, described as a major obstacle or was central to how the firm's situation was explained, it is described as strongly constraining. Where a barrier was mentioned but ways of working around it had been found, it is described as partially constraining. Where a barrier was not raised or was described as manageable, it is described as not prominently raised. It should be noted that not prominently raised does not mean the barrier is absent. In some cases barriers were simply not discussed in the interview rather than being reported as non-existent. These patterns are researcher constructions based on qualitative evidence, not scores assigned by interviewees.

The tables throughout this chapter organise these researcher interpretations. They do not measure or score reality. They reflect what interviewees described, read through the analytical lens of the integrated framework developed in Chapter 3.

5.1 Case Portfolio Overview

Table 3 looks at the same ten firms but from a different angle than Table 2 in Chapter 4. Rather than focusing on why each firm was selected, this table is concerned with what each one brought to the analysis.

Table 3: Case portfolio overview: ten firms with material types, development stage, market orientation and core strengths.

Firm	Material Type	Stage	Primary Market	Core Strength
Biobags Nepal	Biodegradable polymers	Growth	Export (emerging)	First-mover innovation
Paramendo Nepal	Recycled and upcycled	Early	Community-based	Waste valorisation
Nepal Art Shop	Lokta paper and hemp	Established	International	Cultural heritage
Nepal Felt Craft	Wool felt handmade	Established	International	Fair trade and women empowerment
Quality Roto	Conventional plastic	Established	Domestic	Industrial capacity
Biocom Nepal	Biocomposites	Growth	Emerging export	R&D innovation
Bottlers Nepal	PET and recycled	Large corporate	Domestic	Systems approach
Natural Fiber Nepal	Hemp and jute fibre	Established	International	Decentralised network
Cargo Nepal	Logistics and freight	Established	Trade facilitation	Customs expertise
LeafPlus Nepal	Sal leaf tableware	Early, export-focused	Export and domestic	Social enterprise, natural materials

The focus here is on material type, development stage, market orientation and the particular strength each firm offered as a case. It gives an overview of each firm's material type, stage of development, primary market orientation and core competitive strength. The ten firms were chosen deliberately to provide diversity in these areas. Six firms produce sustainable materials. One is a conventional manufacturer beginning a sustainability transition. One is a large corpo-

rate with systems level recycling operations. One provides logistics services. And one bridges multiple categories through technology enabled natural material processing.

Of the ten firms, six have established or emerging international export activity. Three remain primarily domestic. One provides logistics support to exporters. Development stage labels used throughout this chapter reflect researcher classifications based on interview descriptions of growth trajectory and export activity, as explained in Chapter 4. Where an interviewee described their firm as a startup but with active export orientation, the label reflects both dimensions rather than startup status alone. The portfolio therefore spans both mature enterprises and early stage ventures. Natural fibre producers make up the largest material cluster. They are also the most export oriented. This suggests that Nepal's craft infrastructure and heritage provide a relatively accessible pathway to international markets.

One pattern is consistent across all ten firms. Every firm positions sustainability, whether environmental, social or both as a core part of its value proposition. This includes firms that are still rooted in conventional materials but are beginning to change.

5.2 The SBMC: Business Model Comparison Across Firms

The Sustainable Business Model Canvas is the main organising structure for comparing how firms integrate environmental, social and economic value creation. Table 4 maps each firm across five SBMC components that are most diagnostically relevant to the scaling and internationalisation challenges examined in this study. The remaining four components (customer relationships, revenue streams, key activities and customer segments) are addressed selectively in the cross case discussion where interview evidence directly speaks to them. These are the value proposition, key resources, key partnerships, distribution channels and the primary cost challenge that constrains scaling. Where interview evidence did not directly address a component for a specific firm, entries reflect the closest available contextual description rather than a direct response. This applies particularly to Cargo Nepal, whose SBMC entries describe logistics operations rather than a packaging business model. Three patterns emerge consistently across the sample.

The information seen in Table 4 were derived from the inductive coding of the interview transcripts. Business model details like channels, cost structures and partnerships were not always collected through direct questions but it came up naturally as the invited interviewees described their operations and challenges. This information containing the full coding trail with evidence is also properly presented in Appendix B.

One clear pattern that can be observed across all the ten firms is the universal resource gap. Every firm lacks either capital, technology or certification needed for international scaling or

a combination of all of them. Again, this gap looks different depending on material type. For example, biopolymer firms struggle with processing technology, natural fibre firms lack certification, recycled material firms face collection and processing problems. The appearance of such kind of gaps points to a systemic constraint rather than a firm specific weakness.

Table 4: SBMC component comparison across all the firms: value creation, key resources, partnerships, distribution channels and primary cost challenge.

Firm	Value Proposition	Key Resources	Key Partnerships	Channels	Cost Challenge
Biobags	Biodegradable, fossil-free	Plant-based polymers (partly imported), limited tech	NGO, limited buyers	Intermediaries, trade fairs	Higher cost from plant-based inputs
Paramendo	Waste to value, circular	Collected plastic waste, recycling machinery	Waste collectors, NGOs, local govt	Domestic B2B, institutional	Processing cost, contamination handling
Nepal Art Shop	Heritage, sustainability, crafts	Lokta fibre, hemp, artisans	Farmer networks, intl distributors	Direct export, established	High labour, logistics via India
Felt Craft	Fair trade, handmade; women	NZ wool, eco-dyes, artisans	Fair trade networks, retailers	Intl retailers, direct export	Import dependency (wool), high labour
Quality Roto	Cost efficiency; product protection	Industrial machinery; plastic resin	Domestic buyers	Domestic retail, B2B	Price competitiveness in domestic market
Biocom	Circular, agricultural waste to material	Agricultural waste, R&D capacity	NGO, donors, government	Emerging domestic, B2B	High R&D cost, market readiness gap
Bottlers Nepal	Recyclable, circular, scale	Industrial machinery, PET collection	Retail partners, government	National distribution	Recycling infrastructure dependency
Natural Fiber Nepal	Local, circular; social employment	Local jute and hemp, artisans	Farmer networks, intl buyers	Direct export; established	High labour, limited scale
Cargo Nepal	Efficient export logistics	Fleet; warehouse, customs expertise	Exporters, freight partners, govt	Air and sea freight options	High transportation cost, customs delays
LeafPlus	Zero plastic, biodegradable; natural	Sal leaves (local, seasonal), processing machinery	Rural leaf collectors, distribution partners	Export and domestic retail	Seasonal supply; processing energy cost

The other pattern observed is the partnership dependency, especially among the early stage and social enterprises. Firms like Biobags, Paramendo, Biocom and LeafPlus rely heavily on

NGOs and development organisations for technical support, market access and seed funding while the established exporters like Nepal Art Shop and Natural Fiber Nepal have built their own commercial buyer networks making them less independent on institutional intermediaries.

The third pattern observed is that the the development stage of each firm's largely affected the channel maturity. Established exporters with year of experience of attending trade fairs and fulfilling repeat orders have built multiple direct relationships but emerging firms depend almost on intermediaries and NGO-facilitated market linkages which results in the lower margins and less stable demand.

Amid such analysis and observations, Cargo Nepal being a logistics operator rather than a packaging firm occupies a rather different position. The value proposition of Cargo Nepal revolves around export facilitation and its key resources are customs expertise, freight networks and warehouse capacity. It mostly partners with exporters and international freight provides and faces cost challenge of high transportation costs and custom delays, which ultimately affect all the exporters. The SMBC for Cargo Nepal shows no typical packaging business model rather it highlights logistical constraints which every producer firm faces but can not control on its own. As a result, cargo Nepal behaves as a critical ecosystem actor in the analysis.

5.3 Key Resources and Capabilities

Across all the ten firms selected, resource configurations vary considerably ranging from material sourcing, technology sophistication, certification status to human capital and financing models which is also presented in Table 5.

The certification landscape is sparse across all the firms because most of them either lack formal international certifications or are in early stages of pursuing them. This is supported by certification status of different firms. For example, Nepal Felt Craft operates under fair trade principles but formal certification was not confirmed while Paramendo has engaged with Nepal's carbon credit portal but it is a domestic mechanism not an international standard. Rest of the firms have no international certifications and this sort of certification gaps is one of the most significant barriers to premium markets because international buyers demand third party verification and without such certification, it is very much difficult for firms to enter the competition.

Another distinction was also observed how the firms source materials. They either source the materials locally or rely on imports. Biobags imports plant based polymer resin and Nepal Felt Craft imports wool from New Zealand and both of them are exposed to currency fluctuations, supply chain disruptions and cost volatility. Seema Tharu specifically mentioned that the import of wool creates exposure to international price changes. All other firms source their

materials domestically: Natural Fiber Nepal from farming communities, LeafPlus sal leaves locally, Nepal Art Shop Lokta fibre from hill forests, helping in the reduction of supply chain risks. But domestic sourcing of materials also introduces seasonal variability especially for sal leaves and hemp.

Table 5: Key resources and capabilities of the case firms: raw materials, processing technology, certifications, human capital and financing model.

Firm	Raw Materials	Processing Technology	Certifications	Human Capital	Finance Model
Biobags	Plant-based polymers (partly imported)	Technology gap in processing	None obtained	Limited technical expertise	NGO grants and commercial revenue
Paramendo	70% local plastic waste, 30% trade waste	Machinery imported from India and Europe	Carbon credits (in progress)	Training in progress	NGO and social finance
Nepal Art Shop	Local Lokta fibre and hemp	Manual handcrafting	None obtained	Experienced artisans	Revenue-driven
Felt Craft	Imported NZ wool and eco-dyes	Manual handfelting	Fair trade principles (status unconfirmed)	Skilled artisans	Revenue-driven
Quality Roto	Petroleum plastic resin	Industrial scale	None	Experienced management	Revenue-driven
Biocom	Agricultural and organic waste	R&D stage	Pursuing sustainability standards	Technical R&D team	NGO grants and donor funding
Bottlers Nepal	Virgin PET and collected recyclate	High-speed industrial bottling	Operational quality systems	Large professional team	Corporate revenue
Natural Fiber Nepal	100% local jute and hemp	Manual handweaving	None confirmed	Artisan network	Revenue-driven
Cargo Nepal	N/A (service provider)	Customs and logistics systems	Operational licensing	Licensed customs agents	Revenue-driven
LeafPlus	Locally sourced sal leaves (seasonal)	Manual processing and aggregation	Pursuing international standards	Technical and founder-led	NGO seed funding moving to growth stage

Technology sophistication is divided rather than uniformly weak. Industrial scale firms such as Quality Roto and Bottlers Nepal operate established machinery. Artisanal firms such as Nepal Art Shop, Felt Craft and Natural Fiber Nepal rely on manual hand-crafting. Hybrid firms such as LeafPlus combine processing machinery with manual collection and aggregation. The technology gap is therefore type dependent. Firms that need R&D intensive processing such as Biobags and Biocom face acute technology constraints. Firms that use established craft techniques face labour cost constraints instead. As Rahul Visenkay of Paramendo noted, even basic recycling machinery had to be imported from India and Europe because in Nepal there is no capacity to build or work with these technologies.

Financing models differ according to the firm type. Social enterprises such as Biobags, Paramendo, Biocom and LeafPlus depend on NGO grants and donor funding for starting capital. This model helps them begin operations. However, it creates strong dependency. When grant money ends, scaling becomes very difficult. Commercially established firms such as Nepal Art Shop, Felt Craft, Natural Fiber Nepal and Quality Roto reinvest their own operating revenue. Bottlers Nepal is a large corporate subsidiary. It finances itself through internal corporate capital allocation.

5.4 Market Positioning and Customer Access

The entries in Table 6 are based on interview evidence coded in Appendix B. Where interviewees described their customers, geographic reach or pricing position directly, those descriptions were used. Where this information was not stated explicitly, it was inferred from descriptions of operations and market activity. These are researcher interpretations, not self-reported categories.

Market positioning data from Table 6 shows a clear difference. Some firms compete in premium international market segments. Other firms operate in cost driven domestic markets.

All six export oriented firms position their products at high price premiums compared to conventional plastic alternatives. Nepal Art Shop charges premium prices through heritage and craft positioning. Natural Fiber Nepal charges premium prices through artisanal natural fibre products. LeafPlus charges the highest premiums in the sample. These high prices are justified by its zero plastic and compostable sal leaf products. These premium positions are not random. They come from the cost structures that will be explained later in this chapter. Matching conventional plastic prices is difficult because of high labour and logistic costs as well as high imported costs. As Diwakar Karki of Biobags said that even the modest biodegradable packaging costs comparatively more because it uses different materials. Customers mainly choose such materials for brand image and environmental considerations rather than for lower cost.

Table 6: Market positioning across the ten case firms showing customer segments, geographic reach and price positioning compared to conventional products

Firm	Primary Segment	Secondary Segment	Geographic Reach	Price Positioning
Biobags	Premium and institutional buyers	Corporate sustainability buyers	Nepal and regional export	Premium (due to plant-based costs)
Paramendo	Community institutions	Institutional B2B	Nepal only	Cost parity with recycled materials
Nepal Art Shop	Premium international consumers	Artisan and heritage buyers	USA, Canada, EU, Asia, Africa	Significant premium
Felt Craft	Fair trade retailers	Premium boutiques	EU, North America, Australia	Significant premium
Quality Roto	Mass domestic market	Industrial buyers	Nepal only	Cost leader
Biocom	Premium institutions	Export-ready buyers	Nepal and emerging export markets	Premium (varies)
Bottlers Nepal	Mass domestic market	Institutional buyers	National (Nepal)	Cost parity with good quality
Natural Fiber Nepal	Premium international market	Fair trade retailers	EU, North America, Asia	Significant premium
Cargo Nepal	Export-oriented businesses	International freight partners	All Nepal exports	Competitive cost and efficiency
LeafPlus	Premium international and domestic	Corporate events	International and Nepal	High premium (natural and biodegradable)

The domestic market in Nepal looks different as compared to the international market. Firm like Quality Roto packaging competes on low costs while Bottlers Nepal balances cost parity with quality. Only LeafPlus Nepal and Paramendo Nepal have real domestic presence among sustainable firms. This pattern depicts the fact that the sustainable packaging works best in high

end international segments. Breaking into domestic market necessitates either much lower costs or change in what domestic customers are willing to pay.

LeafPlus Nepal is beginning to break the pattern of export only because it is building a model that serves not only international buyers but also local retail chains. For this it has set up direct distribution deals with the available domestic supermarket chains and corporate event organiser while keeping its international export partnerships. This market strategy may prove a way for firm to diversify and rely less on exports only.

5.5 Barriers to Scaling: Pattern Analysis

Across economic, logistics, institutional, market and technical dimensions, barrier patterns were interpreted for each firm as shown in Table 7. SC means the barrier was described in ways that suggest it strongly constrains scaling. PC means the barrier was present but the firm appeared to partially manage it. NR means the barrier was not raised as a significant constraint in the interview. These labels reflect how interviewees described their situations. Firms that used language such as major barriers, very hard or very expensive are marked SC. Firms that described challenges in neutral terms or said they were manageable are marked PC or NR. These are researcher interpretations of interview content, not ratings provided by interviewees. Where a firm is marked NR across all dimensions, as with Quality Roto, this reflects that barriers were not raised as significant concerns in that interview rather than a finding that barriers are absent. The same label applied to two different firms does not imply that their experiences are equivalent or directly comparable. SC for one firm reflects that firm's interviewee's particular description of their situation. It is not a score that can be summed or ranked against another firm's SC. The table is a device for organising interpretations across cases, not a measurement instrument.

These patterns show a clear picture. Younger firms that are working with new materials, like Biobags and Biocom or community based models like Paramendo, face strongly constraining barriers in almost every dimension. On the other hand, established exporters with heritage based products such as Nepal Art Shop and Natural Fiber Nepal report mostly partially constraining or not prominently raised barriers. This difference conveys clear message that barrier profile is not consistent across the whole sector and it depends on the material a firm uses, the maturity of the firm and the market strategy a firm uses. Quality Roto Packaging and Bottler Nepal show the lesser number of prominently raised barriers. This strengthens the idea that the practices of sustainability do not replace standard trade challenges, rather they compound them.

Table 7: Barrier prominence by firm as interpreted from interview data: SC (strongly constraining), PC (partially constraining), NR (not prominently raised) across five barrier dimensions.

Firm	Economic	Technical	Market	Institutional	Logistics
Biobags	SC	SC	SC	PC	SC
Paramendo	SC	PC	SC	SC	SC
Nepal Art Shop	NR	NR	NR	NR	PC
Felt Craft	PC	NR	PC	NR	PC
Quality Roto	NR	NR	NR	NR	NR
Biocom	SC	SC	SC	SC	SC
Bottlers Nepal	NR	NR	NR	PC	PC
Nat Fiber Nepal	NR	NR	PC	PC	PC
Cargo Nepal	NR	NR	PC	PC	SC
LeafPlus	SC	PC	PC	PC	SC

The logistics barrier is the most consistent among all the material types because 9 out of 10 firms report partially or strongly constraining logistics constraints which shows the disadvantage of Nepal as a landlocked country. Rahul Visenkay of Paramendo Nepal said that Nepal has airways as only major means to send products and that turns out very expensive. Besides, Sahil Bhandari of Cargo Nepal added that customs delays reduce supply chain efficiency because longer delays mean more storage, repeated handling, longer transportation times and greater fuel use, which in turn makes customs friction not just a business cost but a sustainability cost as well.

5.6 Barrier Breakdown by Material Type

Barrier patterns by material classification obtained from the interpretation of interview are presented in Table 8. Number of firms in each material category is represented by *n*. This kind of aggregation moves beyond individual firm circumstances to identify structural patterns that are linked to material types.

Across all the five dimensions, natural fibre producers appear to have the fewest prominently raise the barriers.Handmade products from hemp, jute and Lokta fibre avoid high material import costs and bypass technology gaps that constrain biopolymer firms. These firms compete on heritage and craft provenance rather than technical certification. The main constraint for them is the labour intensity that limits scalability, but it does not prevent profitable export with premium prices. Natural Fiber Nepal's Sujith Karki said that the barriers hinge mainly about consistency in quality, supply and standards and seasonal variations which affect natural fibre availability. All of these are operational challenges and not structural cost barriers.

Table 8: Barrier patterns by material classification as interpreted from interview evidence: SC (strongly constraining), PC (partially constraining), NR (not prominently raised).

Material Type	Economic	Technical	Market	Institutional	Logistics
Biopolymers (*n*=1)	SC	SC	SC	PC	SC
Natural Fibre (*n*=3)	NR	NR	PC–NR	PC–NR	PC
Recycled and Waste (*n*=2)	SC	PC	SC	SC	SC
Biocomposites (*n*=1)	SC	SC	SC	SC	SC
Leaf-based (*n*=1)	SC	PC	PC	PC	SC
Conventional (*n*=1)	NR	NR	NR	NR	NR
Large Corporate (*n*=1)	NR	NR	NR	PC	PC

Biopolymer and biocomposite firms face the most compounding barriers based on the interview results, because Biobags Nepal's plant based polymer inputs costs more than conventional plastics resulting in an economic barrier, which in turn affects other dimension. Higher costs forces company for premium pricing and premium pricing intensifies market barriers. Biopolymer and biocomposites also need specialised processing and it creates technical barriers. Biocom Nepal operates at R&D stage and it faces strongly constraining barriers across all the five dimensions. Aashish Chhetri also described that the R&D costs, scaling production and competition against cheaper conventional plastics are the key barriers.

For recycled and waste based systems like Paramendo and Bottlers Nepal, institutional constraints dominate because for the recycling, waste segregation policy, collection infrastructure and material recovery facilities are required. And these requirements are systemic which individual firms can not create alone. According to Rahul Visenkay, the unstable government makes it very hard for the companies to collaborate with local, provincial or central government. He also said that people having less knowledge about handling and separating waste results in the arrival of high volume of waste in their company.

Across all the material types, logistics barrier appear to be the most consistent ones. Every export oriented company faces either partially or strongly constraining logistics constraints. Nepal Art Shop confirmed that the sea cargo from Kolkata port takes more than 65 days to reach destination countries like USA, Canada and Europe. Besides sea transportation, Air cargo is faster but it is comparatively costly. This kind of structural constraint applies regardless of what each firms produce.

5.7 Channel Strategy

The relationship between the development stage of a firm and channel maturity is presented in Table 9. From table, it is clear that the established exporters such as Nepal Art Shop, Nepal Felt Craft and Natural Fiber Nepal have built direct relationships with international distributors and retailers, which they developed over time through different trade fairs and repeat orders. Direct channels help firms to capture higher margins, provide stable demand as well give stronger control over brand positioning.

Table 9: Channel strategy: export channels, domestic distribution, channel maturity and degree of direct versus intermediary access.

Firm	Export Channels	Domestic Channels	Maturity	Direct vs. Intermediary
Biobags	Trade fairs, intermediaries	Emerging institutional buyers	Early	Mostly intermediary
Paramendo	NGO and donor networks, B2B	Community institutions	Early	Mostly intermediary
Nepal Art Shop	Direct intl distributors, air and sea freight	Limited domestic	Established	Mostly direct
Felt Craft	Fair trade retailers, boutiques	Limited domestic	Established	Mostly direct
Quality Roto	N/A (domestic only)	Retail, industrial B2B	Established	Mostly direct
Biocom	Emerging, B2B buyers	Institutional buyers	Early	Mixed
Bottlers Nepal	N/A (domestic focus)	National retail and distribution	Established	Direct (large firm)
Natural Fiber Nepal	Direct intl buyers, established retailers	Limited domestic	Established	Mostly direct
Cargo Nepal	Freight partner networks	N/A (logistics service)	Established	Partner-based
LeafPlus	Intl distributors and direct, domestic retail	Retail chains and corporate B2B	Growth	Transitioning to direct

Biobags, Biocom and Paramendo Nepal, which are emerging exporters still depend on intermediaries and NGO facilitated market access heavily which is also confirmed by Rahul Visenkay when he said that his firm enters international market through donor agencies and international companies willing to expand in Nepal.These sort of reliance reduces margin capture and limits the ability of firm to respond directly to buyer requirements.

If comparison is made in channel development, domestic channel development is still weak among all the firms. Besides LeafPlus Nepal and Paramendo Nepal, other firms are export

oriented. This situation also reflects the pricing mismatch identified earlier because domestic consumers generally can not pay the premium prices that sustainable products require.

The type of material selected by firm shapes which channels are actually useable. The products made from Lokta paper, felt crafts and hemp textiles are advantageous because of their low weight as compared to heavier alternatives, enabling lighter products better suited for air and sea freight. This shows the strategic importance of material choice when deciding which channels to use.

5.8 Cost Structure Patterns

The interviews did not produce systematic cost figures across firms. Interviewees described cost pressures in qualitative terms rather than providing specific monetary data. Cost pattern descriptions in this section are therefore directional and qualitative. They reflect the nature and relative weight of cost pressures as described by interviewees, not measured cost data. What came through clearly was the direction and nature of cost pressures rather than their precise scale.

The most important pattern for cost structure observed is that none of the selected sustainable packaging firms can match the cost of conventional plastics, which necessitates for the premium pricing. As a result, even not wanting to charge, the packaging firms charge more than the conventional alternatives as it leaves them no other option.

If cost pressure from raw materials is considered, biopolymer firms face the biggest cost pressure. Firms using locally sourced waste or agricultural byproducts like Paramendo Nepal and Leafplus have very low costs of the material but they face rather processing and handling expenses. Natural fibre firms remain somewhere in the middle because they get raw materials at a lower price but at the same time, they need a lot of labour, which limits how fast these natural fibre firms can grow.

Logistics costs affect all export oriented firms in the same way because exporting from a landlocked country through the ports of India is a structural barrier that will ever remain and it applies regardless of what the companies produce. Besides, for emerging firms, the certification costs create extra barrier and most of these can not afford such certifications that premium buyers demand. Eventually, these conditions trap small firms in the lower margin market segments even if their products are genuinely sustainable.

5.9 Summary: Universal Patterns and Material-Type Variation

By adopting the key 7 SBMC components that emerged as analytically central, Table 10 separates patterns that apply to all firms from those that change depending on material type.

The universal patterns point to systemic constraints that need ecosystem level solutions while material specific variations point to targeted strategic choices at the firm level.

Across all the 7 SBMC components, all the universal patterns lead to structural constraints and these can not be solved by individual firms alone. All firms face resource gaps, depend on external partnerships, face channel limitations and logistics cost penalties. All sustainable alternatives require premium positioning, and also encounter the barriers of certification, institution or market at some level. Barriers, strategy and market all depend on what a firm produces which boils down to one fact that material choices shapes everything. These findings lead to the development of strategic archetypes discussed in chapter 6.

5.10 Key Findings Summary

The cross case analysis reveals three critical findings. Based on this findings, the theoretical interpretations are also made in Chapter 6.

Finding 1: Four barriers are systemic and universal

Four barriers are systemic and universal: first, the difficult geographical position of Nepal adds more logistic costs for firm. Second, domestic market price gap stops most of the sustainable firms to sell locally at viable margins. Third, the certification infrastructure gaps that Nepalese firms have prevent them from accessing premium buyers. And the fourth, there is no coherence institutional support because of the fragmented government coordination. Because of these barriers, ecosystem level solution is required as no individual firm can solve these problems alone.

Finding 2: Material choice is the master strategic decision

The choice of packaging material determines the firm's cost structure, its barrier profile, its customer segment and its upgrading pathway. Natural fibre firms face the fewest prominently raised barriers. Biopolymer and biocomposite firms face the most strongly constraining combination. This means that two firms in the same country and the same sector can face completely different strategic landscapes simply because of what they produce.

Finding 3: Sustainable packaging viability is concentrated in international markets. Almost all sustainable firms in this sample depend on international premium markets to survive. Only LeafPlus and Paramendo have meaningful domestic presence. LeafPlus's emerging model of serving both international buyers and domestic retail chains points toward a possible path for reducing this dependence. Chapter 6 explores this further.

Table 10: Summary matrix: universal patterns versus material-specific variations across the SBMC framework.

SBMC Component	Universal Pattern	Material-Type Variation
Value Proposition	All firms bundle environmental and social value explicitly. Even transitioning conventional firms adopt sustainability messaging.	Heritage firms emphasise cultural preservation; biopolymer firms emphasise technology innovation; waste-based firms emphasise circular economy.
Key Resources	All firms identify capital, technology or certification gaps. No firm reports being fully resource sufficient.	Import dependency (Biobags, Felt Craft) vs. full local sourcing (Natural Fiber Nepal, LeafPlus). Technology sophistication varies sharply by production model.
Key Partnerships	All firms rely on external partnerships. No firm operates in isolation.	NGO dependency (emerging social enterprises) vs. commercial buyer networks (established exporters) vs. corporate and government relationships (Bottlers Nepal).
Channels	All export oriented firms depend on intermediaries or trade fairs at some stage. No firm reports abundant direct buyer access.	Established exporters maintain direct buyer relationships. Emerging firms rely entirely on intermediaries. Domestic channels underdeveloped except LeafPlus and Paramendo.
Customer Segments	Premium or niche positioning required for all sustainable firms. Mass domestic market not commercially viable at current cost structures.	Heritage and artisanal firms command significant premiums. Biopolymer firms face price resistance despite environmental credentials.
Cost Structure	All sustainable firms more expensive than conventional plastics. Landlocked logistics costs are a universal burden on all exporters.	Biopolymers face input cost uplift; handmade products are highly labour intensive; recycled materials seek cost parity but face processing costs.
Key gaps and constraints	Landlocked logistics, limited domestic demand, certification gaps and weak institutional coordination affect all firms.	Biopolymers and biocomposites face highest compounding barriers. Natural fibres face lowest barriers due to existing craft infrastructure and heritage positioning.

6 Discussion

This chapter takes the findings that were presented in Chapter 5 and looks at them through the combined theoretical lens that were built in Chapter 3. The goal is to see where this study agrees with research done in the past, where it adds something new for present and where it challenges what others have found. The chapter is mainly organised around the three research objectives of this thesis. Each section brings in the SMBC, GVC theory and Sustainable Entrepreneurship theory as needed to support the argument. Throughout the chapter, the findings are discussed in relation to the existing literature that were reviewed in Chapter 2.

Beyond the three empirical findings, the discussion also develops five theoretical contributions. The first extends the SBMC by showing that barriers do not sit inside individual canvas components but rather cascade across them. The second introduces material choice as a meta-strategic decision within the SBMC rather than a simple production input. The third moves frugal innovation from a broad concept to an empirically grounded set of firm archetypes. The fourth identifies how upgrading pathways within GVCs depend on material type rather than firm strategy alone. And the fifth one reframes the domestic demand constraint not as a communication gap between consumers and firms but as a structural cost paradox built into Nepal's geography and institutions. Each of these contributions is developed across the subsections that follow.

The discussion below basically consists of three parts. First is about barriers not being separate problems, but building on each other and the way the combine depends on material type. Second, the material chosen by firms is not just a production decision, but also it shapes the entire business model. And the third about the gap between what firms alone can do and what the ecosystem provides, and that gap is the real limit on scaling. And no single firm, no matter how innovative, can close that gap by itself.

6.1 The Anatomy of Compounding Barriers

Addressing RO1: To map the economic, technical, institutional, market and logistics barriers constraining Nepalese SME scaling of sustainable packaging for international markets.

After finding and analysing the severity of different barriers for each firm and material type in chapter 5, this section covers the interpretation part. The key insight is that barriers not only exist, as known from the literature, but they also work together in loops making each other worse resulting in compounding effect. Understanding this compounding effect helps to identify the support required to fix the problem rather than just the visible symptoms.

6.1.1 Barrier Cascades: The Compounding Logic

Applying SBMC framework across all cases as a diagnostic tool identifies that the barriers are not limited inside single canvas , rather they spread across multiple components. Of all the samples, Biobags Nepal is the clearest example which uses plant based polymer that cost more than conventional plastics, which was also confirmed by the production manager. Higher costs results in premium pricing, which in turn makes the market worse because fewer buyers will pay. Again, to reach those buyers, the firm needs international certification. This cerfication requires enough capital and technical infrastructure, so the firm goes back to ending with the same economic constraint and eventually the loop closes. This whole processes is also illustrated in Figure 5

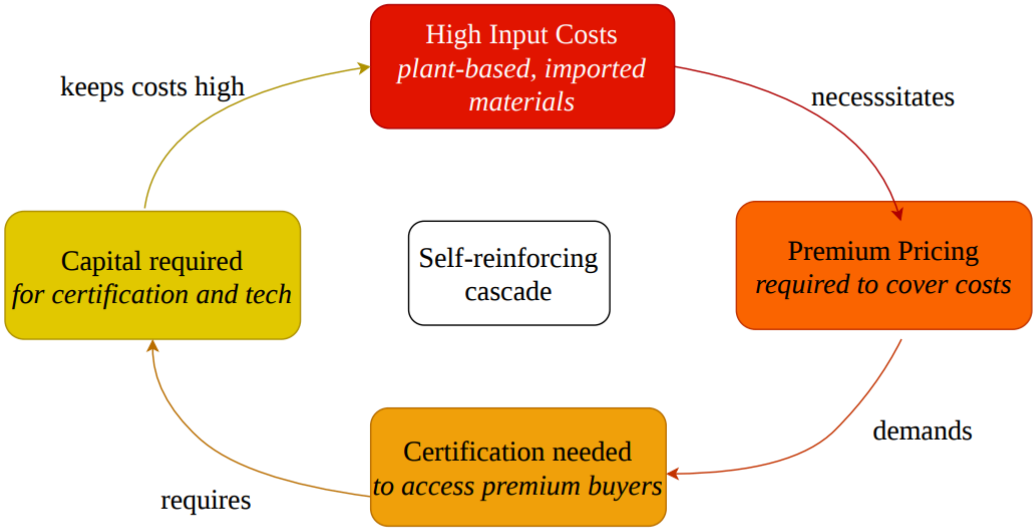

Figure 5: The compounding barrier cascade: how economic, market, institutional, and resource constraints form a self-reinforcing loop, compounded by systemic barriers that no individual firm can resolve alone.

Guillard et al. (2018) identified technical, economical and institutional barriers as separate categories, but this study adds evidence by identifying that these categories follow each other in sequence, and they simply do not sit in parallel which makes each one worse. Compounding effect is more severe in Nepal as shown by Kharel & Dahal (2020), according to whom, logistics costs are 25% of total product cost in Nepal versus 13-14% in India. Of all the trade obstacles, Non tariff barriers (NTFs) account for 86.3%. Sustainable packaging firms face all those baseline constraints plus the extra sustainability specific barriers on top. This study calls that combination a double compounding challenge and it is a completely difficult and different challenge which the developed countries and their exporters face.

Paramendo Nepal shows a different version of the same compounding pattern whose trigger is institutional barrier rather than economic barrier. Working with governmental bodies is difficult for companies because of political instability and this leaves waste segregation systems very weak and underdeveloped. Without the proper development of the waste segregation systems, the raw materials arrive in contaminated form which result in lower output quality and also raise the processing cost. If the firms deliver lower quality products, it limits them to access markets. Even the firm's representative said that the problem is not the shortage of raw material but rather the lack of public infrastructure to collect and sort the material cleanly. This is not a firm created problem, rather a systemic institutional gap. Melles et al. (2025) identified the infrastructure of waste management as a basic requirement circular economy transition in Nepal and Paramendo Nepal confirms that gap at a firm level.

6.1.2 The Logistics Multiplier

Logistics constraints affect maximum firms, i.e., 9 out of 10 firms at partially or strongly constraining severity which makes it most consistent barrier among all the firms. It is worth noting because this constraint is not just an extra cost.

Logistics constraints affect nine of ten firms at partially or strongly constraining severity which makes it the most consistently severe barrier dimension among all the samples and this is worth interpreting carefully because it is not just an extra cost. GVC theory highlights that logistics expenses largely determine which positions within global value chains are realistically accessible to firms. Studies that use gravity modelling, such as Paudel (2014) show that land-locked developing countries face more higher trade costs than those with sea access because distance has stronger negative effect on their export flows. The low export-to-import ratio of Nepal for a long time reflects this structural disadvantage (Sainju, 2021).

For sustainable packaging firms, the logistics barrier is also connected with the material type because it limits which channels are actually usable and Nepal Art Shop is a good example of this. Large orders from Nepal Art Shop travel by sea freight through Kolkata and take more than 65 days to reach major Western markets while smaller high value shipments can use courier services and arrive within days. This two channel approach works well for lightweight high value products like Lokta paper notebooks and hemp bags but it does not work for heavier products because those products cannot absorb the air freight costs at a price that buyers will accept. So logistics works like a filter that decides which product types can actually be exported profitably and this reinforces the material type differences that were already shown in the barrier severity analysis.

Channel strategy data used throughout this chapter came from interview transcripts through inductive coding. The full coding trail showing how this information was extracted from interviews is in Appendix B.

Paramendo's situation adds more evidence from the waste sector side. Because Nepal is landlocked, air freight is basically the only realistic export option which makes price competitiveness almost impossible for lower value goods. Internal customs add even more cost on top of that with taxes applied at provincial and district borders that make the international transit disadvantage even worse. Cargo Nepal's operations confirmed this from the logistics side. Longer customs delays mean more storage time, more handling and greater fuel use. So customs friction is not just a business cost but also a sustainability cost.

6.1.3 The Systemic–Specific Distinction

The barrier analysis reveals a distinction that is very important for policy. Four barriers are systemic meaning they affect every firm regardless of what material it uses or what strategy it follows. The rest are either material specific or firm specific.

The four systemic barriers are Nepal's landlocked logistics penalty, the gap in domestic willingness to pay, the absence of certification infrastructure and the fragmented policy coordination among government bodies. None of these can be fixed through entrepreneurial strategy at the firm level. They require institutional responses at the ecosystem level. This finding connects with Rajgarhia (2026) who showed that Nepalese sustainable enterprises depend heavily on NGO and community support but lack any sustained pathway to commercial viability. What this study adds is a clear specification of which barriers are actually systemic and which are not. The existing literature treats this distinction loosely. This study makes it precise.

The material specific barriers are different in nature. Biopolymer input cost uplifts, artisanal labour scalability limits and recycled material contamination problems are real barriers but they respond to targeted interventions. They need firm level strategies, material specific technical support and differentiated policy tools rather than the same ecosystem level response for everyone.

What this section contributes to the literature is the demonstration that Canvas components cannot be analysed separately when firms are operating under compounding institutional and logistics constraints. Guillard et al. (2018) and Kharel & Dahal (2020) each documented barrier categories as if they were independent. This study shows that those categories interact and amplify each other through sequences that are shaped by material type. That relationship has not been examined at the firm level before.

6.2 Material Type as Meta-Strategy

Addressing RO2: To identify the entrepreneurial strategies and business model innovations that enable Nepalese firms to overcome those barriers.

The most important strategic finding in this research is that material choice is not just a production input decision. It is a higher level strategic choice that shapes the entire SBMC configuration. It determines the value proposition, customer segments, channel strategy, partnership requirements, cost structure and barrier profile all at once. No existing study on sustainable packaging in developing economies has documented this relationship in a systematic way.

Three Strategic Archetypes

Comparing all ten cases through the SBMC lens reveals three distinct strategic archetypes. Each one is anchored in a material category and produces a different business model configuration. These are summarised in Table 11.

The first archetype is heritage craft positioning. This describes Nepal Art Shop, Nepal Felt Craft and Natural Fiber Nepal. These firms use locally available low cost materials processed through manual artisanal methods. Those methods are both the competitive advantage and the scalability limit at the same time. They do not compete on cost per unit, volume or standardisation. They compete on indigenous material traditions, artisanal skill and craft provenance. Nepal Art Shop's representative described the products as combining environmental and aesthetic value for premium and gift markets. Natural Fiber Nepal's operational director said that traditional knowledge in processing local fibres produces products that appeal to international buyers precisely because industrial producers cannot copy that embedded expertise. These firms represent frugal innovation as described by Rajgarhia (2026). They are not cheaper copies of developed world approaches. They are entirely different models that use local assets industrial producers cannot access. This archetype has the fewest prominently raised barriers in the sample.

The second archetype is technology dependent scaling which describes Biobags Nepal, Biocom Nepal and in a hybrid form, LeafPlus Nepal. These firms go after innovation driven value propositions that need processing technology, international certification and scale to reach commercial viability. The problem is that Nepal does not have the domestic capacity to manufacture or operate the equipment these firms need, so they end up depending on costly imports. Biocom Nepal's representative confirmed that economic, technical and market barriers all compound at the same time. LeafPlus is a hybrid variant that combines locally sourced sal leaves with processing machinery and targets both international and domestic premium

segments at the same time, making it a possible model for firms that want to develop in both markets.

The third archetype is circular systemic positioning. This describes Paramendo Nepal and parts of Bottlers Nepal's operations. These firms depend entirely on institutional prerequisites outside their control. They need waste segregation policy, collection infrastructure and material recovery facilities to function well. Melles et al. (2025) documented that Nepal's circular economy work stays at the level of basic recycling without the institutional integration or financing needed for genuine circularity. The finding here that recycled and waste based firms face the most strongly constraining institutional barriers of any material category confirms that assessment with firm level evidence.

Table 11 shows that the three archetypes differ not only in material category but across every SBMC dimension. Barrier severity, GVC upgrading pathway and market target all vary systematically with material type. That covariation is the evidence base for treating material choice as a meta-strategic decision rather than a technical production input. Prior applications of the SBMC treat material selection as an input to the value proposition. This study shows it determines the complete Canvas configuration. The three archetypes are the empirical form that relationship takes.

Table 11: Three strategic archetypes: material type as meta-strategy.

	Heritage-craft positioning	**Technology-dependent scaling**	**Circular-systemic positioning**
Material type	Lokta, hemp, jute, felt	Biopolymers, biocomposites, sal leaf	Recycled and waste-based
Firms	Nepal Art Shop; Felt Craft; Natural Fiber Nepal	Biobags Nepal; Biocom Nepal; LeafPlus Nepal	Paramendo Nepal; Bottlers Nepal
Barrier severity	Fewest barriers; heritage bypasses certification needs	Most strongly constraining; compounding cost, technical and certification loop	Strongly constraining; institutional prerequisites required
GVC pathway	Functional upgrading	Process upgrading	Chain upgrading
Market target	EU, North America, Asia, Australia	Premium international and domestic	Domestic and institutional

6.3 GVC Positioning and Upgrading Pathways

Addressing RO3: To analyse how international regulatory frameworks and global value chain dynamics shape firm-level sustainability choices and market positioning.

GVC theory helps to explain how the strategies of individual firms connect with the wider structure of global trade networks. This section looks at where Nepal's sustainable packaging firms

actually sit in international value chains, what upgrading pathways they are currently pursuing and how the EU's Packaging and Packaging Waste Regulation is changing their strategic options.

6.3.1 Current Positioning: Low Margin Capture

Nepal's sustainable packaging firms mostly sit in basic production positions within international packaging value chains. They have limited involvement in higher margin activities like design, branding and direct to consumer distribution. Most sell through intermediaries or trade fair contacts and capture relatively low margins even though products command significant retail price premiums. The four upgrading pathways identified by Gereffi & Fernandez-Stark (2011), which are process, product, functional and chain upgrading, are being pursued differently across the sample. Material type is the main factor that determines which pathway is actually open to a firm.

6.3.2 Material-Dependent Upgrading Pathways

Natural fibre firms are pursuing functional upgrading. Nepal Art Shop has built direct relationships with international distributors across multiple countries, bypassing intermediaries for a large share of its sales. Nepal Felt Craft reaches international markets through fair trade retail networks. Natural Fiber Nepal maintains direct export buyer relationships alongside its rural supplier network. In each case the firm has moved beyond basic production toward activities that capture more value in the chain. Arya (n.d.) documented a similar trajectory for Nepalese natural material firms. That convergence suggests functional upgrading through heritage positioning is a repeatable pathway, not an isolated success.

Technology dependent firms are pursuing process upgrading. LeafPlus has invested in processing machinery, expanded rural sal leaf sourcing and is building direct distribution partnerships. Its dual market approach targeting both export and domestic premium segments is aimed at reducing dependency on intermediaries over time. Biocom Nepal is following a similar logic but at an earlier stage. Recycled and waste based firms face the most limited options because process upgrading requires collection infrastructure that does not yet exist at the needed scale. For this archetype, chain upgrading into adjacent value chains such as carbon credit markets may be the most realistic alternative and Paramendo's early engagement with Nepal's government carbon credit portal shows early movement in that direction.

6.3.3 The Two Sided Effect of PPWR on Nepalese Firms

The EU Packaging and Packaging Waste Regulation requires all packaging on the EU market to be recyclable or compostable by 2030. GVC theory sees this as a buyer driven governance mechanism where large European retailers put pressure on their supply chains to meet compliance standards, which at the same time creates demand for compliant products and raises cost barriers (Cerqueira et al., 2021). For Nepal's firms this works in two ways.

Firms producing naturally compostable products like Lokta paper, hemp bags and sal leaf tableware are already aligned with PPWR requirements. That alignment is a potential competitive advantage but only if firms can obtain and communicate the certification that proves compliance. The fact that most firms lack internationally recognised certifications shows the gap between potential alignment and actual commercial advantage. On the other side, Quality Roto Packaging faces the possibility of being locked out of EU markets entirely if it cannot meet the 2030 thresholds. The certification gap is therefore the critical variable sitting between PPWR's theoretical opportunity and its practical realisation, connecting with Kharel & Dahal (2020) who documented that Nepal lacks adequate domestic testing and certification infrastructure.

The contribution of this section is the finding that material type is the primary determinant of which upgrading pathway is accessible, operating before and independently of firm level strategy. Gereffi & Fernandez-Stark (2011) identified the four upgrading trajectories but did not explain what makes a trajectory open or closed to a specific firm. This study fills that gap. Heritage attributes open functional upgrading. Technology and cost constraints limit biopolymer firms to process upgrading. Institutional prerequisites block all routes except chain upgrading for recycled and waste based firms.

6.4 The Export Domestic Divide and the Willingness to Pay Paradox

Addressing RO1 and RO2: barriers in the domestic market context and entrepreneurial strategies for bridging the export-domestic divide.

The findings showed that sustainable packaging viability is concentrated in international premium markets. Only LeafPlus and Paramendo serve domestic markets meaningfully. This section interprets that pattern to expose a structural paradox with important consequences for entrepreneurial strategy and policy.

6.4.1 The Willingness to Pay Paradox

The literature shows Nepalese consumers express interest in sustainable packaging. Giri & Chaulagai (2024) found that 95 percent of 546 Kathmandu Valley consumers expressed willingness to pay a premium, with 46 percent willing to pay 1 to 10 percent more and 40 percent willing to pay 11 to 20 percent more. Shrestha (2024) confirmed that packaging material is the most influential factor in Nepalese consumer purchasing decisions. Khand (2024) found that brand perception is the most influential packaging dimension for Nepalese consumers.

But the cost structure analysis in Chapter 5 showed that sustainable alternatives require premiums much higher than 1 to 20 percent. This gap is what this study calls the willingness to pay paradox. Consumer interest is real but structurally insufficient. The gap is not between consumer attitudes and behaviour, which is what Boz et al. (2020) called the value action gap. It

is a gap between consumer willingness and product economics. That is a supply side structural problem that consumer education alone cannot fix. The binding constraint in Nepal is not consumer awareness. It is the cost of production, logistics penalties and certification expenses that are structural features of Nepal's geography and institutions.

6.4.2 Cost Structure as Binding Constraint

The SBMC shows exactly where this constraint sits. Three cost categories combine to produce the premium pricing that shuts most sustainable firms out of the domestic market. Material costs range from minimal for firms using agricultural byproducts to high for those importing biopolymer resin or New Zealand wool. Labour costs are universally high for artisanal producers. Nepal Felt Craft's production supervisor noted that the handmade strength of felt products is also the industry's core limitation, unable to compete with industrial machinery on price or volume. Export logistics costs are structurally elevated, with sea cargo taking over 65 days via Kolkata port. Together these three layers place sustainable products in an entirely different price category from conventional packaging. International premium markets can absorb these costs. Domestic markets cannot because the willingness to pay ceiling sits structurally below the cost floor.

6.4.3 LeafPlus and the Hybrid Model

LeafPlus Nepal's dual market strategy is the most promising attempt in the sample to bridge the export domestic divide. Its product manager described a hybrid approach that targets international eco-friendly markets and premium domestic segments at the same time, including corporate events and upscale retail rather than the mass market. LeafPlus delivers environmental, social and economic value across both markets at once, which fits well with the bundled value creation logic of Sustainable Entrepreneurship theory. However, this model needs premium brand positioning, domestic distribution access and production consistency that most emerging firms have not yet achieved.

The theoretical contribution of this section is a reframing of the domestic demand constraint. Boz et al. (2020) established the demand gap as a communication problem. The evidence from Nepal points to a structural cost problem instead. The premiums consumers are willing to pay sit below the cost floor that sustainable product economics require. This calls for supply side and institutional interventions rather than demand side communication, connecting consumer behaviour theory with GVC theory and Sustainable Entrepreneurship theory in a way not previously pursued for developing economy sustainable packaging.

6.5 The Ecosystem Gap: From Firm Level Strategy to Systemic Enablement

Addressing RO2 and RO3: entrepreneurial strategies and regulatory dynamics in relation to the ecosystem gap.

The sections above established that barriers compound, material type determines strategic pathways, GVC upgrading is blocked by certification gaps and the domestic market is structurally out of reach for most sustainable alternatives. This section addresses the central implication: the gap between what firm level entrepreneurial strategy can achieve and what ecosystem level institutional support would need to provide.

6.5.1 The Partnership Asymmetry and Its Implications

Firms inside NGO and development organisation networks, including Biobags, Paramendo, Biocom and LeafPlus, access technical support, certification assistance and seed financing. Firms outside those networks, such as Nepal Art Shop, Nepal Felt Craft and Quality Roto, rely entirely on commercial self reliance. NGO connected firms benefit from early development support but face a dependency ceiling which is consistent with Rajgarhia (2026) who observed that Nepalese sustainable enterprises rely on grants rather than commercial financing and lack access to formal value chain services. When grant cycles end, firms that have not built their own commercial capabilities face real risks to their viability.

Commercially self reliant firms have built more durable capabilities because they were never protected from market pressure. Nepal Art Shop has direct buyer relationships across multiple continents and a product portfolio that spans traditional and contemporary designs. Its hemp laptop bag shows how traditional craftsmanship can be adapted to what the current market wants. That adaptive capacity came from decades of market participation, not from institutional support. The best path is to use institutional support during early growth stages while at the same time actively building commercial capabilities for independence. LeafPlus is doing this most deliberately. The challenge is that most support available in Nepal's ecosystem is designed to keep current operations going rather than build future commercial independence.

6.5.2 The Institutional Void

In developed economies, sustainable packaging firms have access to certification bodies, testing laboratories, export facilitation agencies and green finance institutions. In Nepal, these kinds of intermediary institutions are either absent, underdeveloped or poorly coordinated. The certification gap is the most serious of these missing pieces. Most firms lack internationally recognised certifications yet international buyers increasingly require third party verification. Firms with genuinely sustainable products cannot access the markets that would value them because they cannot prove what they already are. This connects with Kharel & Dahal (2020) who documented that Nepal lacks adequate domestic testing and certification infrastructure. Paramendo's situation captures the void most directly. The government recognises waste management is necessary but lacks the capacity to deliver it, so the firm provides the institutional function that government cannot fulfil.

6.5.3 What a Functional Ecosystem Would Require

The cross case analysis points to four ecosystem components whose absence constitutes the binding constraint on sector wide scaling, as illustrated in Figure 6.

Shared certification infrastructure would pool demand across firms and lower per firm certification costs. Coordinated logistics facilitation would address the domestic dimensions of the logistics burden through customs streamlining, harmonised transit taxes and road infrastructure investment. Growth stage financing mechanisms would fill the gap between NGO seed grants and commercial lending through patient capital and blended finance instruments. Integrated policy coordination would bring trade facilitation, environmental regulation and certification support together under one coherent framework. Melles et al. (2025) called for a whole system assessment moving away from piecemeal solutions. This study provides the empirical foundation for specifying what that approach would need to address in sustainable packaging specifically.

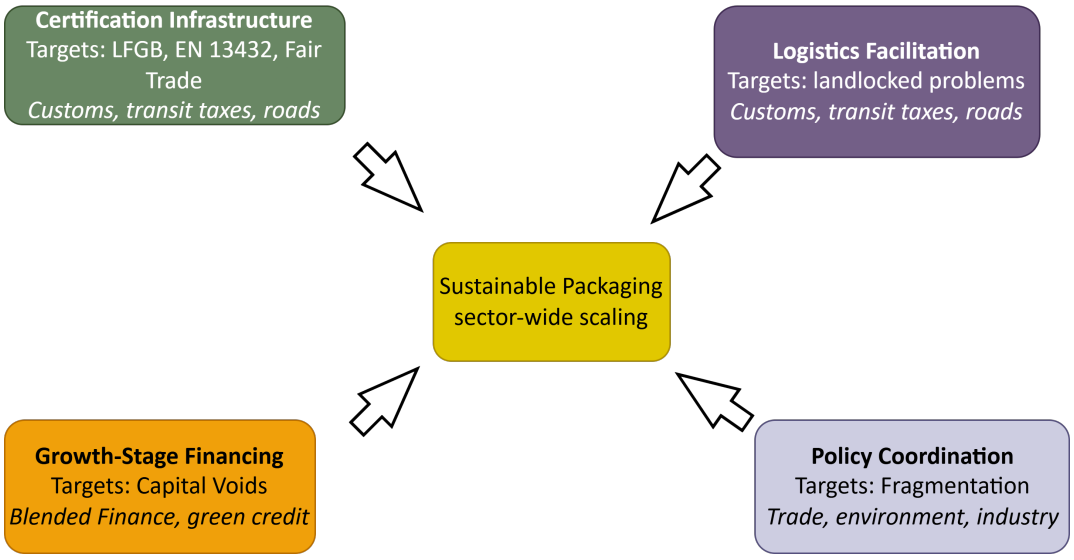

Figure 6: Ecosystem prerequisites for sector-wide scaling: four institutional components and the specific barrier types each targets.

6.5.4 Nepal's Export Decline and the Sustainable Packaging Opportunity

Sharma (2023) documented that merchandise exports as a share of GDP fell from nearly 15 percent in 2000 to about 3 percent in 2019 while remittance inflows rose from 2 percent to 24 percent of GDP. Sustainable packaging represents a counter direction to that decline. The global biodegradable packaging market is projected to grow significantly through 2030 (Petrenko et al., 2024) and Asia Pacific is the fastest growing region. Nepal has genuine material advantages in indigenous fibres, regenerating plant resources and established craft traditions. Six of the ten firms in this study already export and the established natural fibre exporters have built durable international buyer relationships. The entrepreneurial capability exists. What is missing is the

ecosystem architecture that would allow individual firm capabilities to combine into collective competitive advantage.

6.6 Managerial and Policy Implications

The findings developed across this chapter carry practical implications for three interconnected groups: entrepreneurs and firm founders, policymakers and government agencies and development institutions and donors. These implications follow directly from the three analytical arguments made in this chapter. Barriers compound in material-specific ways. Material choice functions as a meta-strategic decision. And the binding constraint on sector-wide scaling is an ecosystem gap rather than a firm-level capability deficit.

6.6.1 Implications for Entrepreneurs

The most important shift this study suggests for entrepreneurs is to treat material selection as a full business model decision rather than a production input. The three strategic archetypes show that choosing a material is simultaneously choosing a cost structure, a barrier profile, a customer segment and a GVC upgrading pathway. Founders who treat material choice as a technical question and business model design as a separate exercise are likely to discover misalignments between their production capabilities and their market access requirements only after significant investment has already been made.

For founders working with limited capital, the heritage craft archetype offers the most accessible entry point into international markets. Natural fibre firms in this sample face the fewest prominently raised barriers, require the least certification infrastructure to reach premium buyers and benefit from craft provenance that industrial producers cannot replicate. This does not mean the heritage archetype is without limits. Labour intensity constrains volume scaling and the domestic market remains structurally difficult. But for founders at early stages, it provides a commercially viable path that the technology dependent archetype does not.

Certification is the single most important capability gap that entrepreneurs can act on without waiting for ecosystem level change. Most firms in this sample deferred certification on cost grounds. That decision is understandable but counterproductive. Without internationally recognised certification, firms with genuinely sustainable products cannot access the premium buyers whose willingness to pay would justify their cost structures. Pursuing certification early, even incrementally through lower cost entry points such as fair trade or organic verification before moving toward EN 13432, reduces the market access gap that compounds with every other barrier the firm faces.

The dual market model of LeafPlus offers a concrete strategic template for firms that have moved beyond early stage operations. Instead of depending entirely on international premium export demand, LeafPlus has built domestic distribution through corporate events and upscale

retail channels alongside its export partnerships. This reduces the risk of depending too much on one revenue source and creates a connection between domestic brand building and international credibility. Firms with moderate cost structures and strong sustainability credentials should consider whether a similar hybrid approach is possible given their material type and production stage.

6.6.2 Implications for Policymakers

The barrier analysis in this chapter points to a clear priority order for policy intervention. Not all barriers can be addressed through policy equally and not all interventions would have the same impact across the sector. Four areas stand out as having the highest leverage.

The urgent gap that needs to be adressed is the certification infrastructure. Most firms in this sample lack internationally recognised certifications despite producing genuinely sustainable products. This is a market failure that individual firms cannot correct on their own. A sector-level certification facility, jointly managed by government and industry associations, would pool demand across firms to reduce per-firm costs, build shared technical testing capacity domestically and reduce the current dependence on costly foreign certification bodies. Subsidising initial certification costs for qualifying SMEs would generate expanded market access across multiple firms simultaneously rather than funding individual firm operations one at a time.

Logistics reform directly addresses the most consistently raised barrier in the sample. Nine of ten firms reported partially or strongly constraining logistics constraints. The domestic dimensions of this burden, including inter-provincial customs procedures, overlapping transit taxes at district and provincial borders and poor road connectivity between production areas and Kathmandu, are within the reach of domestic policy to address. These are not the same as the structural landlocked geography penalty, which requires longer term regional diplomacy. The domestic logistics burden is a policy-created cost that policy can reduce. Harmonising internal transit taxes and streamlining customs documentation between provinces would lower costs for all exporters, not only sustainable packaging firms.

Growth stage financing is the structural gap between NGO seed grants and commercial bank lending. Most commercially oriented growth among the firms in this sample happened through revenue reinvestment rather than external financing, because no appropriate financing instruments exist for firms at that intermediate stage. Blended finance instruments, patient capital facilities and green credit lines targeted at SMEs with demonstrated sustainability credentials would allow firms that have outgrown grant dependency to scale without the funding gap that currently forces them to grow more slowly than their market position would allow.

Policy coordination across ministries is the most structurally difficult but potentially most impactful intervention. Trade facilitation policy, environmental regulation and certification support currently operate through separate government bodies with little coordination. Sustainable packaging firms sit at the intersection of all three policy domains. A sustainable packaging sector coordination mechanism, even an informal inter-ministerial working group, would prevent the situation where progress in one domain is cancelled by gaps in another.

6.6.3 Implications for Development Institutions and Donors

The evidence from this study suggests that the dominant model of donor support for Nepalese sustainable enterprises, project-based funding that sustains current operations, has a structural weakness. Firms that depend on NGO and donor support for continued operations rather than using early support to build the commercial capabilities needed for independence face a viability gap when grant cycles end. The measure of success for donor programmes should shift from whether the funded activity continues during the grant period to whether the firm is actually commercially viable after the grant ends.

This reorientation has concrete implications for how programmes are designed. Technical assistance should prioritise certification access, buyer relationship development and market linkage facilitation over operational subsidies. These are the capabilities that translate into durable commercial independence rather than continued grant dependency. The firms in this sample that have built the most durable international market positions, Nepal Art Shop and Natural Fiber Nepal, built those positions through sustained market participation without institutional protection, not through sustained grant support.

Certification infrastructure should be treated as a public good investment rather than a firm-level support activity. Funding a shared certification testing facility that multiple firms can access would generate systemic market access improvements across the sector rather than incremental improvements for individual grant recipients. Similarly, shared logistics facilitation, trade fair participation programmes and export market intelligence services generate returns across multiple firms simultaneously and are therefore more efficient uses of development finance than equivalent per-firm operational subsidies.

Development institutions are also well placed to play a bridging role between the NGO-dependent early stage firms and the commercial financing system. Co-investment instruments, first-loss facilities and blended finance structures that bring in commercial capital alongside donor funds would extend the reach of development finance into the growth stage where the current gap is most acute. The firms in this sample that are closest to breakthrough commercial viability, LeafPlus and Biocom Nepal, are exactly the firms for which this kind of instrument would be most immediately useful.

7 Conclusions

This chapter briefly summarises what this study set out to do and what it found. It also acknowledges the limitations of this study and also identifies the potential directions for future research.

7.1 Summary of Findings

This study looked at the barriers that stop Nepalese sustainable packaging firms from growing in international markets. It also looked at the entrepreneurial strategies that help firms to deal with those barriers. Ten firms were interviewed. They worked across different material types including biopolymers, natural fibres, biocomposites, recycled materials and leaf based tableware. Three theoretical frameworks guided the analysis. These were the Sustainable Business Model Canvas, Global Value Chain theory and Sustainable Entrepreneurship theory. Three main findings came out of this work.

The first finding is that barriers do not work as separate problems. They build on each other in loops that depend on what material a firm uses. Higher material costs force firms to charge premium prices. Premium prices make it necessary to have international certification. Certification requires capital. And without capital, costs stay high. The loop keeps going. Biopolymer firms are caught in an economically driven version of this loop. Recycled and waste based firms are caught in an institutionally driven version. Because of the heritage positioning that natural fibre firms have, they face the least severe version as this position reduces the need for formal certification. This study defines double compounding effect as the combination of baseline trade constraints and extra sustainability specific barriers. No matter what materials the firms use, four barriers affect all the firms: the geographical position of Nepal as landlockedness, domestic willingness to pay gap, absence of certification infrastructure and fragmented policy coordination.

Second finding is that material choice is not just a production decision but also it shapes the entire business model from the start. From the cross case analysis, three types of firms emerged. Heritage craft firms compete on cultural provenance and artisanal skill, which is why they face the fewest barriers. On the other hand, technology dependent firms follow innovation driven approaches which need capital, certification and scale. It is the most constraining barriers but, at the same time, it also has the highest potential if firms can grow. Circular systemic firms depend on institutional conditions outside their control. Firms those were able to succeed internationally worked with Nepal's constraints rather than against them. They turned resource limitations into something industrial producers were not able to copy.

The third finding of this study is the willingness to pay paradox, which say that the customers in Nepal are willing to pay 1 to 20% more for sustainable packaging. However, the actual cost of producing these products is very high than that 1 to 20%. So that gap between what consumers will pay and what products actually cost can not be fixed by marketing or education. It is built into production costs, certification fees and logistics expenses and institutional conditions. It is built into production costs, logistics expenses and certification fees that come from Nepal's geography and institutional conditions.

All three findings point towards one main conclusion. The biggest constraint on sector wide growth is not that firms lack entrepreneurial ability, rather this study found that ability to be strong across all ten firms. The real constraint is the gap between what individual firms can do and what the institutional ecosystem around them would need to provide. Four things need to align properly for the firms to scale which are shared certification infrastructure, coordinated logistics support, growth stage financing and integrated policy coordination. Until those are in place, individual firm successes will stay as individual firm successes rather than becoming sector wide progress.

7.2 Limitations

This study has some limitations that need to be acknowledged clearly.

The first limitation is the interview guide because it was not designed around the SBMC framewor and was applied later as an analytical lens to organise the data. This means some SBMC components, particularly revenue streams and customer relationships, were not directly and systematically asked in each of the interviews. When they appeared in the findings, it means that the interviewees mentioned them naturally rather than responses to specific questions.

The second limitation is how barrier patterns were constructed. Interviewees were not asked to rate or score barriers. The SC, PC and NR patterns in the findings tables are interpretive judgements made by the researchers based on how prominently each barrier appeared in the interview data. Similarly, cost structure descriptions, firm archetypes and strategic groupings are researcher constructions built from qualitative evidence and these are not the measurements provided by respondents.

The third limitation is the single respondent design because only one person from each firm was interviewed. In some cases this was an operational staff member rather than a founder or senior manager. This means some firms may be described less completely than others or some may be described more completely than others. A second interview per firm or interviews with multiple people in the same firm would have strengthened the credibility of the findings.

The fourth limitation is that the research was done at one point in time. A study that follows firms over several years would give stronger evidence about whether the strategies identified here actually produce better outcomes over time.

The fifth limitation is sample coverage. The ten firms cover a large part of Nepal's active sustainable packaging ecosystem but small informal firms and firms outside the Kathmandu Valley are not well represented. The findings are relevant to other landlocked developing countries in similar situations but statistical generalization of the findings is not possible.

The sixth limitation is that the interview guide was designed primarily to map barriers and strategies. It did not include direct questions on GVC positioning, barrier interaction mechanisms or strategic archetype differences. The compounding barrier cascade, the three strategic archetypes and the GVC upgrading pathway analysis are therefore researcher-level analytical constructions built through cross-case comparison. Future research could use a more targeted guide that asks interviewees directly about these dimensions.

7.3 Future Research Directions

This study points to potential three areas that future researchers could explore.

Following up with the ten firms over time would show whether the three archetypes identified here produce different results in the long run. It would also show whether the LeafPlus dual market model can be repeated by other firms. This kind of longitudinal research would also help to confirm which strategies actually cause better outcomes rather than just being associated with them.

A larger scale quantitative study would test whether the patterns found here hold across more firms. The three archetype framework could form the basis of a survey instrument. That survey could be used with firms across Nepal and in comparable landlocked developing countries such as Bhutan, Laos, Rwanda and Bolivia.

The study that would be focused on consumer would add the perspective of the demand side which this study did not cover. It showed the willingness to pay paradox from the supply side, but research which looks at how the actual customers respond to real sustainable packaging products at real prices would show if the domestic premium market can grow over time.

7.4 Closing Reflection

Given the growing consciousness towards sustainability, Nepal's sustainable packaging sector stands at an important moment. There has been growth of sustainable packaging: Global biodegradable packaging is expected to grow significantly through 2030. Different international rules are pushing companies to exclude conventional plastics. Buyers from different countries are also looking for sustainable alternatives. In this scenario, Nepal possesses clear material

advantages, as it has indigenous fibres that regrow naturally, craft traditions that are centuries old and communities with deep knowledge of natural materials.

The selected 10 firms shows that the Nepalese entrepreneurs have vision, creativity and strategic thinking that is required to build internationally competitive business and they have done this while dealing with the prevailing compounding effects that would stop other similar firms. The firms have not been able to build the institutional ecosystem that would help them to turn their individual successes into sector wide progress.

This study was conducted at one point in time, with ten firms, using qualitative methods. The findings are interpretive and analytically generalisable rather than statistically representative. But the direction they point is clear. Nepal's sustainable packaging sector does not need more entrepreneurial effort. It already has that. What it needs is the institutional architecture that allows that effort to compound rather than dissipate. Building that architecture is the work that remains.

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Appendices

Appendix A: Interview Guide

The following semi-structured interview guide was used across all ten case interviews. The questionnaire is divided into five sections, each aligned with the research objectives and theoretical framework.

Section 1: Basic Information

1. Can you briefly describe your company, its mission, and its role in sustainable packaging?
2. What type of packaging products do you produce or use (natural fibre, biodegradable plastics, recycled plastics, etc.)?
3. What percentage of your production is focused on international markets?

Section 2: Understanding Sustainable Packaging Practices in Nepal

1. How do you define "sustainable packaging" in the context of your company's work area?
2. What raw materials do you use? Are they locally sourced or imported?
3. What environmental benefits does your packaging provide compared to conventional plastic packaging?
4. Do you measure environmental impact (carbon footprint, recyclability, compostability, waste reduction)?

Section 3: Barriers to Scaling in International Markets

1. What are the major financial challenges in scaling production?
2. Do you receive any government subsidies or policy support?
3. Do you face limitations in machinery or production technology?
4. Are raw materials consistently available in sufficient quantity and quality?
5. Is there a gap between local technology and international standards?
6. How does Nepal's landlocked geography affect your export operations?
7. What are the key logistics challenges (transportation cost, delays, customs)?
8. How do international packaging regulations affect your trade?
9. How effective are Nepal's packaging and waste management policies?
10. Do international buyers trust Nepali sustainable packaging?
11. Is price competitiveness a challenge compared to China, India, or EU producers?
12. Do consumers understand the value of sustainable packaging?

Section 4: Opportunities and Enabling Factors

1. Are you using any sustainable materials (hemp fibre, Lokta, bagasse, starch-based bioplastics)?

2. How did you enter international markets?
3. What makes Nepali sustainable packaging unique?
4. Does Nepal's traditional fibre knowledge give a competitive advantage?
5. How do you differentiate your product in global markets?
6. Do you collaborate with logistics companies or trade partners?
7. Do NGOs, government, or international organisations support your work?

Section 5: Future Outlook and Recommendations

1. What is your company's vision for the next 5–10 years in sustainable packaging?
2. What must change in Nepal to scale sustainable packaging in trade?

Appendix B: Interview Coding Document

Evidence Trail: Interview Transcripts → SBMC Components, Barriers and Market Positioning

This document provides the coding trail between the interview transcripts and the SBMC-based analysis tables in Chapter 5. For each firm, the table maps every analytical claim to a direct quote from the transcript and the corresponding section of the interview guide. Classifications SC / PC / NR in the barrier profile reflect the researcher's interpretive judgment of how prominently each barrier type was raised by the interviewee, not ratings provided by interviewees themselves. All quotes are verbatim or lightly condensed from the transcripts.

Interview Guide Section Reference

S1 Basic company information (mission, product type, market position)
S2 Sustainable packaging practices (definitions, raw materials, environmental benefits, impact measurement)
S3 Barriers to scaling (financial, technology, logistics, policy, trust, price competitiveness)
S4 Opportunities and enabling factors (materials, market entry, differentiation, partnerships, support)
S5 Future outlook and recommendations (vision, what must change)

Firm 1: Biobags Nepal

Component	Evidence from transcript	Supporting quote	Guide
Value proposition	Biodegradable and compostable bags replacing petroleum plastics; environmental compliance and brand image for buyers	*"Our main objective is to reduce dependency on petroleum-based plastics… supports compliance,*	S1

		brand image, and long-term environmental responsibility."	
Key resources	Plant-based polymer inputs (partially imported); basic compostability and lifecycle tracking systems	*"We use plant-based polymers, some partially imported."*	S2
Key partnerships	International buyers (target); limited current partnerships; no NGO or distributor named explicitly	*"Export partnerships allow expansion into international markets with stricter regulations."*	S4
Channels	Intermediaries; trade fairs implied; exports 20–30% of production; no confirmed direct buyer relationship	*"Biobags Nepal exports approximately 20–30% of its production, indicating an established presence beyond the domestic market."*	S1
Customer segments	Businesses under pressure from consumers, regulators, and international buyers; corporate sustainability buyers	*"Many businesses are under pressure from consumers, regulators, and international buyers to reduce plastic waste."*	S1
Cost structure	Higher material cost (plant-based vs petroleum); certification costs; logistics and supply chain costs; imported input dependency	*"High production cost due to plant-based polymers. Certification requirements… which are costly and time-consuming. Logistic and supply chain challenges, including imported raw materials."*	S3
Barrier profile	Economic SC, Technical SC, Market SC, Institutional PC, Logistics SC	*"Supply uncertainty and limited technology adoption… dependency on partially imported raw materials, which increases costs and supply risks."*	S3

Firm 2: Cargo Nepal

Component	Evidence from transcript	Supporting quote	Guide

Value proposition	Export facilitation; efficient low-impact logistics; reducing product damage and over-packaging	*"Cargo Nepal can contribute through how packaging is handled… reduce product damage and avoid over-packaging."*	S2
Key resources	Fleet; warehouse capacity; customs expertise; freight partner network	*"It is a business that is heavily tied to export processes, making it an important player in international supply chains."*	S1
Key partnerships	All Nepal exporters; international freight partners; government (customs)	*"Cargo Nepal is already highly involved in export logistics."*	S4
Channels	Air and sea freight options for exporters; channel description inferred from operational role as logistics facilitator, not directly stated as strategic channel choice	*"facilitating the transportation, handling, and shipment of products that are already processed by the clients."*	S1
Customer segments	All export businesses in Nepal; international freight partners	*"We mainly focus on what the customer is demanding… exporters increasingly need logistics partners who can create a competitive advantage."*	S1,S4
Cost structure	High transportation costs; customs delays; fuel costs increasing; both financial and sustainability burdens	*"The major problems we currently face are high transportation costs and customs delays."*	S3
Barrier profile	Logistics SC, Institutional PC, Market PC, customs delays identified as both a business and sustainability cost	*"Customs delays can mean more storage, repeated handling, longer transportation times, and potentially greater fuel use and energy consumption."*	S3

Firm 3: Nepal Art Shop Export & Import (P.) Ltd

Component	Evidence from transcript	Supporting quote	Guide
Value proposition	Handmade Lokta paper and hemp products; heritage plus	*"A blend of cultural heritage and sustainable production… eco-*	S2

	eco-friendly positioning; premium artisanal identity	*friendly, traditional items that use natural materials and minimise environmental impact."*	
Key resources	Lokta fibre (Himalayan, self-regenerating); hemp fibre; experienced artisan workforce; established cargo and logistics relationships; government registration	*"Lokta fibre, derived from the bark of the Lokta plant… hemp fibre, a renewable and durable natural material."*	S2
Key partnerships	Farmer and forest community networks for fibre sourcing; international distributors; government (registered); global cargo partners	*"Registered with the Nepal Government… modern cargo services supporting its international operations."*	S4
Channels	Air cargo via TIA with origin certificates; sea cargo from Kolkata (65+ days to USA/Canada/EU); courier door-to-door (4 days); established direct export	*"Air cargo via Tribhuvan International Airport… sea cargo from Kolkata port, which takes more than 65 days to the USA, Canada, and Europe."*	S4
Customer segments	Premium international consumers (USA, Canada, EU, Australia, Japan, South Africa, China, India); eco-conscious and heritage gift market	*"It supplies handmade products to global markets including USA, Canada, Europe, Australia, Japan, South Africa, China, and India."*	S1
Cost structure	High labour cost (entirely manual production); logistics cost via India; limited ability to scale volume without sacrificing craft quality	*"Scaling handmade production… increasing production volume is challenging and limits the ability to meet large-scale demand."*	S3
Barrier profile	Logistics PC (65-day sea freight confirmed; port access via India); other barriers NR, established firm with long-standing direct export relationships	*"Sea cargo from Kolkata port, which takes more than 65 days to the USA, Canada, and Europe."*	S4

Firm 4: Paramendo Nepal

Component	Evidence from transcript	Supporting quote	Guide
Value proposition	Plastic waste to value; circular recycling model; waste from international trade logistics and local Nepal sources given new life	*"We collect plastic waste and recycle it into new products. Instead of going to landfills, the waste can actually be recycled."*	S1
Key resources	Collected plastic waste (70% local, 30% trade-related); recycling machinery imported from India and Europe; NGO financing; carbon credit tracking system	*"Machinery imported from India… some other countries in Europe. It is very hard for us to actually create or obtain the technologies."*	S3
Key partnerships	Waste collectors; NGOs and international communities; local government; logistics companies (source of waste raw material)	*"We collaborate with logistics companies because they generate a lot of plastic waste… NGOs and international communities are also supporting our work."*	S4
Channels	Domestic B2B and community institutions; international market access through donor agencies and international partner companies	*"We enter international markets through donor agencies and international companies that are willing to expand their work here in Nepal."*	S4
Customer segments	Community institutions (domestic); institutional B2B; donor-funded international agencies	*"Local government supports our work… a lot of NGOs and international communities are also supporting our work because we are trying to solve a global problem."*	S4
Cost structure	No established market for recycled products; contamination handling costs; machinery import costs; revenue generation very limited	*"We do not have a proper market here in Nepal or internationally to sell plastic waste or recycled products… hard for us to sustain and scale."*	S3
Barrier profile	Economic SC, Institutional SC, Logistics SC, unstable government; only airways for export; contaminated waste inputs; no functioning domestic market for recycled goods	*"The unstable government makes it very hard to collaborate… Nepal has only one major way to send products to other countries and that is through airways. That is very expensive."*	S3

Firm 5: LeafPlus Nepal

Component	Evidence from transcript	Supporting quote	Guide
Value proposition	Zero-plastic biodegradable tableware from Sal leaves; compostable; visually and symbolically recognisable as natural and eco-friendly	*"Natural, compostable, and returns safely to nature after use. It minimizes long-term pollution and avoids plastics."*	S2
Key resources	Sal leaves (locally sourced, seasonal); processing machinery; rural leaf collector network; founder-led technical team; NGO seed funding	*"We use Sal leaves, locally sourced. Local sourcing reduces dependency on imports, shortens supply chains."*	S2
Key partnerships	Rural Sal leaf collector communities; distribution partners; NGO seed funders (transitioning to commercial growth stage)	*"We aim to become a global eco-based company, building internationally recognized products."*	S5
Channels	International distributors and direct export; domestic retail chains and corporate events, actively building dual-market strategy	*"We are an export-oriented startup. Our main focus is international markets."*	S1
Customer segments	Premium international eco-buyers; food service, retail, and hospitality sectors; domestic corporate event organisers and retail chains	*"High export demand and niche eco-friendly markets worldwide. Leaf-based products appeal strongly in food service, retail, and hospitality."*	S4
Cost structure	Seasonal supply of Sal leaves (rural aggregation); processing energy cost; limited production scale; capital investment in machinery required	*"Limited production scale and low technological support… production capacity constraints may hinder consistent supply."*	S3
Barrier profile	Economic SC, Technical PC, Market PC, Institutional PC, Logistics SC, startup stage with strong concept but constrained by scale and supply seasonality	*"Major barriers include scaling production and access to machinery. Consistent supply of raw materials, labor, production capacity."*	S3

Firm 6: Biocom Nepal

Component	Evidence from transcript	Supporting quote	Guide
Value proposition	Biocomposite packaging from agricultural waste and biodegradable binders; industrial-scale plastic alternative using waste that would otherwise be discarded or burned	*"We develop eco-friendly packaging solutions… biocomposite packaging made from natural fibres and agricultural waste as an alternative to plastics."*	S1
Key resources	Agricultural crop residues and plant fibres (100% domestic); R&D capacity; technical team; NGO and donor funding as primary capital	*"We use agricultural waste, such as crop residues and plant fibres, combined with biodegradable components."*	S2
Key partnerships	NGOs; donors; government (pursuing sustainability standards and certifications)	*"Growing global demand for eco-friendly packaging… attracting environmentally conscious customers and premium markets."*	S4
Channels	Emerging domestic B2B; institutional buyers; not yet export-established, in R&D and growth phase	*"We are in a growth phase. Domestically, our presence is developing, while we are gradually expanding internationally."*	S1
Customer segments	Premium institutions; export-ready eco-buyers; sustainability-focused market segments	*"Innovation allows differentiation, attracting environmentally conscious customers and premium markets."*	S4
Cost structure	High R&D costs; production scaling costs; direct competition from much cheaper conventional plastics creates margin pressure	*"Key barriers include high R&D costs, scaling production, and competition from cheaper conventional plastics."*	S3
Barrier profile	Economic SC, Technical SC, Market SC, Institutional SC, Logistics SC, most constrained firm in sample; SC across all five dimensions	*"Main weakness is limited sustainability measurement and reporting. Without proper data tracking, it is difficult to fully evaluate and demonstrate environmental impact."*	S3

Firm 7: Nepal Felt Craft Industry

Component	Evidence from transcript	Supporting quote	Guide
Value proposition	Fair trade handmade felt products; women empowerment; biodegradable reusable packaging; multi-dimensional sustainability (environmental, social, cultural)	*"Sustainability is multi-dimensional: environmental (biodegradable materials), social (fair trade, women empowerment), cultural (hand felting techniques)."*	S2
Key resources	Imported New Zealand wool (consistent quality); azo-free eco-dyes; skilled artisan workforce predominantly women; established fair trade network relationships	*"Primary raw material: 100% natural sheep wool, often imported from New Zealand for consistent quality. Dyes are azo-free and eco-friendly."*	S2
Key partnerships	International fair trade networks; boutique retailers; artisan communities	*"Handmade in Nepal brand highlights women empowerment and Himalayan heritage. Differentiates from mass-produced synthetic felt."*	S4
Channels	International fair trade retailers; premium boutiques; direct export; established relationships in EU, North America, Australia	*"Strong export orientation. Major markets: Europe, North America, Australia."*	S1
Customer segments	Fair trade retailers; premium boutiques; eco-luxury gifting market; corporate gifting; conscious consumers internationally	*"Eco-luxury and ethical gifting. Felt as premium reusable alternative for wine packaging, corporate gifts, and luxury wraps."*	S4
Cost structure	Import dependency on NZ wool (currency risk; cross-border logistics cost); high manual labour cost; landlocked logistics penalty on inbound materials	*"Reliance on imported wool exposes industry to price fluctuations and logistics challenges as a landlocked country, increasing shipping costs and export delays."*	S3
Barrier profile	Economic PC (wool import cost), Logistics PC (landlocked inbound and outbound), Market PC, es-	*"Scalability due to manual production. Reliance on imported wool exposes industry to price*	S3

	tablished exporter; barriers present but managed	*fluctuations and logistics challenges."*	

Firm 8: Natural Fiber Nepal Private Limited

Component	Evidence from transcript	Supporting quote	Guide
Value proposition	Local jute and hemp packaging; fully natural, biodegradable, and reusable; traditional craft knowledge combined with export-oriented production	*"Environmentally friendly alternatives to plastic-based packaging… combining local raw materials, traditional knowledge, and global interest in biodegradable packaging."*	S1
Key resources	100% locally sourced jute and hemp; artisan hand-weaving network; 5 years of operational experience; traditional processing knowledge	*"Local natural fibers, mainly jute and hemp. Local sourcing creates regional economic value."*	S2
Key partnerships	Rural farming communities (fibre sourcing); established international buyers and retailers	*"Combining traditional knowledge with improved production and branding to position the company strongly in export markets."*	S4
Channels	Direct international buyers; established export retailers in EU, North America, Asia; limited domestic channel development	*"Export expansion realistic… existing export awareness, natural fiber expertise, and distinctive traditional knowledge."*	S4
Customer segments	Premium international market; fair trade retailers; EU, North America, and Asian markets	*"To expand exports, strengthen international market position, and meet growing global demand for sustainable packaging."*	S5
Cost structure	High labour cost (manual hand-weaving); limited scale; consistency and quality control costs; seasonal raw material variability	*"Barriers are primarily about consistency in maintaining quality, supply and standards and seasonal or technical variations affecting natural fibre availability."*	S3

Barrier profile	Logistics PC, Institutional PC, Market PC, established firm; barriers operational rather than structural; least constrained among export-oriented firms	*"Barriers include consistency in maintaining quality, supply, and standards… seasonal or technical variations affecting natural fibre availability."*	S3

Firm 9: Bottlers Nepal

Component	Evidence from transcript	Supporting quote	Guide
Value proposition	Recyclable PET with circular use; reduced virgin plastic dependency through recycled content; national-scale distribution and brand recognition	*"Sustainable packaging is efficient, recyclable packaging that reduces carbon footprint… emphasis on operational efficiency, circular resource use."*	S2
Key resources	Industrial high-speed bottling machinery; PET collection and recycling system; large professional team; corporate capital allocation from parent company	*"Mainly PET (polyethylene terephthalate) bottles. We also use recycled plastics to reduce reliance on virgin materials."*	S1
Key partnerships	Retail distribution partners; government; Coca-Cola franchise relationship (implied); collection and recycling infrastructure partners	*"Collection, recycling networks, and recycled content improve sustainability and resource efficiency."*	S4
Channels	National retail and distribution network; domestic focus; limited and minor exports	*"Domestic market is primary. We have some exports, but our focus is mainly Nepal, serving the national beverage sector."*	S1
Customer segments	Mass domestic market (beverage consumers); institutional buyers; national beverage sector across Nepal	*"Domestic market is primary… serving the national beverage sector."*	S1
Cost structure	Dependency on external recycling infrastructure (weak in Nepal); collection system costs;	*"Weak recycling infrastructure, high recycling-related costs, and inconsistent policy enforcement."*	S3

	inconsistent policy enforcement reducing sustainability ROI		
Barrier profile	Institutional PC (policy enforcement gaps), Logistics PC, fewest barriers; large established corporate; sustainability limited by ecosystem not firm capacity	*"Dependence on external recycling systems, which are weak. Even with recyclable packaging, outcomes are limited without proper collection, sorting, and recycling."*	S3

Firm 10: Quality Roto Packaging

Component	Evidence from transcript	Supporting quote	Guide
Value proposition	Cost-efficient flexible packaging using laminated films, pouches, and wrappers; product protection for domestic food, beverage, and consumer goods industries	*"The company focuses on product protection and cost-effective packaging, though sustainability is an increasing concern."*	S1
Key resources	Industrial rotogravure printing and lamination machinery; experienced management; petroleum-based resin inputs (BOPP, polyester, polyethylene)	*"Technologies such as rota gravure printing and lamination."*	S1
Key partnerships	Domestic industrial buyers; retail sector; no NGO, no international partners raised in interview	*"Primarily domestic market focus with limited international presence. Serves local industries."*	S1
Channels	Domestic retail and industrial B2B exclusively; no export channels present or discussed	*"Primarily domestic market focus with limited international presence."*	S1
Customer segments	Mass domestic market; industrial buyers in food, tea, snacks, and consumer goods sectors	*"Used for snacks, food, tea, and consumer goods."*	S1
Cost structure	Price competitiveness in domestic market is primary concern; transition to sustainable alternatives would require significant capital investment	*"Transitioning from conventional plastics to eco-friendly alternatives requires investment. Alternative materials are costly and*	S3

		may not match traditional performance."	
Barrier profile	All NR, no barriers raised as constraining; established domestic firm; NR reflects interview content, not absence of barriers	*"Packaging that is recyclable and uses materials efficiently to reduce environmental impact."* (Stated aspiration, not current practice)	S2

Methodological Note on Coding Approach

The interview guide was structured around five sections: basic company information, sustainable packaging practices, barriers to scaling, opportunities and enabling factors, and future outlook. The guide did not ask directly about SBMC components such as channels, customer segments, or cost structure as standalone categories. However, data relating to these components emerged organically throughout interviewees' responses, particularly in Sections 1, 2, and 3, as interviewees described their operations, products, market presence and challenges.

The SBMC was applied as an analytical lens post-data collection to organise and interpret what emerged, consistent with an inductive qualitative coding approach. This is standard practice in interpretive case study research: theoretical frameworks are used to structure and make sense of data rather than to pre-determine what is asked. As stated in the thesis methodology, the Sustainable Business Model Canvas was used as an analytical lens to organise and interpret the interview data, not as a data collection framework.

The barrier profile classifications (SC / PC / NR) are researcher interpretations based on how prominently each barrier type was raised in the interview. SC was assigned when interviewees used language such as major barriers, very hard, very expensive, or impossible without support. PC was assigned when challenges were described in more neutral or managed terms. NR was assigned when a barrier dimension was not prominently raised by the interviewee. These are not ratings provided by interviewees and are not intended as quantitative scores. They reflect the researcher's interpretive judgment of relative barrier salience as communicated in each interview.