Business model innovation in small and medium-sized enterprises within university-led cluster initiatives in Bolivia

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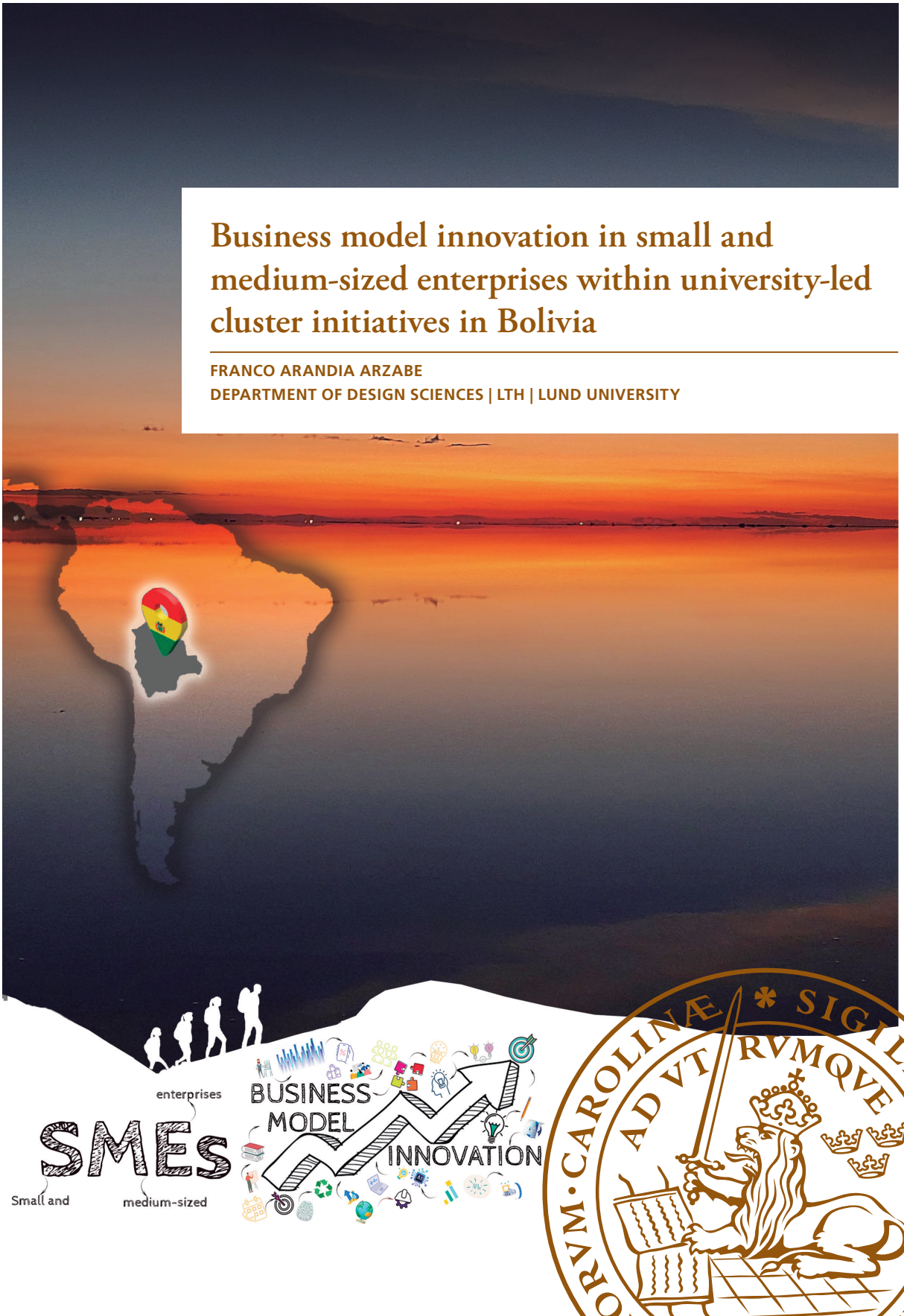

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Franco Arandia Arzabe

LUND UNIVERSITY

LICENTIATE THESIS

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Abstract:

To engage SMEs in innovation could be important to economic growth in Bolivia, it is challenging to develop and achieve business model innovation due to several factor like inability to establish clear demands for technology, limited access to technological resources, insufficiently educated and trained human resources, and a lack of scientific and technological support. Also, the country's technological capabilities, market access, management assistance and other related factors play significant roles in hindering its innovation progress

This licentiate thesis seeks to explore and advance understanding of how SMEs innovate their business models in a lower middle-income country like Bolivia through participation in university-led cluster initiatives. To achieve the research objectives, a literature review and explorative qualitative research methodology were employed, through case studies and interviews for data collection. Empirical data was collected from the perspective of SMEs' owners/managers, who receive external support, to examine how tailored support mechanisms can enhance SMEs business models.

Based on the literature review, it was found that universities can influence insights from a diverse range of research studies to support BMI in SMEs, by structuring and designing different support activities. This can be achieved through: Facilitating knowledge or technology transfer from universities, exploring networks of relationships between universities and SMEs, SMEs seeking support to effectively manage and address problems, and the government or other institution incentivize the relationship. Each contributes to BMI by enhancing value creation, value delivery, and/or value capture.

Furthermore, when examining how cluster initiatives currently impact the business model innovation of SMEs in Bolivia, the analysis revealed that university support predominantly concentrated on the development of value creation, such as technical solutions and laboratory resources, while less emphasis was placed on the dimensions of value delivery and capture. In this context the focus is on technology transfer and capacity-building; however, there is a need for more comprehensive support in value delivery and capture dimensions.

Additionally, successful cases of SME business model innovation in this context, have innovated their business models in two principal ways: following a technology-driven BMI pattern, with a circular approach and technology and product development and/or innovated with a market-driven pattern, with market focusing and customer understanding and expanding customer access. Macroeconomic factors supports good access to natural resources and reliance on the informal part of the economy. In the successful cases, we found adherence to regulations and use of higher education resources as important factors for the SMEs' enhancement of their value creation and capture processes through continuous business model innovation.

In conclusion, this thesis elucidates the complex interplay between various stakeholders and factors influencing BMI in Bolivian SMEs. By leveraging support activities in collaborative university and other partnerships, SMEs can navigate challenges and capitalize on opportunities to drive business model innovation.

Key words: Business models, business model innovation, lower middle-income countries, SMEs, Bolivia.

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Acknowledgments

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I clearly remember when this dream began -on my birthday in late 2021-, when I received the news, that I had been selected to start my doctoral studies. That notice was one of the best birthday gifts I have ever received. Embarking on this journey was not an easy decision, considering all the implications and details before making it. However, I made it, and throughout, many people have been involved, providing support in various ways and always willing to help with whatever I required.

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Thanks all for your assistance so far, but the journey continues...

Abstract

To engage SMEs in innovation could be important to economic growth in Bolivia, it is challenging to develop and achieve business model innovation due to several factor like inability to establish clear demands for technology, limited access to technological resources, insufficiently educated and trained human resources, and a lack of scientific and technological support. Also, the country's technological capabilities, market access, management assistance and other related factors play significant roles in hindering its innovation progress

This licentiate thesis seeks to explore and advance understanding of how SMEs innovate their business models in a lower middle-income country like Bolivia through participation in university-led cluster initiatives. To achieve the research objectives, a literature review and explorative qualitative research methodology were employed, through case studies and interviews for data collection. Empirical data was collected from the perspective of SMEs' owners/managers, who receive external support, to examine how tailored support mechanisms can enhance SMEs business models.

Based on the literature review, it was found that universities can influence insights from a diverse range of research studies to support BMI in SMEs, by structuring and designing different support activities. This can be achieved through: Facilitating knowledge or technology transfer from universities, exploring networks of relationships between universities and SMEs, SMEs seeking support to effectively manage and address problems, and the government or other institution incentivize the relationship. Each contributes to BMI by enhancing value creation, value delivery, and/or value capture.

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Additionally, successful cases of SME business model innovation in this context, have innovated their business models in two principal ways: following a technology-driven BMI pattern, with a circular approach and technology and product development and/or innovated with a market-driven pattern, with market focusing and customer understanding and expanding customer access. Macroeconomic factors supports good access to natural resources and reliance on the informal part of the economy. In the successful cases, we found adherence to regulations and use of higher education resources as important factors for the SMEs'

enhancement of their value creation and capture processes through continuous business model innovation.

In conclusion, this thesis elucidates the complex interplay between various stakeholders and factors influencing BMI in Bolivian SMEs. By leveraging support activities in collaborative university and other partnerships, SMEs can navigate challenges and capitalize on opportunities to drive business model innovation.

Resumen

Involucrar a las PyMES en la innovación podría ser importante para el crecimiento económico en Bolivia; sin embargo, desarrollar e implementar la innovación en los modelos de negocio es un desafío debido a varios factores, como la incapacidad para establecer demandas claras de tecnología, el acceso limitado a recursos tecnológicos, la insuficiente formación y capacitación de los recursos humanos, y la falta de apoyo científico y tecnológico. Además, las capacidades tecnológicas del país, el acceso al mercado, la asistencia en gestión y otros factores relacionados desempeñan un papel significativo en la obstaculización del proceso de la innovación.

Esta tesis de "licentiate" busca explorar y avanzar en la comprensión de cómo las PyMES innovan en sus modelos de negocio en un país de ingresos medianos bajos como Bolivia, a través de la participación en iniciativas de clúster lideradas por universidades. Para alcanzar los objetivos de investigación, se empleó una revisión de la literatura y una metodología de investigación cualitativa exploratoria, a través de estudios de caso y entrevistas para la recolección de datos. Los datos empíricos se recopilaron desde la perspectiva de los propietarios/gerentes de las PyMES que reciben apoyo externo, con el fin de examinar cómo los mecanismos de apoyo adaptados pueden mejorar los modelos de negocio de las PyMES.

Con base en la revisión de la literatura, se encontró que las universidades pueden aprovechar conocimientos de una amplia gama de estudios de investigación para apoyar la innovación en los modelos de negocio en las PyMES, mediante la estructuración y el diseño de diferentes actividades de apoyo. Esto se puede lograr a través de: la facilitación de la transferencia de conocimiento o tecnología desde las universidades, la exploración de redes de relaciones entre universidades y PyMES, las PyMES que buscan apoyo para gestionar y abordar problemas de manera efectiva, y el gobierno u otra institución incentivando la relación. Cada uno contribuye a la innovación de modelos de negocio al mejorar la creación de valor, la entrega de valor y/o la captura de valor.

Además, al examinar cómo las iniciativas de clúster impactan actualmente la innovación en los modelos de negocio de las PyMES en Bolivia, el análisis reveló que el apoyo universitario se concentró predominantemente en el desarrollo de la creación de valor, como soluciones técnicas y recursos de laboratorio, mientras que se puso menos énfasis en las dimensiones de entrega y captura de valor. En este contexto, el enfoque está en la transferencia de tecnología y el desarrollo de capacidades; sin embargo, se requiere un apoyo más integral en las dimensiones de entrega y captura de valor.

Por otra parte, los casos exitosos de innovación en los modelos de negocio de las PyMES en este contexto han innovado sus modelos de negocio de dos maneras principales: siguiendo un patrón de BMI impulsado por la tecnología, con un

enfoque circular y desarrollo de tecnología y productos; y/o innovando con un patrón impulsado por el mercado, centrado en el mercado y en la comprensión del cliente y la expansión del acceso al cliente. Los factores macroeconómicos apoyan un buen acceso a los recursos naturales y la dependencia de la parte informal de la economía. En los casos exitosos, encontramos que la adhesión a las normativas y el uso de los recursos de educación superior son factores importantes para la mejora de los procesos de creación y captura de valor de las PyMES a través de la innovación continua de sus modelos de negocio.

En conclusión, esta tesis despeja la compleja interacción entre diversos actores y factores que influyen en la innovación del modelo de negocio en las PyMES Bolivianas. Aprovechando las actividades de apoyo en colaboraciones con universidades y otras asociaciones, las PyMES pueden sortear desafíos y capitalizar oportunidades para impulsar la innovación en sus modelos de negocio.

List of appended papers

The research presented in this Licentiate thesis comprises three complete papers that are listed below. A brief description of the author's contribution to each paper is included in Chapter 1, section 1.5, while a summary of the results of each paper can be found in Chapter 5. The full version of each paper is appended at the end of the thesis.

Paper I

Arandia Arzabe, Franco (2024). *The university´s support to develop, change and innovate the Small and Medium-sized Enterprises (SMEs) Business Model. A review*

Earlier version (extended abstract) of the manuscript presented and published in the proceedings of the 8th International Conference on New Business Models, 2023, (peer-reviewed). Maastricht University, The Netherlands. Maastricht University Press. https://doi.org/10.26481/mup.2302.

Status: Manuscript unpublished

Paper II

Arandia Arzabe Franco, Olivares Ugarte Jazmin Estefania, Bengtsson Lars (2024) *How cluster initiatives support business model innovation of small and medium-sized enterprises. Cases from a public University in Bolivia.*

Status: Under review at the Journal of Business Models.

Paper III

Arandia Arzabe Franco, Bengtsson Lars, Olivares Ugarte Jazmin Estefania (2024) *Business model innovation factors of small and medium-sized enterprises in Bolivia.*

An initial version of the paper was presented in the International Conference on Regional Development in South America: empowering knowledge flows and collaboration networks, RSA KIRDSA Network, 2024, (peer-reviewed). Montevideo, Uruguay

Status: Published in the Journal of Risk and Financial Management, Vol. 17, No 334, Special Issue Corporate Social Responsibility, Governance, and Small & Medium Enterprises Performance. Published under the Creative Commons Attribution (CC BY 4.0) license. https://doi.org/10.3390/jrfm17080334

Abbreviations

BM	Business models
BMI	Business model innovation
CI	Cluster initiatives
FCF	Food Cluster Cochabamba
GDP	Gross domestic product
GTC	Green Technology Cluster
SME	Small and medium-sized enterprise
UMSS	Universidad Mayor de San Simón
UTT	Unit of Technology Transfer

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1 Introduction

This chapter exposes the background, articulates the problem statement, and delineates the objectives of the research. Subsequently, it outlines the research questions and delimits the scope of the study.

Background

Bolivia is classified as a lower middle-income economy (World Bank, 2023). Small and medium-sized enterprises (SMEs) are approximately 80% of economic activity among enterprises in the national economy (Encinas and Arteaga, 2007), generating 83% of the labour force but contributing only about 26% to the GDP (Ulandssekretariatet - DTDA, 2021). A significant number of SMEs operate informally, facing various challenges in transitioning to a formal economy (Garcia-Agreda et al., 2022), which are intensified by regulatory issues and weak institutional frameworks (Ferraro et al., 2011). These factors contribute to high levels of unemployment and economic lack of progress (Rhijanet Cristina and Rivera Chacon, 2023). Developing innovation activities is challenging due to the inability to establish clear demands for technology and the limited access to technological resources (Arandia Garcia, 2020), as well as insufficiently educated and trained human resources and a lack of scientific and technological support (Arbache et al., 2023).

The specific context of Bolivia presents unique conditions and challenges that may either facilitate or impede the efforts of enterprises to innovate and growth. It is evident that Bolivia needs to transition from an economy predominantly reliant on natural resource extraction to one seeking to diversify and upgrade its economic landscape (Castillo Machicado and Ignacio, 2020; Vila, 2022). This transition underscores the importance of SMEs evolving from simplistic business models to more sophisticated ones that offer enhanced solutions and value. The macro- and micro-level conditions in Bolivia can either enable or impede the origination and development of innovative business models, highlighting the influence of the environment on the innovation process.

Business models describe the design and architecture of a firm's value creation, value delivery, and value capture mechanisms (Teece, 2010). Every enterprise has

a business model, whether explicit or implicit, which is crucial to the success, regardless of whether it is a new venture or an established enterprise (Magretta, 2002; Osterwalder and Pigneur, 2010). Business model innovation (BMI) happens when an enterprise modifies or improves at least one of these value dimensions in accordance with its different components (Angelshaug et al., 2023; Foss and Saebi, 2018). BMI involves the design of novel, nontrivial changes to the key elements of a firm's business model and/or the architecture linking these elements (Foss and Saebi, 2017).

Research on business models and business model innovation, particularly in the context of SMEs in lower middle-income countries, remains underdeveloped (Alba and Dentchev, 2021; Sánchez and Ricart, 2010). This thesis seeks to address this gap by contributing to the body of knowledge relevant to similar countries, highlighting the role that SMEs play, despite their often-limited innovation activities and capacities. These limitations are frequently intensified by diverse challenges, including insufficient institutional support.

In many cases, the innovation capacities of SMEs are not well-developed, and the competition with large businesses and corporations further restricts their growth (Cosenz and Bivona, 2021). This underscores the need for more research in this area. Usually, business model research is conducted in resource-rich countries with stable economic and political structures, which points to a significant research gap in resource-limited and more informally organized countries (Sánchez and Ricart, 2010). There is a pressing need to explore how the characteristics of these different environments shape SMEs' business models and their efforts to innovate (Guo et al., 2017) and to enhance their overall impact, better engagement and the implementation of diverse strategies that are needed to improve capacities for value creation, value delivery, and value capture, thereby supporting economic growth (Albats et al., 2023).

There is significant potential for SMEs in Bolivia to enhance their contributions to the national economy by increasing the value of their products and services (Vila, 2022). SMEs could expand their capacities, improve productivity, and improve production processes, thereby adding value to the Bolivian economy (Acevedo, 2018). Such advancements would not only enhance the competitiveness of SMEs but also contribute to the development of a more dynamic and resilient ecosystem (Barja Daza, 2020). Fostering innovation and enhancing value creation, delivery, and capture in SMEs could be a key strategy for improving capacities, promoting economic development, and achieving sustainable growth (Castillo Machicado and Ignacio, 2020).

Furthermore, institutional support for fostering innovation among SMEs is often limited in lower middle-income countries (Barja Daza, 2020). This type of support is crucial for promoting innovation and should be a focal point in these regions (Acevedo, 2018). Recognizing the important role that SMEs play in the economy is

central to this research project, as well as to the development efforts of SMEs operating in such complex and challenging environments.

One type of institutional support for SMEs' efforts to innovate their business models can come from universities, such as university-led cluster initiatives (Klofsten et al., 2015). This study has taken its departure in the cluster initiatives promoted by the Universidad Mayor de San Simón (UMSS) in Cochabamba, one of Bolivia's largest public universities. The Unit of Technology Transfer at Universidad Mayor de San Simón (UTT-UMSS) recognizes the need for supporting activities as well as research on business models and business model innovation for SMEs participating in their cluster initiatives. Such research could describe and analyse various aspects related to activities performed in the cluster initiatives, including proposals on how cluster initiatives could provide better support for SMEs to innovate their business models.

Research problem

To engage SMEs in innovation could be a key to economic growth in Bolivia as well as other lower middle-income economies (Arbache et al., 2023). However, the precise mechanisms to foster such innovation may not always be immediately apparent to both researchers and practitioners (Acevedo et al., 2015; Cespedes Quiroga and Martin, 2017). For Bolivia, it is challenging to develop and achieve a higher level of innovation activities due to several factors. These include an inability to establish clear demands for technology and limited access to technological resources (Arandia Garcia, 2020), insufficiently educated and trained human resources, and a lack of scientific and technological support (Arbache et al., 2023). The country's technological capabilities, market access, and other related factors also play significant roles in hindering its innovation progress (Vila, 2022).

In this context, it would be beneficial to enhance the SMEs' value propositions by fostering the creation, development and incorporation of more innovative and valuable products and services (Cespedes Quiroga and Martin, 2017). This requires a shift from traditional business models focused on extraction and sales of raw materials towards a business model focused on the innovation of higher value products and services (Castillo Machicado and Ignacio, 2020).

In Bolivia, most SMEs operate within the informal sector, presenting numerous challenges in activities aimed at fostering their integration into economic growth (Garcia-Agreda et al., 2022). Within this environment, the prevalence of informality is attributed to a confluence of factors and undertakings, including regulatory disparities, institutional weaknesses, and a lack of comprehension regarding the advantages associated with formalization (Ferraro et al., 2011). The predominant features include their emergence within a submerged economy marked by informal

activities, considerable constraints in terms of competitiveness, and a demonstration of the fragility and inefficiency of both public and private sector plans aimed at fostering, advocating for, and enhancing business activities (Vila, 2022). Institutionally thin regions lacking resources and competences related to R&D centers and support structures for innovation adversely affect the development of innovation activities in these contexts (Arocena and Sutz, 2020a).

In that regard, the Innova-UMSS program at Universidad Mayor de San Simón (UMSS) aims to support SMEs involved in cluster initiatives by enhancing their innovation capabilities, including their ability to innovate business models. Following the developmental university approach, Acevedo (2018), analysed at UMSS diverse activities and initiatives developed in response to the varied societal demands placed on the university. That in order to leverage the capacities and business perspectives that can benefit from university resources, particularly those SMEs that are willing to engage in such collaborations.

Empirical evidence gathered from prior cluster development activities of SMEs in Bolivia, Acevedo (2018) accentuates the importance of cultivating innovative competences in innovation management, value creation, delivery, and capture within the operational framework of SME cluster development. Furthermore, it highlights the importance of promoting collaboration and engagement between a university and SMEs (Latifi et al., 2021). Additionally, it advocates for the necessity of research in business model and business model innovation, contextualizing the effort within resource-constrained societies to bridge knowledge gaps and advance understanding the research area.

Numerous publications highlight the lack of empirical evidence in business model and business model innovation research, especially in resource-limited contexts, thus identifying a significant research gap (Anwar, 2018; Bucherer et al., 2012; Casadesus-Masanell and Zhu, 2013; Hedman and Kalling, 2003; Latifi et al., 2021). In studies of business model innovation (BMI), a strong correlation emerges between the components of value creation, delivery, and capture as beneficial, collectively shaping various facets of business models (Foss and Saebi, 2017; Latifi et al., 2021; Ramdani et al., 2019; Rayna and Striukova, 2016).

One of the research gaps guiding the future trajectory of BMI research is BM design and innovation for SMEs (Zhang et al., 2023), such as in the context of lower middle-income economies and markets (Sánchez and Ricart, 2010). Extant literature concerning this subject is fragmented, necessitating further research to attain a broad identification of the principal drivers of innovation in SME business models (Wirtz et al., 2016; Wirtz and Daiser, 2018) and their consequential effects on SMEs' business performance.

Research question, research purpose, and objectives

Research question

How do small and medium-sized enterprises innovate their business models in a lower middle-income country like Bolivia through participation in university-led cluster initiatives?

Research purpose

To develop knowledge about how small and medium-sized enterprises innovate their business models in a lower middle-income country like Bolivia through participation in university-led cluster initiatives.

Specific objectives

-1. To describe the current state of research knowledge of business model innovation in SMEs within clusters led by a university.

-2. To describe and analyze the SMEs' experiences of supporting activities from university-led cluster initiatives in Bolivia aiming to support small and medium-sized enterprises in business model innovation.

-3. To describe and analyze successful business model innovation experiences of SMEs, in the cluster initiatives led by a university, in the Bolivian country context.

Research focus and demarcations

This study pertains to the theoretical domain of business model innovation, in an empirical context where a public university in Bolivia, supports SMEs to explore and develop novel business models in SMEs involved in their cluster initiatives. The university-led activities aim to facilitate the adoption of technical and other business-related capabilities required for business model innovation activities.

The empirical data is primarily gathered from the SME owners/managers' perspective, who are often the recipients of external support activities. By focusing on the experiences and viewpoints of SME managers, this research tries to explore how support mechanisms can be effectively tailored to meet the specific needs of SMEs, thereby enhancing their business models and overall performance. The study places emphasis on understanding the perspectives of SMEs as the ultimate beneficiaries of such innovations.

Extant business model innovation research includes several definitions and perspectives. However, for this research project, we will conceptualize it as "BMI as a change process in value creation, value delivery and value capture" (Angelshaug et al., 2023; Foss and Saebi, 2017). Additionally, it is important to underscore that this project primarily focuses on the firm-level perspective, specifically targeting SMEs operating in resource scarce conditions and with an involvement in cluster initiatives led by a public university in Bolivia.

Author contributions

This licentiate thesis consists of an introductory essay (kappa) and three academic papers (appended). In all three papers I have taken the role as the main author with my academic colleagues as co-authors. My contributions and the co-authors' contributions in the three papers are described in the table below, based on the CRediT taxonomy.

Table 1. Contribution roles in academic papers

Paper	**Paper I**	**Paper II**	**Paper II**
Author(s) / **Contribution Roles Taxonomy (Credit)**	Franco Arandia Arzabe (FAA)	Franco Arandia Arzabe (FAA), Jazmin Estefania Olivares Ugarte (JEOU) and Lars Bengtsson (LB)	Franco Arandia Arzabe (FAA), Lars Bengtsson (LB) and Jazmin Estefania Olivares Ugarte (JEOU)
Conceptualization	FAA	FAA and LB	FAA and LB
Data curation	FAA	FAA and JEOU	FAA and JEOU
Formal analysis	FAA	FAA and LB	FAA
Funding acquisition	N/A	N/A	N/A
Investigation	FAA	FAA and JEOU	FAA and JEOU
Methodology	FAA	FAA	FAA and LB
Project administration	FAA	FAA	FAA
Resources	FAA	FAA	FAA
Software	FAA	FAA	FAA
Supervision	LB	LB	LB
Validation	FAA	FAA, JEOU and LB	FAA, LB and JEOU
Visualization	FAA	FAA and JEOU	FAA and JEOU
Writing – Original draft preparation	FAA	FAA	FAA
Writing – Review and editing	FAA	FAA and LB	FAA and LB

Thesis outline

This thesis includes a compiled summary and three appended papers. The compiled summary is divided into the following chapters.

Chapter 1. Introduction presents the background and research purpose of this study.

Chapter 2. Small and medium-sized enterprises in Bolivia the context upon which the research presented in this thesis is based on.

Chapter 3. Frame of reference provides the literature on business models, business model innovation and SMEs cluster development, upon which this study is based.

Chapter 4. Research methodology describes the research process, research design, data collection techniques and analysis process used in the study.

This chapter also describes the actions taken to ensure the research quality of the study and ethical considerations.

Chapter 5. Summary of appended papers summarizes the appended papers, their findings, and contributions to the thesis. Based on these contributions, this chapter presents the connection between these papers and the research purpose of this study.

Chapter 6. Concluding discussion presents an aggregated discussion of the findings, fulfilment of research objectives and the contributions to the research purpose. This chapter also presents the implications, the conclusion, the study's limitations, and future research.

2 Small and medium-sized enterprises in Bolivia

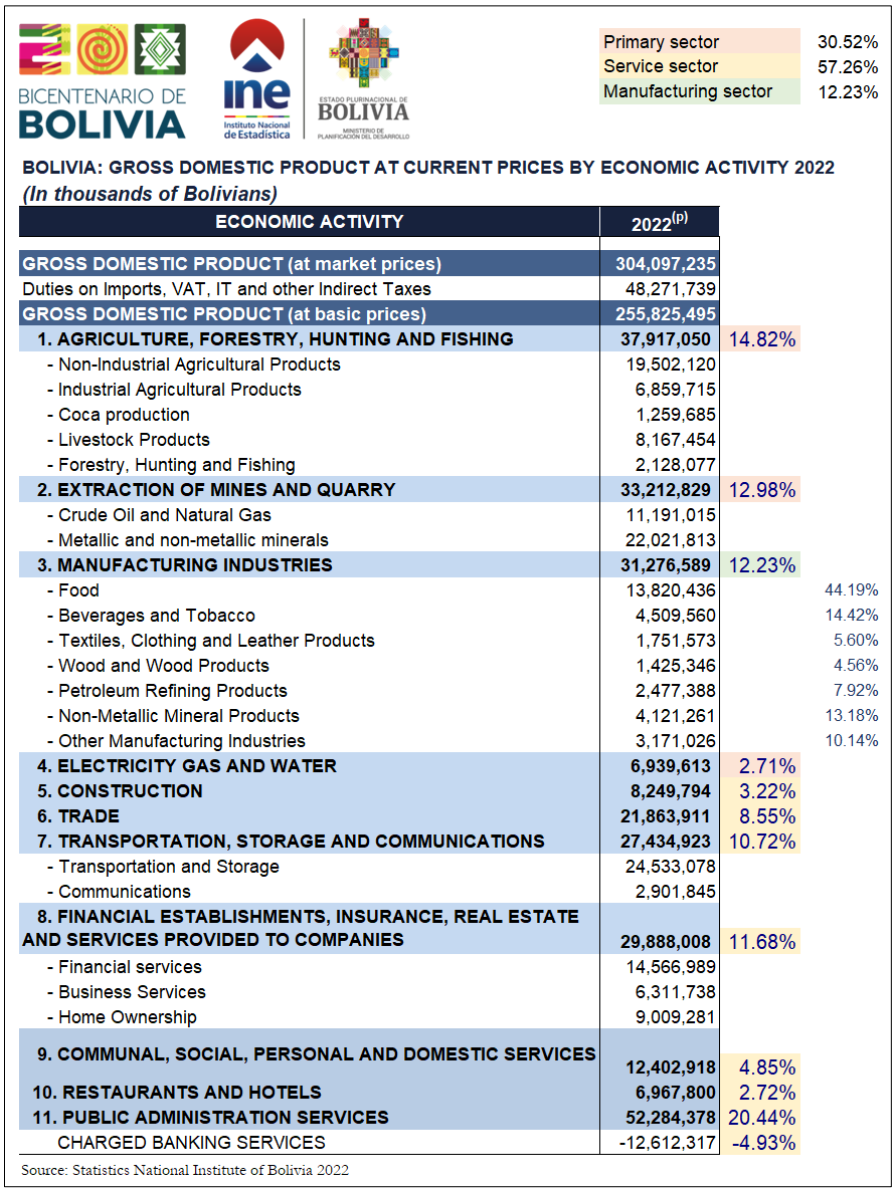
This chapter provides the context upon which the research presented in this thesis is based on. It offers an overview of the specific relevant characteristics, along with insights into the current situation.

Current situation of SMEs in Bolivia

Main characteristics of the Bolivian economy

The World Bank (2023) categorizes Bolivia as a lower middle-income economy. The economic structure of Bolivia is characterized by various sectors, each making distinct contributions to the GDP. Approximately 31% of the GDP originates from the primary sector, primarily driven by extractive industries. The manufacturing sector contributes 12%, while the service sector accounts for the remaining 57% (for detailed classification, refer to Figure 1). This study focuses primarily on the area of the manufacturing sector, which comprises several sub-divisions. These sub-divisions predominantly fall within traditional sectors classified by the National Statistics Institution into groups such as food; beverages and tobacco; textiles, clothing, and leather products; wood; petroleum refining products; non-metallic mineral products; and other unclassified areas.

The economy of the country predominantly relies on the extraction and exportation of natural resources only as raw materials (Rhijanet Cristina and Rivera Chacon, 2023). This necessitates different considerations for the planning of the business environment within this context. The economic and social challenge faced by the country pertains to the presence of a significant, robust, and formidable informal economy, constituting approximately 55% of the GDP in 2020, a situation that positions Bolivia as having the fifth-largest informal economy globally, according to the informal economy ranking (World Bank, 2023).



Primary sector	30.52%
Service sector	57.26%
Manufacturing sector	12.23%

BOLIVIA: GROSS DOMESTIC PRODUCT AT CURRENT PRICES BY ECONOMIC ACTIVITY 2022

(In thousands of Bolivians)

ECONOMIC ACTIVITY	2022(p)		
GROSS DOMESTIC PRODUCT (at market prices)	**304,097,235**		
Duties on Imports, VAT, IT and other Indirect Taxes	48,271,739		
GROSS DOMESTIC PRODUCT (at basic prices)	**255,825,495**		
1. AGRICULTURE, FORESTRY, HUNTING AND FISHING	**37,917,050**	14.82%	
- Non-Industrial Agricultural Products	19,502,120		
- Industrial Agricultural Products	6,859,715		
- Coca production	1,259,685		
- Livestock Products	8,167,454		
- Forestry, Hunting and Fishing	2,128,077		
2. EXTRACTION OF MINES AND QUARRY	**33,212,829**	12.98%	
- Crude Oil and Natural Gas	11,191,015		
- Metallic and non-metallic minerals	22,021,813		
3. MANUFACTURING INDUSTRIES	**31,276,589**	12.23%	
- Food	13,820,436		44.19%
- Beverages and Tobacco	4,509,560		14.42%
- Textiles, Clothing and Leather Products	1,751,573		5.60%
- Wood and Wood Products	1,425,346		4.56%
- Petroleum Refining Products	2,477,388		7.92%
- Non-Metallic Mineral Products	4,121,261		13.18%
- Other Manufacturing Industries	3,171,026		10.14%
4. ELECTRICITY GAS AND WATER	**6,939,613**	2.71%	
5. CONSTRUCTION	**8,249,794**	3.22%	
6. TRADE	**21,863,911**	8.55%	
7. TRANSPORTATION, STORAGE AND COMMUNICATIONS	**27,434,923**	10.72%	
- Transportation and Storage	24,533,078		
- Communications	2,901,845		
8. FINANCIAL ESTABLISHMENTS, INSURANCE, REAL ESTATE AND SERVICES PROVIDED TO COMPANIES	**29,888,008**	11.68%	
- Financial services	14,566,989		
- Business Services	6,311,738		
- Home Ownership	9,009,281		
9. COMMUNAL, SOCIAL, PERSONAL AND DOMESTIC SERVICES	**12,402,918**	4.85%	
10. RESTAURANTS AND HOTELS	**6,967,800**	2.72%	
11. PUBLIC ADMINISTRATION SERVICES	**52,284,378**	20.44%	
CHARGED BANKING SERVICES	-12,612,317	-4.93%	

Source: Statistics National Institute of Bolivia 2022

Figure 1. GDP Bolivia by economic activity
Source: Statistics National Institute of Bolivia 2022

The absence of robust formal markets has prompted a notable proliferation of outlawed economic activities, like contraband. Consequently, the informal sector has perceived substantial expansion, posing challenges in its regulation and containment. This trajectory implies that in Bolivia, adherence to formal economic

frameworks is frequently avoided, due to varied factors such as bureaucratic impediments and accomplishments to avoid tax obligations and formalization (Dana, 2011).

Different types of factors indicate that capacity-building processes are influenced by demand problems (e.g., weak demand associated with a small market and issues of inequality), supply weaknesses (e.g., lack of high-level human resources, including engineers), shortage of private sector investment, scarcity of private and public venture capital, the complexity of the economic structure, and the effects of the disruption of productive chains due to market liberalization, among others (Dutrénit et al., 2019). These factors vary significantly in nature and include, for instance, the low density of social networks, insufficient or low levels of training for actors, inadequate infrastructure (such as roads and telecommunications), endemic problems of malnutrition and poor health among livestock, weak user linkages, and a lack of technological assistance. This lack of capacities also reflects a lacking economic diversification strategy or pluriactivity, which necessitates changing economic activities as a poverty resilience strategy (Cespedes Quiroga and Martin, 2017).

Encountering numerous challenges stemming from the lack of formal employment opportunities, individuals are increasingly turning to informal self-employment, entrepreneurship, and subsistence livelihoods through product manufacturing, sales, and others. This trend reflects a growing inclination towards developing such markets, as many seek to sustain themselves solely through informal work arrangements, small-scale retail ventures, and various methods of product distribution (Garcia-Agreda et al., 2022).

In that regard, such arguments contribute to the establishment of SMEs, as they represent a primary avenue for income generation, particularly for families with low socioeconomic status (Vila, 2022). This phenomenon is exacerbated by the absence of conducive conditions and the precarious nature of their operations. A key factor driving this dynamic is rural-to-urban migration, as individuals seek employment or entrepreneurial opportunities in the informal sector due to the precariousness of their living standards and the scarcity of formal job opportunities (Barja Daza et al., 2013), also for recently graduated bachelor's degree students.

General situation of SMEs in the Bolivian context

The significance of SMEs in Bolivia for socioeconomic development is important. These enterprises serve as important vehicles for both survival strategies and avenues for growth, particularly for low-income families (Dana, 2011). Encinas and Arteaga, (2007) emphasize the pivotal role of SMEs in Bolivia, constituting 80% of economic activity among enterprises, Ulandssekretariatet - DTDA, (2021) indicates that SMEs generate 83% of the workforce, and contributing approximately 26% to

the GDP. Consequently, SMEs emerge as crucial economic agents driving business sector development and overall national conditions in Bolivia.

This encompasses various approaches to appreciation, demonstrating that such economic activities could contribute to the country's development while also presenting distinct challenges. As indicated in various publications, it is evident that these enterprises lack effective governmental support, access to diverse training and educational opportunities, innovative avenues for credit access, and credibility (Dana, 2011; Encinas and Arteaga, 2007; Ulandssekretariatet - DTDA, 2021).

In Bolivia, across both rural and urban market domains, commercial activities are predominantly oriented towards the identification and exploitation of marginal market niches which are deemed unviable for larger corporate entities (Ferraro et al., 2011). Furthermore, such endeavours commonly influence informal channels to capitalize on profit prospects, resulting in business paradigms that typically exhibit deficiencies in financial viability over extended temporal prospects (Barja Daza, 2020). Dana, (2011) characterizes the archetype of the traditional Bolivian entrepreneur as one who adeptly navigates ambiguities and contends with indeterminate returns within an environment marked by fluctuating prices and uncertain quantities.

For Bolivian SMEs, numerous challenges are evident, including but not limited to restricted access to finance, infrastructure deficiencies, a complex regulatory environment, socio-political influences, economic adversities, inadequate government support policies, restricted market access, and shortages in skilled labour (Barja Daza et al., 2013; Dana, 2011; Garcia-Agreda et al., 2022).

Obstacles such as limited access to flexible bank loans, bureaucratic hurdles in company establishment, high importation and production costs, and insufficient technology access debilitate Bolivian business (Vila, 2022). Also, small-scale enterprises commonly face issues of machinery obsolescence and technological underdevelopment, hindering value adding (Arandia Garcia, 2020). Bolivia's circular economy efforts are nascent, primarily focusing on recycling, yet lacking a broad circular model. Developing long-term circularity requires strengthening human, technical, and financial capacities. Challenges to circularity adoption include inadequate information and varying interpretations (Soto-Rios et al., 2023). While incentivizing investment through streamlined procedures and reduced taxes is beneficial, addressing legal security, market access, and labour productivity is crucial for sustained growth. Coordination between the state, private sector, and civil society is important to overcome these hurdles and foster economic development (Castillo Machicado and Ignacio, 2020).

However, amongst these challenges lie various opportunities for growth and advancement. These opportunities include the emergence of new industries, technological adoption, future digitalization trends, the necessity for collaboration

and networking, and the increasing emphasis on social and environmental responsibility (Barja Daza et al., 2013; Encinas and Arteaga, 2007; Vila, 2022).

In this context, consumers do not always prioritize the pursuit of the lowest price or the highest quality. Instead, individuals engage in business with those with whom they have established relationships, ensuring the expectation of reciprocity (Dana, 2011). That practice also includes interactions with public institutions, i.e., associated with corruption in public institutions. Furthermore, it is important to underscore the exigency of legal security, a facet yet to be fully realized within the country. Despite the existence of draft legislations aimed at regulating labour, administrative, and commercial dimensions of entrepreneurship, as of present, no legislation has been enacted to safeguard entrepreneurs and their endeavours (Garcia-Agreda et al., 2022).

In the country, a prior program serves as an exemplary demonstration of the significance of innovating the business model within the context under consideration, highlighting the need for such innovation in driving organizational success. To help in the current situation of SMEs in the country, one initiative that was held in Bolivia since 2015, was developed by "Bolivia Emprende", in collaboration with the Emprender Futuro Foundation and the National Chamber of Commerce, has annually conducted the Leadership, Entrepreneurship, and Innovation Program (PLEI) (Arbache et al., 2023). This program, spanning nine weeks each year, is designed to provide complete training to entrepreneurs and businesspersons on matters pertaining to leadership and innovation. The primary objective of PLEI is to equip participants with essential managerial skills necessary for effectively coordinating, managing, and directing companies. As a result, participants are empowered to apply strategic approaches and propose business models conducive to enhancing their companies' market prominence and fostering long-term growth (Arbache et al., 2023).

Insights of SMEs within university-led Cluster Initiatives in Bolivia promoted by UTT-UMSS

Unit of Technology Transfer at UMSS

In 2004, at Universidad Mayor de San Simón (UMSS) established the Unit of Technology Transfer (UTT-UMSS), an initiative through which the institution aims to advance the democratization of knowledge via cluster initiatives (Acevedo, 2018). UTT-UMSS serves as a focal point for the convergence and collaboration of social, economic, productive, and academic stakeholders. Its primary objective is to foster collaboration and generate synergies aimed at influencing regional and local

development processes in different economic areas. The approach adopted by this unit aligns with a developmental university, focusing on exploring diverse notions to further advance inclusive innovation systems (Acevedo, 2018).

This unit serves as an intermediary between academia and SMEs, striving to cultivate relationships wherein research is directly applied to actual demands. Furthermore, it is important to close the gap in the collaboration and engagement between university and SMEs, facilitating the conversion of knowledge into tangible and applied solutions. Leveraging various partnerships and interdisciplinary collaborations, the unit inclines to, as one part of the collaboration, contribute to the innovation of SMEs' business models, guiding enterprises towards a future-oriented perspective that prioritizes growth and sustainability.

This effort entails promoting the exchange of ideas, experiences, and resources to incorporate novel approaches and capitalize on management of technologies, thereby innovating operations and cultivating a competitive approach. Through diverse projects, the unit strives to foster innovation processes, recognizing that each incremental advancement covers the way for subsequent progress (Acevedo, 2018). Ultimately, the overarching objective is to foster university-enterprise collaboration and engagement, which is perceived as a catalyst for both economic growth and social advancement.

Cluster initiatives – Innova-UMSS program

In response to societal needs, Cluster Initiatives were developed as a collaborative effort between a public university and SMEs in Cochabamba region, Bolivia (Acevedo et al., 2015). These initiatives aimed to foster collaboration between academia and industry, offering solutions and engaging in various projects while leveraging the research capabilities of Universidad Mayor de San Simon (UMSS), to advance the democratization of knowledge (Acevedo, 2018) with a developmental university approach (Arocena et al., 2017). Enterprises, often seeking innovative approaches and specific support, have frequently initiated engagements with the Unit of Technology Transfer (UTT-UMSS). Subsequently, UTT-UMSS has played a pivotal role in strengthening these initiatives by providing a range of support services, including technological assistance and management guidance, and facilitating connections between SMEs and UMSS research centers to address specific needs.

Various factors, including the geographical location of Cochabamba, national policies promoting innovation systems, and the proactive engagement of various stakeholders, have contributed to SMEs cluster development at UMSS (Acevedo, 2018). Cluster initiatives, initiated in 2007, provide participating SMEs with support in areas such as research projects, machine design and prototyping, process and product design, and management assistance. By leveraging the capabilities of its

research centers, the university has effectively strengthened its relationship with the business community (Acevedo et al., 2015).

The Food Cluster Cochabamba, established in 2007, the most prominent of these initiatives, involves SMEs in the food sector. The Green Technology Cluster, established in 2021, includes SMEs with a circular economy approach. As of 2024, one hundred SMEs are involved in the Food Cluster Cochabamba, and twenty are part of the Green Technology Cluster.

The initiatives have been cultivated as a strategic response by the university to the demands articulated by the business sector, capitalizing on the capabilities of research centers. This approach serves to fortify collaboration between university and SMEs, acknowledging the multifaceted nature and intricacy of issues, facilitating open dialogue, and forging collaborative links among diverse capacities dispersed throughout (Acevedo, 2018).

UTT's strategies focused on offering research results, but these efforts found almost no local entrepreneurs recognizing the transferable potential to the extent that they were driven to invest time and efforts. On the demand side, entrepreneurs usually lacked pre-identified requests for scientific knowledge production, a deficiency linked to the underdeveloped research capacities within local industries (Arandia Garcia, 2020). While large Bolivian industries generally maintain quality control laboratories, research activities are often conducted by their centralized agencies in other countries (Acevedo, 2018). Activities aimed at fostering collaboration within the program have been originated by enterprises in pursuit of innovative approaches to their operations. In addition, they have been seeking assistance in targeted areas and solutions to minor challenges encountered in the daily operations.

In the program, support for the innovation of SMEs business models begins with different activities designed to foster development and enhance the conditions of the SMEs engaged in the initiatives. This attempt holds significant importance in facilitating the cultivation of more effective operational methodologies within the identified contextual constraints, which may otherwise impede the necessity for novel approaches to development and innovative strategies. The focus and work with SMEs were advised by experiences gained from the development and support of cluster initiatives.

Determining the precise stage at which enterprises in Bolivia aspire to formalize their operations proves somewhat complicated. While they present compelling arguments in favour of formalization, they concurrently contend with distinct obstacles in its pursuit (Vila, 2022). Within the framework of UTT, one proposed approach involves assisting SMEs in their formalization aspirations, thereby enabling them to influence newfound benefits such as market expansion and enhanced absorptive capacities within systemic innovation processes facilitated by UTT.

Furthermore, empirical evidence suggests that small entrepreneurs in the context derive benefits from technology transfer initiatives through the adoption of practices acquired during their tenure in larger private firms, as well as through the transmission of familial knowledge (Barja Daza et al., 2013).

Summary of the chapter

In the context of small and medium-sized enterprises in Bolivia, a considerable portion operates within informal frameworks, while those functioning formally often adhere to traditional business models focused solely on extraction or growth, without augmenting the inherent value of their offerings. In response, different initiatives at both academic institutions and policy-making levels aim to enhance the sophistication of SME operations, encouraging processes that amplify product value and facilitate integration into the formal economy. Such endeavours seek to foster sustained growth within SMEs while concurrently fostering greater economic and employment stability.

3 Frame of reference

This chapter outlines the theoretical foundation that the research presented in this thesis is based on. An overview of the key concepts related to this research is discussed along with some insights on the related existing literature.

Business models and business model innovation

Business models

The historical definition of the business model concept has predominantly centred on highlighting value creation within the context of technology development management (Teece, 2018). It has been characterized as "a coherent framework that takes technological characteristics and potentials as inputs and transforms them, via customers and markets, into economic outputs" (Chesbrough, 2007) . The business model is perceived as a focal point that mediates the relationship between technology development and the creation of economic value" (Chesbrough and Rosenbloom, 2002)

The significance of business models in the area of innovation lies in their provision of a structured framework dictating how a company generates, delivers, and captures value (Chesbrough, 2010; Foss and Saebi, 2017; Teece, 2010). Table 2 show how the dimensions of value creation, value delivery and value capture, encompassing nine components define the business model (Keane et al., 2018; Osterwalder and Pigneur, 2010). A robust business model can empower a company to attain a competitive edge, even in instances where its technology or concept may not be inherently superior (Chesbrough, 2007). Due to the intricate and multifaceted nature of business models, encompassing explicit and implicit knowledge that mutually influences and shape the model, a nuanced comprehension and optimization of the business model are indispensable for success in the contemporary business environment (Wadin et al., 2017).

Table 2. Business model elements and their descriptions.

BM value dimension	*BM Elements*	*Descriptions*
Value creation	Value proposition	A firm offers a mix of products/services to create value for each customer segment
	Key partners	A firm may outsource some activities to its network of suppliers/partners
	Key activities	A firm performs a set of activities to create and deliver the business model elements
	Key resources	A firm requires resources (e.g., physical, financial, intellectual property, and people skillsets) to create and deliver the business model elements
Value delivery	Customer relationships	A firm establishes and maintains relationships with each customer segment
	Customer segments	A firm serves its value proposition(s) to one or more customer segments
	Channels	A firm communicates and delivers its value proposition to each customer segment via various channels
Value capture	Cost structure	Each element of a firm´s business model has a cost component
	Revenue structure	A firm generates revenue streams from the delivery of value to each customer segment

Source: Adapted from Keane et al. (2018), based on the work of Osterwalder and Pigneur (2010).

Business model innovation

Business model innovation (BMI) derives from business models (BM), and is acknowledged as a primary source of innovation, complementing conventional facets of innovation encompassing product/service, process, and organizational dimensions (Foss and Saebi, 2018; Teece, 2010). Consequently, its primary research focuses on the innovative dimension of BM, exploring BMI as a process innovating BM or as an outcome delineating innovative BMs (Angelshaug et al., 2023; Foss and Saebi, 2017).

The BM construct inherently revolves around the structure of the firm's value creation, delivery, and capture mechanisms (Teece, 2010). Theoretically, the core of BM lies in the complementary nature of activities underpinning these mechanisms, and BMI entails substantive alterations to such complementary relationships (Angelshaug et al., 2023). Foss and Saebi, (2017) defines BMI as 'designed, novel, and non-trivial changes to the key elements of a firm's business model and/or the architecture linking these elements'. As any type of innovation activity, it involves risk taking, determining a firm's success, moderate or no positive outcomes or even bankruptcy contingent on its correct implementation (Zhang et al., 2023).

BMI serves as a crucial tool for firms aiming to enhance or sustain their competitive fitness in progressively active environments (Angelshaug et al., 2023), marked by challenging scenarios and recurrent organizational changes (Foss and Stiglitz,

2015). The broader a firm's exploration, the larger its BMI scope, and the deeper a firm's exploration, the more novel its BMI (Angelshaug et al., 2023).

Business model innovation as a process

BMI as a process (not as an outcome) necessitates managing the people and technological aspects of change inside the existing business model. It is crucial to recognise that BMI involves the skilful management of both the technological and human aspects of change within existing business models and should be viewed as a procedural attempt rather than a mere outcome. The technical aspect of BMI pertains to the concrete expressions of change, which include modifications to technologies, procedural approaches, and organizational structures. On the other hand, the human element covers the complex field of change management, tackling the various human and organizational dynamics including resolving conflicts, reducing resistance to change, and fostering motivation among stakeholders (Latifi et al., 2021).

The innovation processes often involve various activities and feedback cycles. Another important component in the process of BMI is the consideration of factors that incorporate ideas from all phases and moments. This includes identifying the aspects of each factor to determine the crucial elements that significantly impact the success of the intention to innovate business models (Wirtz and Daiser, 2018).

Effectively navigating the human and organizational complexities inherent to BMI necessitates skilled interaction with individuals possessing diverse levels of expertise. Furthermore, it mandates the deployment of specific leadership styles and competencies tailored to the unique exigencies encountered across various stages of the BMI process (Angelshaug et al., 2023; Foss and Saebi, 2017). Consequently, equipping managers with the requisite skills and resources is principal to ensuring the efficacious and efficient management of the BMI process.

However, the generic BMI process is not a ready-made, one-size-fits-all concept that can be blindly adopted without making any modifications. It should be viewed as a BMI process framework that provides researchers and managers alike with a conceptual frame for the BMI process, which they can adapt to their specific needs (Wirtz and Daiser, 2018).

Business model innovation for SMEs

Recent research findings highlight that despite the potential of BMI to establish a competitive advantage and enhance performance within firms, a considerable number of SMEs encounter challenges in realizing anticipated outcomes during the process of innovating their business models (Latifi et al., 2021).

The concept of BMI extends beyond merely enhancing a firm's value creation and capture; it encompasses the development of novel approaches to delivering value to customers and potentially necessitates a reorganization of the company's structure (Spieth et al., 2014). This aspect is particularly pertinent for SMEs, which may face limitations in terms of resources and technical capabilities, thereby requiring external assistance, such as engaging new partners or participating in research and knowledge collaborations, to effectively implement BMI (Ibarra et al., 2020).

A fundamental approach for SMEs to manage recognized opportunities and subsequently achieve superior performance is to reinvent their business models (Latifi et al., 2021). Given that BMI necessitates transcending organizational boundaries to integrate both internal and external resources, SMEs should engage in both internal innovation activities and the development of externally oriented networks (Guo et al., 2017) .

Consequently, the formulation and execution of innovative business models pose a substantial challenge for SMEs. Within this thematic domain, a majority of the scholarly publications that have explored BMI in the context of SMEs, relies on empirical evidence and tangible data to elucidate the complexities of the phenomenon (Zhang et al., 2023).

The design of business models in SMEs is predominantly an informal and unstructured process, often led by the entrepreneur's individual experience and intuitive feeling (Heikkilä and Heikkilä, 2017; Latifi et al., 2021).

Business models and business model innovation in lower middle-income economies

Research on business models and business model innovation in lower middle-income economies has not significantly progressed (Alba and Dentchev, 2021; Sánchez and Ricart, 2010). In this context, the study of business models represents a compelling research opportunity due to the necessity for adaptive and inclusive models tailored to the unique economic, cultural, and societal environments. These models should prioritize accessibility, scalability, and social relevance by leveraging technology and various innovation ecosystems to address resource limitations (Roncancio-Marin et al., 2022). The role of social enterprises and SMEs is crucial in supporting development and continuous adaptation to foster business growth, economic outcomes, and positive social impact (Ansari et al., 2012; Guerrero et al., 2021).

In such contexts, innovation appears to be a critical response for enterprise survival, focusing on cost efficiency and addressing diverse market needs and the flexibility required by these environments (Sánchez and Ricart, 2010). Diverse studies have attempted to develop metrics for agile and balanced models, enabling enterprises to

adapt to the changing conditions and preferences characteristic of these segments (Arbache et al., 2023; Singh et al., 2008).

In the context of Bolivia, a significant proportion of enterprises function as subsistence entrepreneurs, even though with aspirations for business growth, thereby emphasizing the importance of their business model (Barja Daza, 2020). The distinctive characteristics of ecosystems are believed to give businesses potential to develop competitive advantages (Cespedes Quiroga and Martin, 2017), thereby necessitating development of robust business models to ensure financial viability and foster potential for further innovation in business models. Consequently, an examination of the business models of subsistence entrepreneurs and the ecosystems in which they operate is expected to yield insights into entrepreneurs' engagement with the local ecosystem (Barja Daza et al., 2013).

The predominant activities across both rural and urban markets in Bolivia primarily involve the exploitation of marginal market gaps, which are not considered profitable for larger-scale enterprises (Daza Barja, 2020). Additionally, there is a significant reliance on leveraging profit opportunities through informal means. It is noteworthy that the prevailing business models in these contexts are typically characterized by a lack of financial sustainability over the medium to long term (Ferraro et al., 2011).

SMEs cluster development

Cluster initiatives

Cluster initiatives represent collaborative activities involving conglomerates of businesses, academic and research institutions, governmental bodies, and various stakeholders (Klofsten et al., 2015). Their principal objective is to enhance the competitiveness of a designated cluster. The distinguishing characteristic of these initiatives lies in their overarching goals rather than specific undertakings. Initiation of such initiatives can initiate from corporations, universities, or governmental entities (Ketels and Memedovic, 2008). Clusters initiatives operate on the premise that individual firms within them are strategically positioned for entrepreneurship, innovation, and growth. Participation in cluster initiatives fosters the anticipation that these firms will gain access to optimal opportunities for formulating successful and competitive strategies, ultimately contributing to the prosperity of their respective places (Klofsten et al., 2015).

Cluster initiatives are entrepreneurially driven organizations aiming to bring together actors/stakeholders in the academic, public, and business spheres in a common geographical space by offering services in a set of intermediary activities

(Laur, 2015). It represents a deliberate attempt to mobilize and coordinate these entities and resources, aimed at fostering innovation and enhancing competitiveness among the constituent companies/firms within the cluster initiative (PACF-SICD-Clusterpedia, n.d.).

In the development of cluster initiatives, conventional mechanisms such as subsidies, supportive organizations, the perpetuation of support institution longevity, and others, may inadequately guarantee the success of cluster initiatives due to the insufficiency of a one-size-fits-all model (Laur, 2015). This awareness holds particular significance in economies unfamiliar with such movements, as it can be misconstrued that a successful initiative implemented in one context would yield analogous outcomes when transposed to another, necessitating a nuanced approach to cluster initiative implementation (Parrilli, 2007).

Any formulation of cluster strategy and subsequent cluster management necessitates a context-specific approach (Karaev et al., 2007). The challenges encountered in emerging economies and structurally weak regions diverge significantly from those prevalent in technologically advanced and highly industrialized nations compare to the less developed countries (Günther and Meissner, 2017).

Through the cultivation of collaborative frameworks, promotion of innovative practices, and enhancement of competitiveness, cluster initiatives within lower middle-income countries have the potential to significantly reinforce economic development, facilitate job generation, and mitigate poverty cluster(Acevedo et al., 2015). These initiatives serve to synergistically influence the collective capacities of local enterprises, thereby fortifying national positions for efficacious participation within the global economic landscape.

Engagement between universities and SMEs

Universities in developing regions possess the potential to serve as focal points for social innovation and learning, particularly in resource-constrained environments (Arocena et al., 2017; Guerrero et al., 2019). This entails collaboration with diverse stakeholders, identification of opportunities, and provision of support to facilitate their evolution into active learning environments. By fostering connections among these spaces, universities can catalyse the emergence of impactful forms of innovation (Arocena and Sutz, 2021).

The involvement of SMEs with universities is linked to a very practical approach, as enterprises often seek to do straightforward business with universities while simultaneously having diverse goals (Smith et al., 2022). SMEs may seek to access the research expertise of the universities, collaborate on research and development projects, or recruit students and graduates with specialized skills (Pereira and Franco, 2022). However, it is important to note that these goals may not always

align with the objectives of the university, which may be more focused on advancing academic research and knowledge generation (Liu et al., 2020).

As such, successful engagement between SMEs and universities requires a delicate balance between the goals and expectations of both parties, and effective communication and collaboration between stakeholders (Acevedo, 2018). The involvement is associated with a highly pragmatic approach by SMEs seeking to engage in different activities such business transactions and collaborative approaches with universities while pursuing a range of diverse objectives (Mäkimattila et al., 2015).

The interrelation among the involved actors is complex, with numerous factors influencing the success of collaboration and knowledge exchange. However, certain factors remain unclear, with their impact on the relationship between SMEs and universities inadequately elucidated. Extant research has elucidated the presence of significant barriers to collaboration between these parties (Bruneel et al., 2010; Guerrero et al., 2019; Miller et al., 2014). Nonetheless, as an outcome, engaging with multiple partners often emerges as the most efficacious strategy for fulfilling requirements, with numerous potential benefits accruing to each participant in such collaborative actions (Ivascu et al., 2016).

At some point, SMEs may innovate their business models independently of external support. However, evidence suggests that engaging with various associations and supportive organizations can enhance the development of these innovations (Latifi et al., 2021).

4 Research methodology

This chapter outlines the research methodology adopted in this licentiate thesis. An overview of the research process and research design, including data collection, and data analysis techniques, is presented. The research quality in terms of validity and reliability is also discussed.

Pilot study to find out the problem-situation

The aim of this pilot study was to investigate the status and challenges faced by SMEs and their owners/managers involved in cluster initiatives at UMSS. This study seeks to identify potential ideas and support mechanisms that could assist these SMEs. By understanding their problem-situation, this study aimed to provide a foundation for further in-depth analysis and development of targeted interventions.

In the pursuit of characterizing business model experiences in SMEs involved in cluster initiatives to provide a meaningful and positive partnership for development, a brief survey was conducted at the "Feria de Comercio Justo y Alimentación Saludable" (Fair Trade and Healthy Food Fair) on June 16th, 2022.

The survey was executed by the facilitation/research team of the Unit of Technology Transfer and engaged 12 enterprises, randomly selected from the participants in the fair, that SMEs belong to the Food Cluster Cochabamba. Comprising of nine questions primarily concerning the decision-making processes within their enterprises, the survey sought insights into their current ideas for development. The intention was to comprehend their current operations, development ideas and evaluate their perception of the university and UTT's involvement in and support for their innovation processes. Additionally, respondents were inquired about their familiarity with the concepts of business models and BMI, intending to introduce forthcoming projects aimed at supporting these initiatives within the cluster framework.

The collected responses exposed a variety of challenges faced by enterprises engaged in cluster initiatives. An initial phase of data collection highlighted that approximately 85% of the surveyed enterprises lack formalized decision-making processes including their innovation processes, relying instead on their own informal routines. Furthermore, these SMEs encounter obstacles in developing their

operations, thereby impeding their capacity for innovation and capitalizing on growth prospects. Furthermore, respondents expressed concerns regarding resource constraints, limited access to engineering competencies, and technology requirements. Notably, some perceived UTT as a potential partner for addressing these innovation-related challenges, particularly within the cluster initiatives promoted by Universidad Mayor de San Simón.

Research process

The importance of additional research of lower middle-income countries, alongside the identification of diverse challenges inherent in both practical application and research pertaining to business model innovation within such contexts, has propelled the pursuit and objectives of this research. The research process began with the admission of the PhD program in June of 2022.

A qualitative methodological approach was employed to explore the research process, driven by the necessity of thorough investigation. Three complete studies were conducted, resulting in three articles over a length of approximately two years. Throughout this period, my program activities needed alternating stays between Bolivia and Sweden. The process of study development facilitated the accumulation of knowledge and addressed various requirements within the program. “Figure 2” provides an overview of the research process, delineating the study schedule, milestones and outcomes.

In the initial stages of this research, locating literature pertaining to the innovation of business models for SMEs in lower middle-income countries proved challenging, thereby highlighting a notable gap in scholarly publications, and underscoring the necessity for further investigation. The extant literature was found to be insufficient in addressing this specific topic comprehensively. Consequently, "Study A" involved a thorough literature review focusing on the role of universities in supporting business model innovation, elucidating various challenges encountered in this domain and offering preliminary insights. Subsequently, the findings were disseminated at the New Business Model Conference, in which, it experienced analysis of the participants and occasioned diverse perspectives, encouragement the recognition of the need for adjustments and a sensitive emphasis on the context of the global south within the framework of this research process.

Subsequently, 'Study B' was conducted utilizing an explorative qualitative methodological approach, employing a multiple case study design to investigate the experiences of SMEs regarding BMI in their participation in cluster initiatives. The study explored how cluster initiatives facilitate BMI and analysed the implications of such initiatives on BMI within SMEs, particularly in a lower middle-income country such as Bolivia. Through in-depth examination, this study uncovered

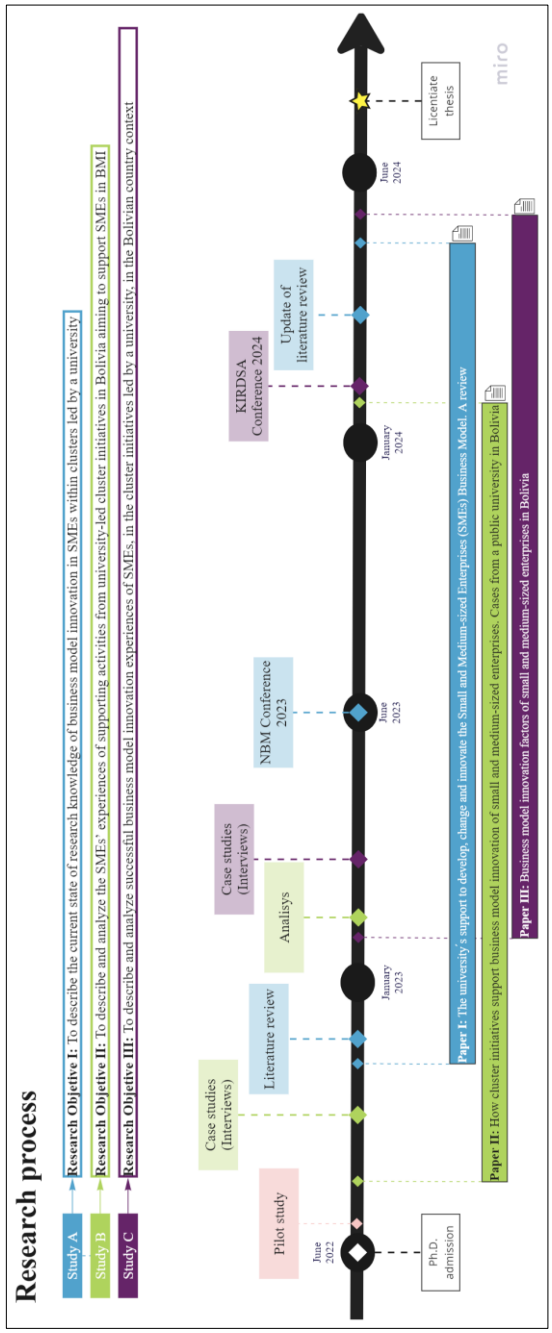


Figure 2. Research process

various patterns discernible across the dimensions of business model value, elucidating activities that either strongly or weakly support the innovation of SMEs' business models. Following this process, it became necessary to explore various perspectives on how Bolivian SMEs have the support to overcome the gaps and to innovate their business models or having different activities around that, in “Study C” we have addressed the challenges associated with dependence on commodity pricing and effectively utilized innovation inputs, such as technology and a skilled workforce to innovate their business models. This exploration was undertaken to advance the research within the PhD project. An exploratory qualitative methodological approach was employed, focusing on the examination of four selected cases of Bolivian SMEs.

Research design

In this study, a multimethod approach was adopted to address the research question and achieve the research objectives. This approach is founded on two distinct methodological strategies: a literature review for study A, and an explorative qualitative methodological approach through case studies for studies B and C. Table 3 provides a comprehensive overview of the appended papers, detailing their characteristics to elucidate and justify the research design employed in this research. It should be noted that this process was iterative, entailing ongoing data collection and analysis concurrent with project development. This iterative nature allows for the incorporation of diverse ideas and contextual tones as the research progresses within its specific framework.

The research design began with an initial stage of literature review aimed at exploring the foundational concepts and establishing whether analogous research activities had been undertaken within the specific context of Bolivia. Subsequently, data collection was initiated, along with the synthesis of extant studies, to discern the potential of SMEs to innovate their business models, taking advantage of the help of organizations like UTT. Concurrently, attention was devoted to elucidating how small and medium-sized enterprises could innovate their business models within the specified context. The preceding exposes the methodological trajectory pursued for each study, culminating in the formulation of research papers.

Table 3. Overview of appended papers

	Paper I	*Paper II*	*Paper III*
Tittle	The university´s support to develop, change and innovate the Small and Medium-sized Enterprises (SMEs) Business Model. A review	How cluster initiatives support business model innovation of small and medium-sized enterprises. Cases from a public University in Bolivia	Business model innovation factors of small and medium-sized enterprises in Bolivia.
Purpose	Establish and identify the university´s support to develop, change and innovate the business models of Small and Medium-sized Enterprises in extant research	Describe and analyze the effects on business model innovation of SMEs due to the support of a cluster initiative promoted by a public university in Bolivia	Explore how four Bolivian SMEs have overcome the gaps of reliance on traditional SME business models, i.e., extract and sell raw unrefined natural resources in a local area, and instead make productive use of innovation inputs (technology, higher educated people) by innovating their business models.
Unit of analysis	SMEs receiving support of universities to innovate their Business Models	SMEs receiving support to innovate their business models from a university-led cluster initiative	Patterns to innovate the BM of SMEs in the context
Research design	Literature review	Multiple case study	Multiple case study
Data sources	Literature	Semi-structured interviews, direct observations, documents	Semi-structured interviews, direct observations, documents
Data analysis	Qualitative content analysis	Open coding	Open coding, selective coding

Study 1: literature review

For the purposes of this study, a literature review was conducted using the Scopus database, which provides access to peer-reviewed articles for analysis. Search strings were employed to ensure a comprehensive coverage of the topic, comprising the following keywords: TITLE-ABS-KEY ("Business Model" * AND "Innovation" * AND (sme* OR smes* OR "small and medium-sized enterprise" OR "small and medium enterprise" OR "small medium enterprise" OR "small and medium-sized firm" OR "small and medium firm" OR "small firm" OR "medium firm" *) AND (university)). The search string exclusively encompassed peer-reviewed articles (journal and conference articles) to uphold standards of quality.

The search yielded 32 documents published in the Scopus database, which were subsequently reviewed and filtered according to the inclusion/exclusion criteria. The search was limited to English-language literature, with scrutiny applied to titles, keywords, and abstracts across various fields.

To strengthen the initial search results, a forward snowball sampling procedure was employed, following the methodology outlined by Wohlin, (2014). This procedure aimed to supplement the initial findings with articles containing relevant content, even if their keywords did not precisely match the search criteria or if they originated from other databases. Consequently, a total of 40 articles were founded: 24 were initially identified through the search string, while an additional 16 were obtained via forward snowball sampling. This approach was adopted to enhance the robustness and comprehensiveness of the results.

Study 2: Multiple case study

This study utilized a qualitative methodological approach of multiple case studies (Yin, 2009) to investigate the support of cluster initiatives for BMI of SMEs in the context of Bolivia. The business model was divided in three distinct value dimensions, as categorized by Osterwalder and Pigneur, (2010), identified as value creation, value delivery, and value capture. BMI occurs when at least one of the value dimensions are modified or improved (Abdelkafi et al., 2013; Foss and Saebi, 2017; Sosna et al., 2010; Teece, 2018).

In this study, for data acquisition, informed consent was verbally obtained during recorded interviews, with durations ranging from a minimum of 45 minutes to a maximum of 75 minutes approximately, through which the research scope was presented.

During the interview process, questions pertaining to the background and interest of the SMEs were asked in a general manner. The terms “business model” or “business model innovation” were not introduced to avoid misunderstandings of the concept, rather the components of the value dimensions, such as important resources, products or service offered to customers etc, were introduced and subject to inquiry. It is important to note that every enterprise has a business model, whether explicit or not (Magretta, 2002).

Study 3: Multiple case study

For this study, an explorative qualitative methodological approach of four case studies focusing on SMEs in Bolivia is used. Informed consent was obtained in written form during the initial meeting with the owner or representative of the SME. During this meeting, the research scope was presented and explained. The interviews for the case studies were conducted from April to August 2023, with durations ranging from a minimum of 90 minutes to a maximum of 150 minutes approximately.

The case studies encompass significant elements that draw upon a review of relevant literature, reports, and other studies pertinent to the topic (Yin, 2018). This

methodological approach provides us with the opportunity to comprehensively investigate the innovative advancements within the SMEs' business models, as well as their subsequent transformation into instances of business model innovation in direct response to the evolving Bolivian landscape. Additionally, it could assist in the development and identification of how the macro environmental context could influence the innovation of business models of SMES in Bolivia.

For data collection in this study, we primarily focus on four central dimensions to describe the architecture of the business models of the participating SMEs. This approach follows the categorization proposed by (Frankenberger et al., 2013) and takes into account the dimensions of 'Who,' 'What,' 'How,' and 'Why.' This will afford us with a broad understanding of the BMI processes of the SMEs under examination.

Reflection on research quality

In accordance with Yin, (2018) and Brinkmann and Kvale, (2015), the notions regarding the reflection on research quality pertains to various facets of research quality, encompassing construct validity, external validity, and reliability. Construct validity involves the identification of appropriate operational measures for the ideas under investigation. External validity concerns the extent to which the findings of a case study can be generalized and the manner in which such generalization can be achieved. Reliability denotes the ability to replicate study operations, including data collection procedures, to yield consistent outcomes. This sub section discusses how the author tried to address these views in this research.

Construct validity

In relation to Study 1, it has contributed significantly to the review and comprehension of pertinent notions and theories within the area of business model innovation research. Brinkmann and Kvale, (2015) provide valuable insights into the interconnectedness of stages within the investigative process, characterizing it as a cyclical exchange between different phases. Also, this iterative process is evident in Papers II and III, where there are instances of revisiting previous stages to align the terminology employed in the case studies and interviews with the theoretical underpinnings of the subject matter. Furthermore, in these studies, a triangulation of data was achieved through a combination of direct observations, document reviews, and synthesis of information. Furthermore, in Studies II and III, the transcription of interviews was meticulously cross-referenced with the recordings to encourage the integrity and rigor of the research.

External validity

Validity pertains to the degree to which the findings of a case study can be extrapolated, along with the methodologies employed to achieve such generalization (Yin, 2018). Throughout this research attempt, meticulous attention was devoted to aligning the research inquiries with the design of various studies, ensuring their validity. Addressing the issue of generalizability, participants in Studies II and III were drawn from diverse enterprises and engaged in varied activities. This diversity enhances our comprehension of the study's generalizability. Furthermore, the inclusion of a secondary observer in the study enriches our capacity to consider additional factors for the application of knowledge in analogous contexts.

Reliability

In the academic discourse, reliability pertains to the consistency and dependability of research findings. This concept is frequently considered in light of whether a particular finding can be replicated under differing circumstances by different researchers (Yin, 2018). It encompasses concerns such as the potential for interview subjects to alter their responses during interviews.

In Study I, a methodological approach was adopted to ensure thorough documentation and testability of the literature review, thereby facilitating its reproducibility on any occasion. Additionally, coding was introduced to augment the reliability of the findings. Study II was structured to facilitate the exploration and advancement of novel ideas. Furthermore, efforts were made to enable the replication of the study design across individual case studies, aided by the utilization of recordings and transcriptions to facilitate rigorous coding. Study III sought to enhance reliability through meticulous data revisions and the request of feedback from colleagues who participated in the study, thereby underscoring the importance of reliability.

5 Summary of appended papers

Paper I

The university´s support to develop, change and innovate the Small and Medium-sized Enterprises (SMEs) Business Model. A review

Objectives:

Establish and identify how the university´s support to develop, change and innovate the business models of Small and Medium-sized Enterprises in extant research.

Findings:

When considering the matter of the principal university support activities facilitating BMI in SME´s, an examination of the database reveals that such activities can be categorized into four overarching themes or areas of influence (see figure 3): a) Facilitating knowledge or technology transfer from universities (A1); b) Exploring networks of relationships between universities and SMEs (A2); c) SMEs seek support to effectively manage and address problems (A3); and d) the government or other institution incentive the relationship (A4).

Modifying a single element of the business model, such as content, structure, or governance, suffices to innovate the business model (Amit and Zott, 2012). This suggests that firms can create a novel activity system by introducing a solitary new activity. Scholarly literature indicates that examining business model dimensions involves content, structure, and governance (Haftor and Climent Costa, 2023). Content refers to the array of activities, structure denotes organizational units, and governance signifies control mechanisms (Foss and Saebi, 2015). According to (Amit and Zott, 2012), business model innovation manifests in several forms: firstly, by introducing novel activities, such as through forward or backward integration, termed as new activity system "content." Secondly, by establishing novel linkages among activities, termed as new activity system "structure." Thirdly, by altering the actors responsible for executing activities, termed as new activity system "governance." Content, structure, and governance thus emerge as the triadic design elements characterizing a firm's business model (Zott et al., 2011).

Figure 3. Main results paper I

Contribution to the thesis:

Universities play a significant role in the development of new knowledge and its transfer to society through various means (Guerrero et al., 2019), such as publishing scientific articles, hosting seminars, and promoting knowledge transfer activities (Pereira and Franco, 2022). This is crucial for the relationship between universities and businesses, particularly in the area of Business Model Innovation (Rybnicek and Königsgruber, 2018). However, difficulties may exist in this relationship due to differences in organizational culture and objectives between universities and companies (Bruneel et al., 2010). These difficulties can include differences in terms, activities, and perspectives(Miller et al., 2014).

By understanding the interplay between technological shifts, digitalization, entrepreneurial alertness, and collaborative frameworks, universities can design targeted support programs that empower SMEs to thrive in competitive markets (Cosenz and Bivona, 2021). Embracing a culture of innovation, sustainability, and strategic adaptation is essential for SMEs to navigate challenges, seize opportunities, and drive economic growth in the region (Anwar, 2018).

Regarding the location of the studies conducted and revised in the database, it appears that relatively few were focused on countries with limited resources (Guaratini, 2016; Guerrero et al., 2019, 2021; Ribeiro and Nagano, 2018). Most studies were primarily concentrated in traditional areas supported by universities (Bruneel et al., 2010) . This trend suggests that university support is more productive and engaged in high- or medium-income countries, as universities in these regions benefit from better political, economic, and stability issues, and various other forms of support (Arocena and Sutz, 2021). Consequently, this enhances their capacity to provide effective support to other organizations, such as SMEs (de Zubielqui et al., 2015).

Paper II

How cluster initiatives support business model innovation of small and medium-sized enterprises. Cases from a public University in Bolivia

Objectives:

Describe and analyze the effects on business model innovation of SMEs due to the support of a cluster initiative managed by a public university in Bolivia, a country categorised as a Lower Middle-income economy (World Bank, 2023). In addition, the purpose is to examine the implications of how cluster initiatives can support the business model innovation of SMEs in a lower middle-income country like Bolivia.

Findings

The key findings have been organized in nine themes; 1) focus on value creation with an emphasis on development of key resources, 2) student internships as a catalyst, 3) impactful university support, 4) specific support for food cluster – food safety registration, 5) diverse connections and collaborations, 6) the missing part in value creation – the value proposition, 7) varied engagement in value delivery, 8) limited activity in value capture, and 9) varied participation across enterprises.

Contribution to the thesis

When considering how Cluster Initiatives could impact the business model innovation of SMEs in Bolivia, it is worth noting that the support, significantly contributes to enhancing their capabilities in value creation. These factors are important as they have the potential to improve interaction dynamics and, consequently, deliver better outcomes.

This study has delineated the concepts and interpretations of activities supported by cluster initiatives that contribute to innovation of business models of SMEs in Bolivia. Additionally, it scrutinizes the impact and implications of various variables in this context, considering their significance in the patterns presented as results. The findings consolidate the ideas and representations derived from the examination of a country categorized as a lower middle-income economy.

Paper III

Business model innovation factors of small and medium-sized enterprises in Bolivia.

Objectives

Explore how four Bolivian SMEs have overcome the gaps of reliance on traditional SME business models, i.e., extract and sell raw unrefined natural resources in a local area, and instead make productive use of innovation inputs (technology, higher educated people) by innovating their business models. To address the research aim, we will use an explorative and qualitative methodological approach researching four selected cases of Bolivian SMEs that have innovated their business models in a direction of less reliance on commodity price volatility, use of technology and market development, and more sustainable solutions.

Findings

The key finding in this study are two patterns of BMI and the identification of macro level-factors among the four case studies. The first BMI pattern centers on enterprises employing a technology-driven pattern. The other BMI pattern focuses on a market development pattern. Regarding the macro level-factors, good access to natural resources and reliance on the informal part of the economy, regulations and higher education resources (See figure 4).

Enterprises A and B have innovated their business models following a technology-driven driven BMI pattern (cf. Osterwalder & Pigneur, 2010), i.e., based their new product offerings on the organization's existing technology and development resources. We identified *two key patterns in the technology-driven BMI*: *1) circular approach, and 2) technology and product development.*

Enterprises C and D have innovated their business models according following a market-driven pattern (cf. Osterwalder & Pigneur, 2010), i.e., based their new product offerings on understanding of specific customer needs like urban

consumers, children, pregnant women, and athletes, in order to develop new product offerings, such as energy bars, cereals and seasonings. Likewise, these two SMEs have continuously facilitated access to these products through an expanding distribution network as well as the convenience of buying and consuming these products. We identified *two key patterns to implement customer driven BMI: 3) market focusing and customer understanding, and 4) expanding customer access.*

Macro level factors: Two macro-level factors, *good access to natural resources* and reliance on the *informal part of the economy*, does not differentiate these four SMEs' business models from most other Bolivian SMEs' business models. So how come these four SMEs have been able to refine their products and create higher values in their product offerings?

The cases point to two macro-level moderators, *regulations, and higher education resources*. While most Bolivian SMEs tries to avoid regulations, these four SMEs have tried to enjoy the advantages of adhering to regulations. In three of the cases, enterprise A, C and D, adhering to food safety regulations have been key to getting access to markets and distribution channels which are close to companies do not have appropriate certifications for their products. For enterprises A and B, it has also been necessary to adhere to various regulations as their customers, in part, are public entities and public organizations.

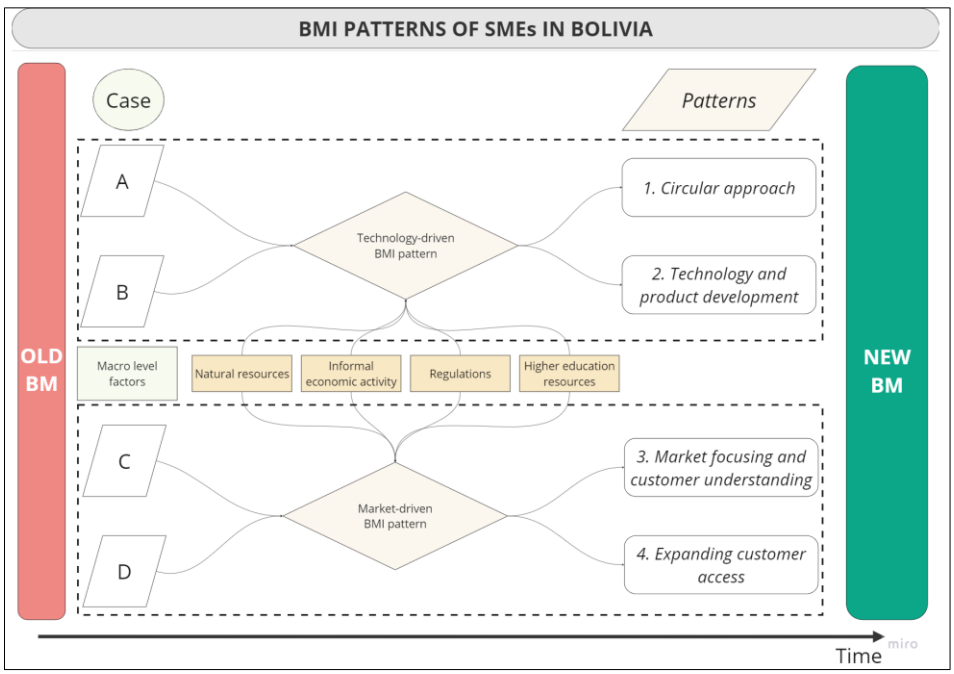


Figure 4. Main results paper III

Contribution to the thesis

We found that the four selected SMEs and their business model innovation followed two different patterns, a technology-driven pattern and market-driven pattern. Both BMI patterns included the sourcing of natural resources from the small family firms, rural communities, waste pickers, and informal recycling shops, i.e., the informal part of the Bolivian economy, as key partners in their business models. The four SMEs developed product offerings to distinct market segments on a national level and at times international level.

The technology-driven BMI patterns required support from the university in terms of higher educated competence, specifically engineers, and support with some technical problem solving. The customer-driven BMI pattern required support from the university in terms certification for product safety and declaration of content and marketing competence.

Regarding macro-level factors, similar to most Bolivian SMEs' business models the four SMEs in this study utilized the easy access to natural resources and sourcing from informally organized economic activities in waste picking and food production. In difference to most Bolivian SMEs the four SMEs tried to adhere to regulations, specifically food safety regulations and public procurement, perceiving them as advantages and keys to opening up national and international markets. Utilization of university resources enabled the four SMEs to invest in and develop new products and processes.

Connection between research papers and research purpose

Paper I, try to establish and identify how the university´s support innovate the business models of Small and Medium-sized Enterprises in extant research, in that sense, trying to describe the current stage of knowledge to study business model innovation in SMEs. The results support the use of different ideas and concepts related in paper II and paper III and also to go into the research domain that this thesis is based.

Paper II try to describe and analyze the effects on BMI of SMEs due to the support of a cluster initiative managed by a public university in Bolivia, a country categorised as a lower middle-income economy and examine the implications of how cluster initiatives can support the BMI of SMEs in a country like Bolivia. The relation with the other papers is in function to describe the activities that empirically UTT is doing to support the innovation of the BM.

Paper III aims to explore how four Bolivian SMEs have overcome the gaps of reliance on traditional SME business models, i.e., extract and sell raw unrefined natural resources in a local area, and instead make productive use of innovation inputs (technology, higher educated people) by innovating their business models.

Figure 5, show the connection between the research question, research paper, results, and research purpose, to show a brief overview based for this thesis.

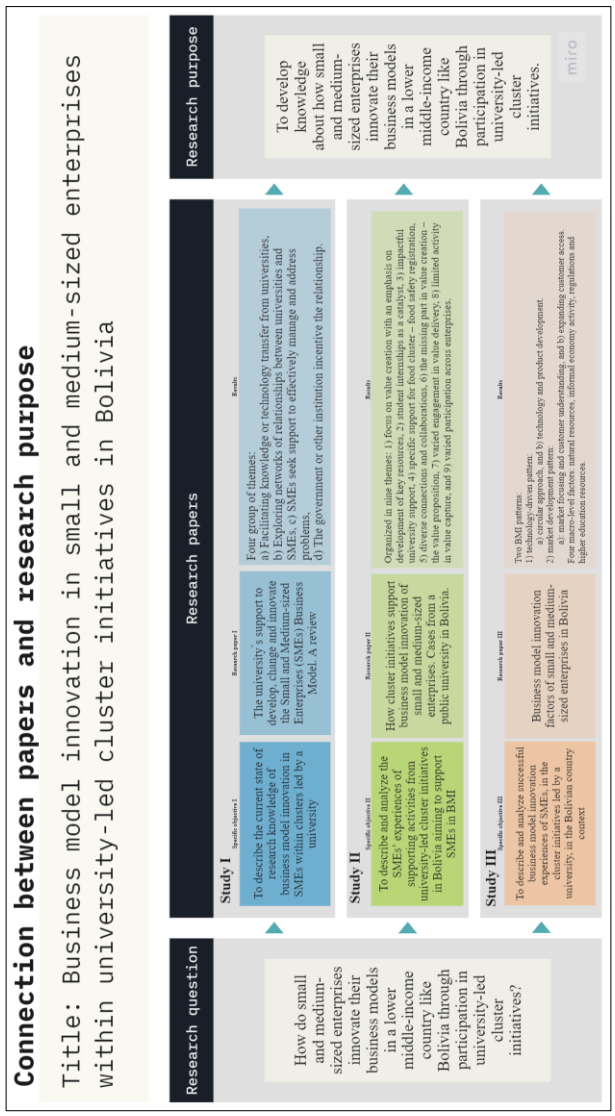


Figure 5. Connection between papers and research purpose.

6 Concluding discussion

This chapter delineates the summary of findings. Additionally, it illustrates the discussion of findings and fulfilment of research objectives, implications for SMEs and university-led cluster initiatives, conclusions, limitations and future research.

Summary of findings

The research purpose staged in this licentiate thesis was: “To develop knowledge about how small and medium-sized enterprises innovate their business models in a lower middle-income country like Bolivia through participation in university-led cluster initiatives”.

To achieve the specific objectives, a literature review and an explorative qualitative research methodology were employed, utilizing case studies and interviews for data collection. These methodologies were guided by different approaches in the research papers and throughout the research process.

For study I (paper 1): the literature review, aimed to understand how university activities could support innovation in the SMEs´ business models.

University engagement with business plays an important role in providing support to SMEs, as discussed by Rybnicek and Königsgruber, (2018), who focus on the specific context of business support provided by universities to SMEs. This type of engagement can offer valuable resources, expertise, and networks that SMEs may not have access to, thereby fostering innovation and growth. Furthermore, Guo et al., (2017) explore the impact of technological turbulence on SMEs' business model innovation performance, shedding light on how SMEs respond to technological shifts and the subsequent effects on their performance. Understanding these dynamics is essential for universities aiming to assist SMEs in navigating technological disruptions and trying to seize opportunities for innovation.

BMI emerges as a central theme in some literature, with studies like Latifi et al. (2021a) highlighting the positive impact of business model adjustments and innovation of SMEs on firm performance. This underscores the need for SMEs to continuously innovate their business models to stay relevant and competitive in changing markets. Furthermore, the study by Cosenz and Bivona (2021)

underscores the importance of enhancing the organizational and economic relations of SMEs to maximize their potential for sustainable economic growth. By fostering collaboration and integration among SMEs, universities can help create a supportive ecosystem that nurtures SME development and innovation.

In summary, to support the innovation of business models in SMEs, universities can influence insights from a diverse range of research studies (Kraus et al., 2020). By understanding the interplay between technological changes, digitalization, entrepreneurial awareness, and collaborative frameworks, universities can design targeted support programs that empower SMEs to create, deliver and capture value. Adopting a culture of innovation, sustainability, and strategic adaptation is essential for SMEs to navigate challenges, seize opportunities, and drive economic growth.

It is noteworthy that limited attention has been directed towards investigating the role of university support for SMEs in countries characterized by resource constraints and traditional business paradigms, such as Bolivia or other countries classified as lower or middle-income economies (Guerrero and Urbano, 2017; Roncancio-Marin et al., 2022). This underscores the importance for additional research, development, and various forms of support tailored to such contexts. Furthermore, it suggests that such initiatives could catalyse innovation within the business models of SMEs.

For study II (paper 2), it has been observed that the support activities undertaken by a university in a lower middle-income country may facilitate value creation, delivery, and capture, encompassing diverse operations that contribute to the innovation of SMEs' business models. Previous studies on cluster initiatives have examined various factors that impact their efficacy, including governmental policies, networking mechanisms, and knowledge dissemination (Ketels and Memedovic, 2008; Klofsten et al., 2015; Sölvell et al., 2003), thereby providing a favourable environment for engagement in cluster initiatives aimed at creating solutions to common challenges.

The case studies revealed a pattern of support activities mainly focusing the development of the SMEs' value creation components of the business model, such as support with technical solutions and lab resources, while support activities aimed at developing value delivery components received less attention. Furthermore, value capture components did not receive any substantial support in this cluster activities.

Additionally, it is apparent that within cluster initiatives at Universidad Mayor de San Simón, there exists a necessity for the development of supporting activities and resources aiming at strengthening the SMEs value delivery mechanisms. While resource-driven BMI processes hold possibilities, cluster initiatives should preferably also provide support for more market- or customer-driven BMI processes (Osterwalder and Pigneur, 2010). With respect to value capture, there is much room for the development of improved approaches (Euchner and Ganguly, 2014) and the exploration of alternative forms of support (Sjödin et al., 2020).

In summary, the interventions by the university in this study, largely focus on supporting the value creation side, i.e., technological resources and capabilities, without much influence in support activities focusing on value delivery and value capture.

For study III (paper 3): BMI presents an avenue for SMEs to exceed traditional business practices and foster collaboration with other entities in their region (cf. Osterwalder & Pigneur, 2010). The macroeconomic environment, comprising economic, political, and social dimensions, significantly shapes SMEs' business models and innovation trajectories, yet this influence remains relatively underexplored (Foss and Saebi, 2017) in this type of contexts. Despite structural challenges like regulations and environmental uncertainty, SMEs can use technological advancements and supportive governmental policies to innovate and growth in local and global markets (Foss and Saebi, 2017).

In Bolivia, the country's vulnerability to external shocks, including climate-related damages and commodity price volatility, emphasizes the need for resilient and adaptable business models (Alba and Dentchev, 2021). Despite demonstrating strengths in innovation inputs, such as improved human capital through higher education, these inputs have not been effectively translated into innovation outputs or entrepreneurial activities, revealing deficiencies within the innovation ecosystem (Barja Daza, 2020). These limitations suggest that, even with strong initial inputs, Bolivian SMEs generally encounter difficulties in converting these strengths into concrete BMI that promote competitiveness and growth.

The explorative study shows, in a case study of four Bolivian SMEs' business model innovation processes, that the SMEs have managed to create, deliver and capture more value through continuous innovation of their business model, by employing higher educated persons, such as engineers, receiving mainly technical support from the university, and high entrepreneurial ambitions. Like most Bolivian SMEs these four companies are still exploiting resources (polymer waste and food products) found respectively grown in the country, but have upgraded their products and market presence, in such a way that they capture more of the value, than traditionally is done within Bolivian SMEs.

Regarding macro-level factors, similar to most Bolivian SMEs' business models the four SMEs in this study utilized the easy access to natural resources and sourcing from informally organized economic activities in waste picking and food production. In difference to most Bolivian SMEs the four SMEs have adhered to regulations, specifically food safety regulations and public procurement, perceiving them as advantages and keys to open national and international markets. Furthermore, utilization of selected university resources enabled the four SMEs to invest in and develop new products and processes.

Discussion of findings and fulfilment of research objectives

In the following section the discussion of findings are considered and the fulfilment of specific research objectives.

Research Objective 1: To describe the current state of research knowledge of business model innovation in SMEs within clusters led by a university.

Paper I, delineates the main ideas to develop further the research objective I, in the study, the elements that were identified as supportive activities of a university in facilitating BMI in SMEs and can be categorized into four groups of conceptions:

a) Facilitating knowledge or technology transfer from universities,

These findings underscore the primary dimensions of support activities, providing insights into the various ways universities can facilitate business model innovation within the context of SMEs (Albats et al., 2023; Mäkimattila et al., 2015). This first element identified relates to the role of universities in mediating knowledge and technology transfer (Asplund and Bengtsson, 2010), thereby creating pathways for integrating innovative concepts and methodologies into SME operational frameworks (Baier-Fuentes et al., 2021; Borrero and Yousafzai, 2024; Guaratini, 2016; Guerrero et al., 2019). In this capacity, universities serve as centers of expertise, actively disseminating specialized knowledge, technological advancements, and methodological models that enhance the competitiveness and resilience of SMEs (Ivascu et al., 2016; Lingens, 2023).

b) Exploring networks of relationships between universities and SMEs,

Furthermore, the relationship between universities and SMEs creates an environment defined by various dependencies and collaborative synergies. These interconnections foster a network in which SMEs seek academic resources, research partnerships (Pereira and Franco, 2022), and collaborative activities to strengthen their innovation capacities, operational agility, and market responsiveness (Miller et al., 2014; de Zubielqui et al., 2015). In this relation, universities gain valuable real-world insights, practical validation, and entrepreneurial perspectives through collaborations with SMEs, cultivating a relationship grounded in mutual exchange and the co-creation of knowledge (Brown and Frame, 2018; Bruneel et al., 2010).

c) SMEs seek support to effectively manage and address problems, and

Furthermore, SMEs demonstrate a need for support mechanisms tailored to address and overcome operational challenges (Purcarea et al., 2013; Zahoor and Al-Tabbaa, 2020). These means various services such as consultations, meetings, technical assistance (Sabatini et al., 2022), skills development, and financial facilitation, all

aimed at enhancing SMEs' competencies, resolving problems, and adapting to market challenges (Guo et al., 2017).

d) The government or other institution incentivize the relationship.

The institutional support of SME-university collaboration underscores the significant role of governmental and regulatory organizations in promoting collaborative activities (Diaz Gonzalez and Dentchev, 2021; Guerrero and Urbano, 2017). Through policies, funding initiatives, regulatory actions, and strategic guidance, governments and other institutions could create environments conducive to fostering SME-university relations (Valencia-Arias et al., 2023). These efforts support BMI initiatives and facilitate transformative economic outcomes through these relationships.

Research Objective 2: To describe and analyze the SMEs' experiences of supporting activities from university-led cluster initiatives in Bolivia aiming to support SMEs in business model innovation.

Paper II presents the answer to this specific objective. The analysis of cluster initiatives' support for SMEs' business model innovation indicates a primary emphasis on value creation, particularly through the development of industrial machine prototypes and support for food safety. Student internships play a critical role in assisting firms with designing prototypes for industrial production machinery and facilitating food safety registration processes. Additionally, seminars and training sessions make significant contributions to enhancing SMEs' capabilities and skills. Support for innovations in value delivery has focused on market research, participation in trade fairs, and the pursuit of financing opportunities, with SMEs engaging at varying levels. In contrast, concerning value capture, which pertains to revenue and financial structures, SMEs have yet to receive substantial support, especially in obtaining financing opportunities.

Prior research underscores the importance for SMEs to increase their capabilities through collaborations with other organizations to refine and innovate their business models within an active and competitive model (Ivascu et al., 2016). Particularly in lower middle-income economies (Sánchez and Ricart, 2010), the prospect of establishing connections via cluster initiatives becomes interesting trying to connect different stakeholders (Acevedo, 2018; Arandia Garcia, 2020). These initiatives primarily facilitate technology transfer to SMEs, a critical aspect given the cost and scarcity of technical expertise within these types of firms. Intermediary organizations like UTT-UMSS play a pivotal role in leveraging technical knowledge generated through collaborations with research institutions, thereby addressing SMEs' technology-related challenges.

However, the focus on technology development within cluster initiatives tends to minimize other dimensions of BMI, limiting its impact. The preference for a resource-driven BMI process (Osterwalder and Pigneur, 2010) may come from the

perceived necessity among participating firms to enhance their technological capabilities or a perception by SME managers that a university can primarily support with technology transfer and no other types of support (Bruneel et al., 2010). However, a broader understanding of BMI activities is necessary to fully exploit its potential for SMEs.

Furthermore, fostering collaboration with university research centers in the economic area can facilitate the development of methodologies to innovate SMEs' business models, particularly in addressing cost and revenue structures. While UTT-UMSS cluster initiatives contribute significantly to strengthening key resources in SMEs, their impact on other dimensions and elements of BMI remains limited. Thus, a determined effort is justified to increase the scope of support activities and promote a more comprehensive approach to BMI within cluster initiatives (Latifi et al., 2021).

Cluster initiatives can significantly impact the BMI of SMEs in Bolivia by enhancing their value creation capabilities and improving interaction dynamics, thereby yielding superior outcomes. There is potential to provide better support activities and resources in the value delivery and value capture dimensions of the business model.

Research Objective 3: To describe and analyze successful business model innovation experiences of SMEs, in the cluster initiatives led by a university, in the Bolivian country context.

Paper III provides the answer of this specific objective, the primary findings of this study identify two distinct patterns of business model innovation and four macro-level factors influencing Bolivian SMEs, as revealed through the case studies. The first pattern centers on enterprises adopting a technology-driven approach (Osterwalder and Pigneur, 2010), while the second focuses on market development strategies (Osterwalder and Pigneur, 2010). Additionally, the study identifies a number of macro-level factors affecting the business models (Angelshaug et al., 2023; Foss and Saebi, 2017) of Bolivian SMEs, including good access to natural resources, reliance on the informal economy, adherence to regulations, and the utilization of higher education resources.

We found that the innovation of the business model of the four selected SMEs followed two different patterns: a technology-driven pattern and a market-driven pattern. Both patterns involved sourcing natural resources from small family firms, rural communities, waste pickers, or informal recycling shops, which at some point are integral components of the informal sector of the Bolivian economy, thus identifying as key partners in SMEs' business models. Additionally, the four SMEs developed product offerings targeted at distinct market segments at both national and, occasionally, international levels.

The technology-driven BMI patterns required support from the university in terms of advanced educational competencies, specifically engineers, and assistance with technical problem-solving. The customer-driven BMI patterns required university support in the form of product safety certification, content declaration, and marketing competences.

At the macro level, the four SMEs, similar to most Bolivian SMEs, utilized easy access to natural resources and relied on informally organized economic activities, such as waste picking and food production. However, unlike the most of Bolivian SMEs, these four enterprises made efforts to adhere to regulations, particularly those related to food safety and public procurement. They perceived regulatory compliance as both beneficial and essential for gaining access to national and international markets. Furthermore, these SMEs utilized university resources to invest in innovative activities and develop innovative products and processes.

Historical, socio-cultural, and economic contexts are recognized as critical factors influencing the business environment (Dana, 2011). SMEs and other organizations frequently operate individually, contributing to their respective sectors without necessarily considering the broader impact on other organizations or other stakeholder groups. However, it is apparent that even partial interconnections between entrepreneurs, SMEs, and other stakeholders can significantly enhance benefits for all organizations involved. Thus, efforts directed towards communication, coordination, and collaboration are expected to yield positive outcomes in similar contexts (Daza Barja, 2020).

In summary, the study illustrates how the four SMEs, through their BMI, have integrated the informal economy sectors of waste and rubber collection, informal recycling enterprises, as well as small-scale agriculture and natural food communities into their business models. These SMEs have added value to these commodities through a technology and market-driven BMI process, supported by the access to and use of university resources.

Implications for SMEs and university-led cluster initiatives

Our findings indicate that SMEs in lower middle-income countries can innovate their business models through various approaches, the implications of that, have been divided into two different sections. The first section addresses the implications for SMEs, while the second focuses on the implications for university-led cluster initiatives.

In both sections, different levels of motivation are essential for the effective implementation and development of business model innovations. High motivation

of both actors (SMEs and promoters of cluster initiatives) is necessary to engage with the diverse needs of the work required to innovate SMEs' business models. Maintaining motivation is crucial for stakeholders to remain aligned with the objectives, participate actively in activities, and influence the development of new attitudes and ideas that can emerge throughout the innovation process.

Fostering robust networks between SMEs and universities, as well as between SMEs and other stakeholders, can enhance the effectiveness and reach the innovation of SMEs business models. Specifically, universities could play a crucial role in facilitating knowledge and technology transfer, which could be integral to the innovation process for SMEs.

For instance, universities could potentially act as intermediaries, to connect SMEs with financial opportunities and other relevant networks, thereby addressing critical needs such as financing and cost reduction. By leveraging their capacity to establish and enhance networks, universities might not only sustain existing collaborative efforts but also generate new value creation, delivery and capture for SMEs.

Implications for small and medium-sized enterprises

BMI underscores the importance of understanding and strategically managing the links between different components or modules within a business model and the interconnection to the broader micro and macro environment (Foss and Saebi, 2017, 2018). Chesbrough and Rosenbloom (2002) emphasize the interconnected nature of business models, stating that successful innovation involves considering the entire system rather than isolated elements. The involvement and the participation in different activities and with various stakeholders, as well as broader economic conditions, can significantly impact the development and innovation processes for SMEs (Albats et al., 2023; Guo et al., 2017) and may be affected by diverse approaches and common economic developments and problems (Bruneel et al., 2010), such as limitations in the extraction and sale of raw materials, or facing lack of support in different avenues, which are characteristic of these types of economies (Alba and Dentchev, 2021).

As managerial implications, SMEs in these types of contexts can innovate their business models through two primary ways: enhancing their products and processes with technology and/or enhancing their market activities. Ideally, a combination of both approaches is preferable; however, resource constraints often make this difficult (Sánchez and Ricart, 2010). After financial and effort investment, successful innovation requires the integration of different knowledge to create new value. Collaborations with other stakeholders, including universities and new persons such as engineers (Guerrero et al., 2019), can facilitate this process to create, capture and deliver value. Once SMEs seek support to effectively manage and

address problems, they often seek such partnerships as a means to enhance the successful development of their activities.

Implications for university-led cluster initiatives

The primary implications for university-led cluster initiatives based on this study center around the development and enhancement of these cluster initiatives, aiming to influence their potential for various improvements, using a descriptive analysis of the support activities (Laur, 2015). A key aspect is fostering trust and providing additional support for innovation, particularly concerning the creation, the deliver and capture of value within business models of SMEs. Careful selection of enterprises for participation in cluster initiatives is necessary (Klofsten et al., 2015). Before initiating activities, it is necessary to evaluate various conditions, such as the level and content of needed support, geographical proximity, time, available resources, and the nature of collaborative activities required.

As policy implications, building trust should be a core activity to involve SMEs in cluster initiatives to innovate heir business models effectively. Real involvement, including the support of clusters in developing new products and services, seems necessary (Arandia Garcia, 2020), also with additional support for innovation in value delivery and value capture components of business models. This aligns with seeking new stakeholders, such as other universities and knowledge-intensive business services, and starting with small-scale research activities before consolidating different approaches to achieve the objectives of SMEs and cluster initiatives.

Managerial implications indicate for these SMEs participating in cluster initiatives, value delivery components related to customers, customer segments, and channels often lack sufficient support. In many cases, there is a need for more involvement in these areas. Similarly, value capture requires new approaches to develop activities that generate better outcomes. Addressing these gaps presents a valuable opportunity to enhance business model innovation processes and achieve goals more effectively. The deficiencies in support for cost structures and revenue streams for SMEs within cluster initiatives highlight the need to explore new networks and ideas. Collaboration with other areas and research centers could lead to the development of methodologies that support these requirements and strengthen the innovation (Acevedo, 2018) of SMEs' business models.

Policy implications for economic and social development involving SMEs in such contexts suggest that innovation systems should be structured to provide targeted support for specific requirements (Acevedo et al., 2015). Various organizations should advocate for policies that foster BMI and explore different intermediary roles to assist SMEs in the innovation of their business models (Cosenz and Bivona, 2021).

Effective training for owners and managers, aimed at enhancing strategic capabilities, is necessary (Clauss et al., 2021). Such training should focus on promoting market transformation and creating new business activities (Foss and Stiglitz, 2015). Adopting innovative strategies in SMEs and responding to specific challenges can help overcome the difficulties faced in these contexts, leveraging insights and approaches to advance business model innovation.

The facilitation of knowledge or technology transfer from universities is essential for developing diverse activities and exploring different approaches within these contexts (Guerrero et al., 2019; de Zubielqui et al., 2015). This involvement is crucial for engaging cluster initiatives with relevant stakeholders. Governments or other institutions should incentivize these relationships by developing and implementing various policy actions and supportive activities to gain valuable insights (Acevedo, 2018; Arocena et al., 2017; Arocena and Sutz, 2020). For cluster initiatives to be successful in innovating business models for SMEs, it is important to incorporate a range of actions that support these approaches and foster supportive environments. Engaging various stakeholders can enhance the effectiveness of activities and strengthen the overall impact of cluster initiatives (Klofsten et al., 2015; Laur, 2015; Sölvell et al., 2003).

Conclusions

The research question: How do small and medium-sized enterprises innovate their business models in a lower middle-income country like Bolivia through participation in university-led cluster initiatives? reveals a multifaceted landscape shaped by diverse factors, ranging from individual enterprise strategies and university-led cluster initiatives. Through a comprehensive analysis spanning multiple studies, several key insights emerge.

From a systems perspective and in the context of supporting the National Innovation System (Arocena et al., 2017; Arocena and Sutz, 2020), it appears that business model innovation in SMEs, through various activities and supports, may play a crucial role in strengthening the innovation system.

Firstly, the pivotal role of universities in facilitating BMI in SMEs is highlighted, with findings emphasizing their function as knowledge hubs and catalysts for technological transfer. Collaborative partnerships between universities and SMEs foster a dynamic exchange of expertise, resources, and entrepreneurial impetus, thereby supporting a cooperative relationship conducive to innovation.

Secondly, cluster initiatives in Bolivia exhibit a predominant focus on value creation, primarily through technology transfer and capacity-building initiatives. While these efforts support key resources within SMEs, there remains a need to

increase the scope of support activities to encompass other dimensions of BMI, such as value delivery and capture, to maximize their impact.

Thirdly, case studies within the Food Cluster Cochabamba and Green Technology Cluster highlight different BMI patterns among SMEs, with some enterprises adopting technology-driven approaches while others prioritize market-development approaches. These findings underscore the importance of strategic adaptation and proactive management within active business environments, particularly in resource-constrained contexts like Bolivia.

In conclusion, this thesis elucidates the complex interplay between various stakeholders and factors influencing BMI in Bolivian SMEs. By leveraging collaborative partnerships, fostering innovation environments, and embracing strategic adaptation, SMEs can navigate challenges and capitalize on opportunities to drive sustainable growth and competitiveness in the developing business scenario.

Limitations and future research

Limitations

One of the limitations of this study pertains to the necessity of expanding the theoretical framework and conducting searches across additional databases for paper I. This aims to expand the inclusivity of the study and diversify the methodologies employed. It is necessary to integrate a greater volume of documents and deepen into the proposed activities, while also engaging with other databases to obtain relevant materials.

Another limitation occurs from the interview process, in which despite the respondents' considerable expertise in enterprise process development, the analyses relied predominantly on self-assessment/analysis. To mitigate potential biases and foster improved development, alternative measurement techniques could be implemented.

Additionally, a limitation can be identified in the relatively limited number of participants involved in the studies, which may hinder the generalizability of the results. Expanding the participant group and the different methods to be employed, could generate better insights for subsequent analyses.

The number of cases studied is limited. Other university-led cluster initiatives in Bolivia or other lower middle-income countries could be added to verify, compare and elaborate the findings in this licentiate dissertation.

Future research

As suggestions for future research, it could be beneficial to explore alternative methodological approaches aimed at further compressing the phenomena under investigation, thereby contributing to the advancement of knowledge within the given context. Given the potential under-representation of research in this area, such actions hold promise for expanding the current understanding.

Additionally, investigating sustainable and circular business models and business model innovation within the context of lower middle-income countries, specifically focusing on SMEs, could offer a fruitful avenue for study. This line of inquiry would involve considering various approaches and addressing unique contextual factors and needs.

Further research should involve into the increasing interest in innovation and entrepreneurial ecosystems within current academic discourse. To better understand the reasons behind the increasing prominence of these concepts, a thorough review of the existing literature on innovation ecosystems and entrepreneurial ecosystems is recommended for future studies. This review should specifically address the current popularity and evolving definitions of these terms.

Furthermore, it is important to consider the integration into theoretical frameworks the approach of innovation ecosystems. Investigating how the literature frames both entrepreneurial ecosystems and innovation ecosystems could offer valuable insights and contribute to the enhancement of the theoretical foundations strengthening future research.

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Paper I

The university´s support to develop, change and innovate the Small and Medium-sized Enterprises (SMEs) Business Model. A review

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ABSTRACT

The collaboration between universities and enterprises yields numerous benefits, including knowledge transfer, innovation generation, and the development of products and services. It is imperative to acknowledge that each party may hold distinct objectives, interests, and constraints, which can either facilitate or impede the collaboration process. Collaboration between universities and small and medium-sized enterprises also holds promise, offering shared expertise, resource and technology access, and novel business prospects. A robust and meticulously shaped business model is indispensable for enterprise success, enabling differentiation from competitors, facilitating investment attraction, and fostering sustainability. Business model innovation entails refining a company's business model to enhance its performance and proves particularly advantageous for SMEs, supporting them in adapting to dynamic environments and fostering innovation and collaboration.

This research tries to scrutinize the role of universities in strengthening the development, transformation, and innovation of SMEs through a comprehensive review of scholarly literature. The study seeks to provide insights into the areas in which universities encourage SMEs and elucidate how these activities are delineated in extant literature. The primary objective is to recognise the components of university support activities in this area. Furthermore, the research aims to determine the strategic goals pertaining to business model innovation that universities attempt to fulfil through their support initiatives. Ultimately, this effort aspires to serve as a foundation for future research and theoretical advancements in this domain.

Keywords: Business model innovation, SMEs, university-industry collaboration.

1. Introduction

Interaction is important in the context of business-university collaborations as it helps to develop new ways of working together and identify opportunities for creating synergies (Argote et al., 2021). Though, it is important to consider that different actors have different objectives and constraints, which can both enhance the value of collaboration but also complicate the process (Rybnicek & Königsgruber, 2018). The overall performance of the collaboration is not just related to formal development, but also to how both organizations interact with each other as a collective system to create and develop new knowledge for both parties with a common interest (Mäkimattila et al., 2015). The relationship between the organizations starts due to various motives and leads to different organizational forms depending on the goals of the relationship (Ankrah & Al-Tabbaa, 2015).

The relationship between universities and industry is important for the transfer of knowledge and innovation (Ribeiro & Nagano, 2018). Universities have a mission to create and disseminate knowledge, while enterprise's focus is on using knowledge to develop products and services(Guerrero et al., 2019). This partnership allows for the application of academic research to real-world problems, leading to advancements in technology and industry growth. The organizational culture of universities is geared towards research and education, while enterprise's culture is focused on commercialization and profitability (Ivascu et al., 2016). The university faculty, leveraging their expertise in both research and pedagogical methodologies, have the potential to initiate innovative and forward collaborative projects with industry partners. By adopting this mindset within the academic sector, both could enhance the productive interplay between industry and academia, which is essential for fostering a prosperous future in both education and business (Asplund & Bengtsson, 2010).

Universities and small and medium-sized enterprises (SMEs) can benefit from collaboration through knowledge exchange and joint projects (Pereira & Franco, 2022). This can lead to enhanced innovation and growth for both parties, this relationship is becoming increasingly important in today's economy (Ankrah & Al-Tabbaa, 2015). It is important to understand that universities interact with enterprise's and small and medium-sized enterprises in different ways due to cultural and economic differences (Ribeiro & Nagano, 2018). This means that there is not a single model that can be used to guide knowledge transfer and involvement in all contexts.

Moreover, business models are crucial for innovation as they provide a framework for how a company creates, delivers, and captures value (Chesbrough, 2010; Foss & Saebi, 2017; Osterwalder & Pigneur, 2010; Teece, 2010). A robust business model can help a company achieve a competitive advantage, even if its technology or idea is not necessarily superior (Chesbrough, 2007). Business models are complex and multifaceted, comprising both explicit and implicit knowledge that interact and shape the different models, understanding and optimizing a business model is essential for success in today's business environment (Wadin et al., 2017). Firms and their business models act as vital forces to facilitate sustainability transitions (Bidmon & Knab, 2018; Sarasini & Linder, 2018).

Business Model Innovation (BMI) involves not only improving the firm's value creation, delivery and capture, but also developing new ways to offer value to customers and potentially reorganizing the company structure (Spieth et al., 2014). This is particularly relevant for SMEs which may lack resources and technical capabilities and may need external help in the form of new partners, also involving research and knowledge collaborations and generation to successfully implement BMI (Albats et al., 2023; Ibarra et al., 2020). BMI refers to the process of creating or changing an enterprise business model to improve its performance. Empirical evidence suggests that this approach can be effective for small and medium-sized enterprises (Anwar, 2018; Miller et al., 2021) as it allows them to adapt to a constantly changing environment and become more innovative and collaborative.

However, there appears to be a lack of knowledge regarding the forms in which universities can support the development, change, and innovation of small and medium-sized enterprises' business models, identifying this as a significant gap (Happonen et al., 2020; Ivascu et al., 2016). This oversight hinders the identification of various areas where SMEs could benefit from collaboration with universities, which could enhance the effectiveness of university interventions and actions. Additionally, this lack of knowledge complicates the contextualization of new findings and the support for innovation in SMEs' business models, thereby impeding the development of practices around this relationship.

The purpose of this research is to establish and identify how the university´s support to develop, change and innovate the business models of small and medium-sized enterprises in extant research, through a literature review of academic publications, intending to provide answers to the research questions:

-What are the principal university support activities facilitating business model innovation in SME's as described or proposed by academic research?

-How are these principal university support activities conducted?

-Which business model design elements in SMEs are influenced by the activities supported by universities?

The article proceeds as follows: First, the author introduces a theoretical framework developed to encompass various notions regarding the university´s support to develop, change and innovate the SMEs Business Model. Second, the methodology employed in the study is delineated, including the specifics of the search strategy. Third, the identified articles are reviewed and categorized to facilitate analysis of the findings. Finally, the article concludes with a summary of the findings and proposes avenues for further research.

2. An overview about the involved theoretical framework.

Involvement between universities and SMEs.

Collaborations between SMEs and universities are essential for fostering trust and strategic competences that lead to successful partnerships and innovation (Sabatini et al., 2022). This is important for promoting innovation and economic growth in a country (Mäkimattila et al., 2015). The relationship is characterized by the transfer of knowledge, collaborative research, and the interchange of resources in both directions, with different implications for academic organizations and SMEs (Bruneel et al., 2010) leading to the creation of value for involved actors.

Universities, as centers of research and development have significant opportunities to share knowledge and experiences that could be transformed into technological development to advancements, thereby enhancing enterprise practices (Ankrah & Al-Tabbaa, 2015). Conversely, while SMEs are often agile and innovative (Anwar, 2018), they frequently lack the economic resources and capacity necessary for conducting in-depth research and self-development (Bruneel et al., 2010). The synergy between SMEs and universities could bridge gaps, facilitating the development of new products, processes and technologies (Pereira & Franco, 2022).

One effective method for fostering collaboration between universities and SMEs is through different associations of research (Yáñez-Valdés et al., 2023). These associations often involve joint research projects in which researchers and the SME owners or representatives work together in order to address different real-world problems (Rybnicek & Königsgruber, 2018), and also explore new business opportunities (Miller et al., 2014). This collaboration not only enhances the research output of

universities but also provides to SMEs with access to knowledge and new technology, thereby increasing competitiveness in various markets and moments (Pereira & Franco, 2022).

As where stated by (Yáñez-Valdés et al., 2023), universities foster innovation capacity in three ways: through the basic and applied research in universities, the faculty working in the R&D unit are qualified and trained in research-oriented universities, and universities also produce innovative graduates for the enterprises.

Technology Transfer Offices (TTO) at universities play an important role in facilitating collaborations between SMEs and universities (Guerrero et al., 2019; Ramos et al., 2009). Acting as intermediaries, they assist in identifying potential collaboration opportunities and joint projects (Asplund & Bengtsson, 2010). This involvement often ensures that university research results are practically and well applied to benefit SMEs.

However, such collaborations face various challenges and difficulties (Bruneel et al., 2010), differences in organizational culture, priorities, and the schedule can create conflicting insights that weaken the relationship (Rybnicek & Königsgruber, 2018). Universities typically operate with longer research cycles, whereas SMEs seek timely results, often driven by market needs (Mäkimattila et al., 2015). Clear agreements on responsibilities and concerns are essential to maintaining effective relationship (Bruneel et al., 2010).

In alignment with these arguments, an increasing number of enterprises are beginning to implement innovative practices that leverage both internal and external flows of knowledge to explore and exploit innovation in collaboration with commercial or scientific agents (Guerrero et al., 2019). University innovation capabilities are crucial for responding to emergent paradigms and meeting the demands of various stakeholders for skilled professionals capable of addressing the challenges of a rapidly changing world, new technological advancements, and reinforced national innovation agendas (Yáñez-Valdés et al., 2023).

As noted by (J. Roncancio-Marin et al., 2022), university-industry collaboration varies between countries categorized as emerging economies and those with well-established economies. These differences are particularly evident in contexts where policies, incentives, and socioeconomic conditions shape the norms by which university and enterprises have collaborations and are conducted under favourable conditions. In developing countries, there is often a low level of research and development within enterprises, with related activities more frequently undertaken by the public sector, state-owned enterprises, research institutes, and universities (Arocena & Sutz, 2021).

Business models and business model innovation of SMEs.

The concept of business model presents a novel domain of innovation, expanding traditional domains such as process, product, and organizational innovation, and entailing novel modalities of cooperation and collaboration (Teece, 2010; Zott et al., 2011). A business model delineates a structured configuration of activities devised and implemented with the overarching objective of furnishing a specific value proposition to the customer (Magretta, 2002; Wirtz et al., 2016). Business models constitute sophisticated systems comprising interconnected components that organizations orchestrate to create, deliver, and capture value (Angelshaug et al., 2023; Foss & Saebi, 2017; Kraus et al., 2020). It assumes predominant significance in a firm's trajectory, serving as an outline for value creation and delivery to customers, value capture, and influencing the feasibility of strategic activities (Teece, 2018).

In the study conducted by Zhang et al., (2023) delineates the business model design for small and medium-sized enterprises, highlighting diverse perspectives on the influence of design influenced by

academic research. This research underscores four central areas necessitating further development in the examination of SMEs and business model innovation: a) identification of additional impact factors mediating the relationship between BMI and its antecedents and outcomes, b) comparative analysis of the efficacy of various BM tools in generating diverse and high-quality new BMs, c) exploration of how companies engage in the BM innovation process and the implications for the education of engineers and managers, and d) re-evaluation of the boundaries of BM prompted by the proliferation of digitalization, with an emphasis on technological and relational boundary management capabilities. This shows various needs to develop for better compression.

Modifying a single element of the business model, such as content, structure, or governance, suffices to effectuate business model innovation (Amit & Zott, 2012). This implies that firms can establish a novel activity system merely by introducing a solitary new activity. Over the last decade, scholarly attention towards business model innovation has surged, with researchers such as Foss and Saebi, (2017) underscoring its increasing significance in both academic inquiry and practical implementation.

As stated by Foss and Saebi, (2017), business *model innovation entails "designed, novel, nontrivial changes to the key elements of a firm's business model and/or the architecture linking these elements."* Recognized as pivotal for small and medium-sized enterprises to maintain competitiveness and foster growth, the transformation of business models becomes important for adapting to shifting market dynamics and technological advancements (Albats et al., 2023) . Concurrently, the ongoing challenge for SMEs lies in the development and enhancement of skills to effectively manage and leverage new processes and technologies, facilitating business model innovation (Sabatini et al., 2022).

Fundamentally, business model innovation entails the exploration of new organizational logics and methodologies for creating and capturing value among stakeholders, with a primary focus on generating revenue streams and delineating value propositions for customers, suppliers, and partners (Casadesus-Masanell & Zhu, 2013). Recognized as a critical facet for the growth and permanence and sustainability of SMEs (Ibarra et al., 2020), various studies delve into the study of business model innovation within the SME context (Albats et al., 2023; Guo et al., 2017; Miller et al., 2021), elucidating diverse approaches that impact the innovation process and outcomes.

In the exploration of diverse approaches and theories, the formulation of a unified concept pertaining to the evolution and impact of business model innovation within SMEs can present a considerable challenge (Kraus et al., 2020; Ramdani et al., 2019; Wirtz & Daiser, 2018). Currently, a consensus on a standardized theoretical framework and delineated construct boundaries for the design and innovation of business models within SMEs remains elusive (M.-A. Latifi et al., 2021). This underscores an urgent call to action for scholars committed to uncovering pertinent business model variables within the SME context (Cosenz & Bivona, 2021).

3. Methodology

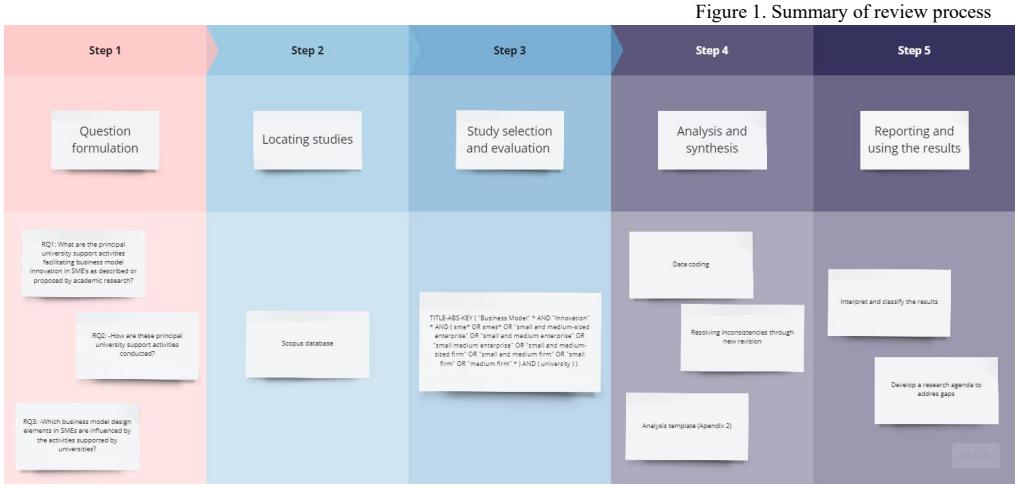
Procedure

The methodology chosen for this study, aimed at gaining valuable insights and ensuring reliable, replicable, and synthesized results (Denyer & Tranfield, 2009; Tranfield et al., 2003), is a systematic literature review following the methodology proposed by Denyer and Tranfield, 2009). This process comprises multiple steps. Figure 1 provide a detailed description of the procedure, encompassing the planning, execution, and reporting phases based on the selected methodology.

In this study, Scopus was selected as the database due to its reputation as one of the largest abstract and citation databases encompassing peer-reviewed literature across various fields, including management

and business research (Donthu et al., 2021). This choice is deemed appropriate for the review's research purpose, as Scopus is acknowledged for offering high-quality metadata and a wide array of usable information that can be utilized in various analytical software, thereby supporting the research (Falagas et al., 2008).

Figure 1. Summary of review process



Source: Own elaboration in base of Denyer and Tranfield, (2009)

The examination of the documents within the database took place in two different phases, the first was initiated in October 2022 and subsequently the second phase, revised and updated in May 2024. Throughout this undertaking, the database underwent minor modifications consequent to the updating of articles, thereby ensuring the precision of the information contained there. This verification process involved a meticulous review of titles, abstracts, keywords, introduction and conclusions, thereby facilitating a more comprehensive understanding of the publications.

From the publications, it was noted that the concept and application of Business Model Innovation have undergone significant development and utilization across diverse research domains within management, covering entrepreneurship, strategy, technology, organizational studies, and marketing (Angelshaug et al., 2023; Foss & Saebi, 2017). Consequently, it becomes evident that terminologies associated with BMI may exhibit variation across these domains, potentially impacting the interpretation of the concept and the breadth of publications involved. Therefore, a systematic search approach was implemented, aligning with the objectives of the literature review.

The search strings that were employed to ensure a comprehensive coverage of the topic, comprising the following keywords: TITLE-ABS-KEY ("Business Model" * AND "Innovation" * AND (sme* OR smes* OR "small and medium-sized enterprise" OR "small and medium enterprise" OR "small medium enterprise" OR "small and medium-sized firm" OR "small and medium firm" OR "small firm" OR "medium firm" *) AND (university)). The search string exclusively encompassed peer-reviewed articles (Journal and conference articles) to uphold standards of quality.

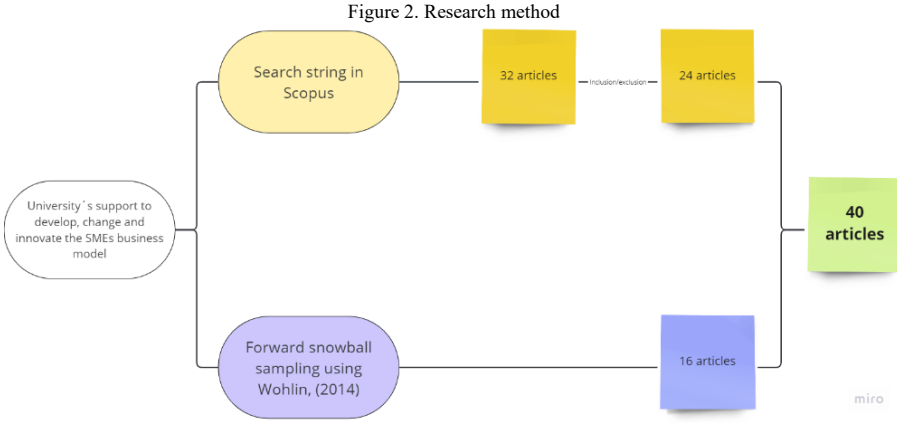
The search yielded 32 documents published in the Scopus database, which were subsequently reviewed and filtered according to the inclusion/exclusion criteria (see table 1). The search was limited to English-language literature, with scrutiny applied to titles, keywords, and abstracts across various fields.

Table 1: Selection criteria

Criteria	Inclusion	Exclusion	Observation
Relevance for review research questions of the articles	Research with core focus in Business Model Innovation, University-Industry Collaboration, management of SMEs and knowledge generation	Articles focus in other thematical areas	Data that will be used to answer the review questions
Language	English	All other languages	
Type of publication	Peer-reviewed journal, book chapters and conference articles	Theses, working papers, reports, press articles.	Other type of publications was excluded due the absence of peer-review process
Disciplines	All subject areas	Medicine and related fields that doesn't match with the focus	
Methodologies	All	None	

To strengthen the initial search results, a forward snowball sampling procedure was employed, following the methodology outlined by Wohlin, (2014). This procedure aimed to supplement the initial findings with articles containing relevant content, even if their keywords did not precisely match the search criteria or if they originated from other databases. Consequently, a total of 40 articles were founded (appendix 1): 24 were initially identified through the search string, while an additional 16 were obtained via forward snowball sampling (see figure 2). This approach was adopted to enhance the robustness and comprehensiveness of the results.

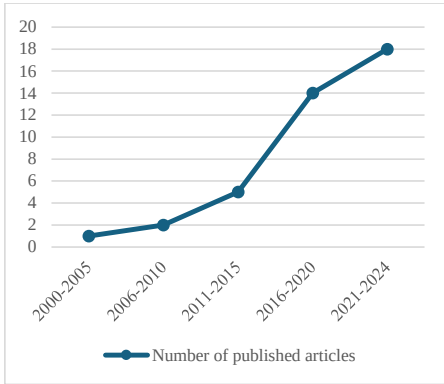
Figure 2. Research method



4. Review highlights

The literature review encompasses articles published between 2001 to 2024, with a particular relevance increasing until 2015 (See figure 3). This indicates a growing discourse surrounding the research domains of business models and business model innovation since that time (Foss & Saebi, 2017; Kraus et al., 2020; Wirtz & Daiser, 2018) reflecting heightened interest among diverse scholarly communities globally engaged in this subject matter. Furthermore, it explores various methodological approaches, highlighting the necessity for clarification and advancement within these domains, as well as responding to recent calls to action (Zhang et al., 2023).

Figure 3. Published articles per year



The four most influential journal represented in this review are: *International Journal of Entrepreneurial Behaviour & Research, Management Decision, Small business economics and Technological Forecasting & Social Change*, showing that the topic around the university´s support to develop, change and innovate the Small and Medium-sized Enterprises (SMEs) Business Model is published mostly in management journals.

In accordance with the analysis and categorization methodology used by (Thorpe et al., 2005), the studies under consideration were classified into three distinct lists: A, B, and C. Within this framework, 'A' pertained to studies considered explicitly pertinent to the research objectives. Conversely, 'B' encompassed studies whose relevance was not immediately discernible a priori. 'C' denoted studies of lesser relevance or those exhibiting ambiguity regarding the nature of their research contributions. It is priority to emphasize that the determination of relevance was contingent upon the specific parameters delineated within the scope of the review, thereby rendering it a relative assessment guided by the study's defined criteria.

The scholarly literature suggests that an examination of business model dimensions entails consideration of its content, structure, and governance (Haftor & Climent Costa, 2023). Content pertains to the array of activities, structure denotes the organizational units, and governance signifies the control mechanisms over these units (Foss & Saebi, 2015). According to (Amit & Zott, 2012), business model innovation manifests in several forms: firstly, by introducing novel activities, such as through forward or backward integration, termed as new activity system *"content."* Secondly, by establishing novel linkages among activities, termed as new activity system *"structure."* Thirdly, by altering the actors responsible for executing activities, termed as new activity system *"governance."* Content, structure, and governance thus emerge as the triadic design elements characterizing a firm's business model (Zott et al., 2011).

5. Results

As findings of the search, significant insights pertaining to the university's role in developing, changing, and innovating SMEs' Business Models have been delineated. These insights are summarized in Table 2, recognizing the linked roles of support functions and the relationship dynamics between SMEs and universities aimed at strengthening the business models of SMEs. The associated interactions among these stakeholders underscore the neccesity of forging novel modes of collaboration, leveraging diverse resources, knowledge bases, and inherent capacities (Bouwman et al., 2019; Zahoor & Al-Tabbaa, 2020). Such insights hold promise for advising future research activities and fostering collaborative initiatives geared towards enhancing engagement with relevant stakeholders (Pereira & Franco, 2022).

Table 2. Insights regarding the university support to innovate SMEs BM.

Author (In chronological order)	**Important insights**
(Valencia-Arias et al., 2023)	*Open innovation in higher education fosters collaboration and knowledge exchange, enhancing entrepreneurial skills, value co-creation, and technology transfer, particularly in emerging economies and SMEs, with trends in Education 4.0 and innovation policies.*
(Sabatini et al., 2022)	*The relationship between business model innovation and digital technologies in SMEs shows that digital technologies enable business model innovation. However, digital technology alone is insufficient, highlighting the complex process of innovation in these enterprises, looking for new partnerships.*
(Pereira & Franco, 2022)	*The relationship between universities and SMEs is vital for economic development and innovation. SMEs seek competitive advantages through university collaboration but often lack awareness of supportive programs. Effective university communication channels are essential to bridge this gap.*
(Guerrero et al., 2021)	*Understanding ecosystem intermediaries' role in shaping social entrepreneurship identities and business model innovations reveals their impact on capturing social and economic value, solving societal problems, and facilitating innovation through intermediary intervention.*
(Diaz Gonzalez & Dentchev, 2021)	*Social entrepreneurs face challenges such as resource scarcity, staffing issues, management gaps, weak networks, and mission drift. Ecosystem thinking helps identify stakeholders who can support SEs with the support categories, relevant actors, and their interconnections.*
(Guerrero et al., 2019)	*Enterprises' competitive advantage relies on resources and capabilities, facing challenges like age, size, and entry barriers. Increasingly, enterprises adopt open innovation with commercial and scientific partners. Universities, especially in emerging economies, support innovation and provide access to R&D subsidies.*
(de Zubielqui et al., 2015)	*SMEs primarily access knowledge from external sources including higher education institutions (HEIs) through generic university-industry knowledge transfer pathways rather than high relational involvement. SMEs rely on various actors like clients, suppliers, and international collaborations for knowledge acquisition, impacting innovation outcomes. Understanding diverse actor roles and SME size effects is crucial in improving collaboration between HEIs and SMEs within regional innovation.*
(Miller et al., 2014)	*Universities are transitioning, engaging stakeholders to strengthen regional innovation. Environmental pressures drive business model innovation. Stakeholders, including academics, industry relationships, and government, shape the university model. Conflicting objectives hinder co-creation, leading to ongoing transitions. Enhancing business model innovation research, showcasing stakeholder impact on innovation.*
(Purcarea et al., 2013)	*SMEs' learning and innovation methods, investigating internal and external learning sources and innovation types. SMEs prioritize internal learning through organizational best practices and external networking, while considering market changes and expert input externally. Despite focusing on business model innovation, SMEs face funding constraints. Strengthening university collaborations enhances organizational learning and innovation management, improving performance.*
(Morel et al., 2019)	*SMEs significantly contribute to regional economies through employment and value addition. Despite various supportive policies, the direct impact on SMEs' innovation capabilities remains uncertain. Misaligned strategies between firms and universities may contribute to this uncertainty. New business models, facilitating real-world problem-solving while securing financing, emerge as a solution, exemplified by collaborative partnerships with engineering schools.*

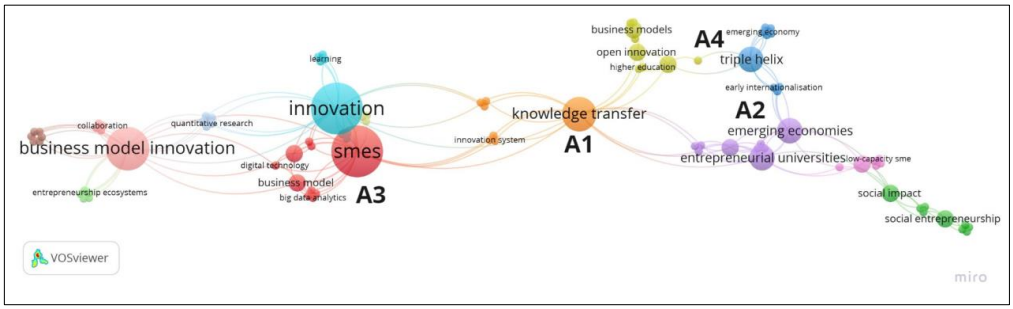
Group network based on co-occurrence of keywords

In this section, it is analysed the co-ocurrence of the keywords pertaining to the data base, with a particular focus on the content developed within the publications. This analysis of keyword co-ocurrence serves as a supplementary tool for exploring the various relationships between themes

(Donthu et al., 2021). Through this, we aim to attain a deeper comprehension of the thematic groups derived from the analysis.

Figure 4, generated through analysis conducted with VosViewer software, is presented to illustrate the visualization of co-ocurrence. From the publications, it becomes evident that certain keywords hold significant influence, allowing for the identification of four important areas prevalent in the articles within the database.

Figure 4. Visualization of group network based on co-occurrence of keywords



Source: Prepared by the authors based on Scopus data and VOSviewer software.

The primary observation as a central point to be made is the significant influence exerted by small and medium-sized enterprises on innovation, as evidenced by their portrayal in the literature through prominent publications. These publications underscore the importance for innovation within SMEs, particularly emphasizing its alignment with digital technology. Notable works such as those by Bouwman et al., (2019); and Ross & Blumenstein, (2015) reinforce this connection between SMEs and digital innovation. Additionally, a considerable body of research, exemplified by (Albats et al., 2023; Guo et al., 2017; Ibarra et al., 2020), highlights the influence of SMEs' business models. This perspective is further substantiated by various research articles, which collectively contribute to a clearer understanding of the issue at hand.

Another significant and central group pertains to the domain of business model innovation (BMI), indicating alignment with various influences within this sphere. As depicted in the figure, BMI represents another focal convergence influenced by diverse areas, including, but not limited to, the innovation practices of small and medium-sized enterprises. Moreover, several articles underscore the significance of this domain for future research and development actions (Anwar, 2018; Asemokha et al., 2019; M. A. Latifi et al., 2021; Miller et al., 2021).

What are the principal university support activities facilitating business model innovation in SME's as described or proposed by academic research?

When considering the matter of the principal university support activities facilitating BMI in SME´s, an examination of the database reveals that such activities can be categorized into four overarching themes or areas of influence (see figure 5): a) Facilitating knowledge or technology transfer from universities (A1); b) Exploring networks of relationships between universities and SMEs (A2); c) SMEs seek support to effectively manage and address problems (A3); and d) the government or other institution incentive the relationship (A4).

Figure 5. Themes or areas of influence

How are these principal university support activities conducted?

A1: Facilitating knowledge or technology transfer from universities.

Facilitating the transfer of knowledge and technology from universities to SMEs involves numerous activities. When these activities are well-executed, it yields positive results and foster innovation in the business models of enterprises (Albats et al., 2023). Collaborative projects, which involve partnerships between universities, higher education institutes, and small and medium-sized enterprises, play a crucial role in that process (Mäkimattila et al., 2015). These projects focus on developing, applying, and piloting tools within individual companies' processes (John Moore et al., 2016). Once solid collaboration is established, technology transfer offices can provide substantial support (Asplund & Bengtsson, 2010).

To overcome the barriers and challenges that impede the effective transfer of knowledge, various efforts are required from the actors responsible for organizations as well as the involved stakeholders (Bruneel et al., 2010). Through different strategic initiatives and supportive policies, the capacity of the knowledge and technology generated by universities can be transferred to enhance and support the innovation and competitiveness of SMEs. This approach underscores that these responsibilities must be part of their societal and economic functions, facilitating the management of relationships between SMEs, policymakers, and academia for effective adoption (Borrero & Yousafzai, 2024).

Mechanisms of collaboration between universities and SMEs can significantly influence and enhance the interaction through the development of research and development projects. These collaborations serve as a crucial source for generating new ideas, initiating new projects, and fostering scientific growth for the actors (Guaratini, 2016). This is particularly important in emerging economies, where governments have instituted subsidies to promote enterprise innovation through mandatory university partnerships (Guerrero et al., 2019). These efforts aim to foster the co-creation of knowledge and innovative solutions, facilitating the acquisition of various technologies that can support business model innovation, and ultimately create, deliver, and capture value for SMEs, thereby enhancing their market competitiveness (M. A. Latifi et al., 2021).

Technology transfer offices (TTOs) of universities play an important role in supporting the innovation of business models of SMEs by managing and facilitating the transfer of technology and knowledge (Guerrero et al., 2019). Additionally, the involvement with TTOs and university collaborative networks entails interaction among various organizational structures of universities (e.g., researchers, research groups, faculties, and incubators) and firms (e.g., teams, departments, subsidiaries, and entire organizations) for specific collaborative purposes such as developing new products, processes, and technologies, training human resources, and sharing knowledge (Baier-Fuentes et al., 2021). This underscores the importance of TTOs in ensuring the correct transfer of technology or knowledge, ultimately translating it into market-ready products or services for SMEs (Asplund & Bengtsson, 2010).

The creation of diverse ecosystems and robust innovation networks, which include universities, SMEs, and other ecosystem participants, is essential for knowledge and technology transfer (Lingens, 2023). These ecosystems foster collaboration and knowledge exchange, providing SMEs with access to various resources and experiences. Universities play a pivotal role in social, economic, and technological development (Ivascu et al., 2016). The interplay between complementary and substitution effects in pursuing universities' three missions—teaching, research, and knowledge transfer and technology commercialization—necessitates strategic decisions by university managers and policymakers participating in the ecosystem (Guerrero & Menter, 2024). Certain characteristics of the university–industry–government collaboration facilitate knowledge creation and management, thus enhancing innovation with a focus on the particularities of the countries in south America (Ribeiro & Nagano, 2018). Creating appropriate innovation ecosystems significantly contributes to the innovation of SMEs' business models (Guerrero et al., 2019).

A2: Exploring networks of relationships between universities and SMEs.

Identifying potential partners holds principal significance in the realm of business development. In order to maintain competitiveness, small and medium-sized enterprises must undertake a transformation of their business models (Albats et al., 2023). Often confronted with the inherent challenges of their size, SMEs frequently find it important to engage in collaborative projects with external entities (Mäkimattila et al., 2015). Through such collaborations, SMEs can significantly contribute to economic development. Similarly, universities emerge as pivotal entities within the innovation ecosystem. However, the establishment of fruitful partnerships between SMEs and universities is hindered by a notable lack of awareness within SMEs regarding university programs that can offer support, as well as the requisite procedures for accessing such programs (Pereira & Franco, 2022).

It is important to note that SMEs engaging with universities and research institutes are likely to acquire knowledge through conventional, tangible pathways of university-to-industry knowledge transfer, such as published research findings and the recruitment of new graduates (Miller et al., 2014). From the

perspective of knowledge transfer between universities and firms, geographical proximity, either within the same region or country, holds particular significance (de Zubielqui et al., 2015) . Moreover, universities possess the capacity to foster various forms of non-commercial knowledge exchange, even in the absence of advanced innovation resources, by leveraging the specific human capital within the university community, derived from activities aimed at assisting others (J. J. Roncancio-Marin et al., 2022).

To enhance collaboration, universities play a crucial role by bridging academia and industry, converting intellectual assets into viable knowledge and facilitating enterprises in accessing external resources like funding and expertise (Oliveira & Ramos, 2013). Collaboration with national or organizations in other countries significantly impacts innovation, especially in environmental sustainability efforts by SMEs through partnerships with suppliers, clients, and educational institutions (Figueiredo et al., 2024).

SMEs face challenges in keeping up with technological advancements, necessitating efficient access to expertise for long-term competitiveness (Aslam et al., 2022). Practical experiences highlight a methodical approach to fostering innovation in SMEs, emphasizing innovation management proficiency and seizing opportunities (Ignacio Igartua & Retegi, 2018).

The integration of diverse solutions within relational networks presents an intriguing concept (Bruneel et al., 2010). Understanding a small business leader's framework is crucial for value creation for both the enterprise and academia. This emphasizes the significant role of business schools and universities in fostering local economic growth, particularly in sustainable business model development (Brown & Frame, 2018). Ambiguous objectives and uncertain benefits of Business Model Innovation hinder SMEs capacities, leading to a gap between awareness and importance (Brown & Frame, 2018). Enhanced educational initiatives are needed to address this gap, with economic development entities and academic institutions playing pivotal roles (Meyer et al., 2023). Contradictory strategies between commercial entities and academic institutions contribute to this deficiency. Longitudinal evaluation of such programs is necessary to understand their efficacy in creating mutual benefits (Morel et al., 2019).

A3: SMEs seek support to effectively manage and address problems.

Although SMEs possess the potential for innovation, they face various challenges that hinder their ability to manage and capitalize on innovative opportunities. Through an understanding of key antecedents, mediators, moderators, and outcomes, it becomes evident that innovation is a complex process involving diverse mechanisms (Zahoor & Al-Tabbaa, 2020). SMEs often face risks and organizational inertia, which hinder their adoption of new processes, methods, and experimentation. This concern extends to the dimension of organizational learning, emphasizing the importance for SMEs to strengthen their collaboration with universities in the higher education sector. Research indicates that only a small number of SMEs rely on universities and educational institutions for knowledge acquisition (Purcarea et al., 2013).

Effective problem management is essential for progress in various activities, facilitating obstacle identification, analysis, and mitigation. However, a lack of awareness in managing business model innovation in SMEs raises concerns about leadership suitability for embracing innovation processes (Sabatini et al., 2022). Cultivating a culture of learning and improvement enables SMEs to navigate innovation challenges, with entrepreneurship education promoting innovation and dynamism (Dinibutun, 2024). Workshops and seminars serve as valuable platforms for knowledge acquisition and idea generation among business owners, intermediaries play a pivotal role in shaping problem solution and identities in business model innovation and managing externalities in capturing social and economic value (Guerrero et al., 2021).

It is essential to recognize the significance of managing the problems and challenges associated with the development of innovation. This recognition underscores the necessity of collaborative initiatives and support mechanisms aimed at empowering SMEs to effectively manage these challenges and enhance their innovation capacities (Guo et al., 2017). Developing a business model and technology platform for an innovation brokering service, which connects ideas and technologies being developed at universities with the specific innovation needs of SMEs, is also important (Ramos et al., 2009). Additionally, organizations responsible for creating a conducive environment for small and medium-sized enterprise entrepreneurship should focus on providing greater access to global markets, lowering opportunity costs, and supporting collaboration and innovation in an increasingly connected world (Ross & Blumenstein, 2015).

A4: The government or other institution incentive the relationship.

Governments and other institutions play a crucial role in promoting innovation in SMEs by facilitating connections with businesses, universities, and government bodies, thereby enhancing access to knowledge, technology, funding, and subsidies. These effects are particularly significant for high-growth enterprises, distinguishing those that develop entrepreneurial innovations from traditional ones (Guerrero & Urbano, 2017). Government agencies should offer different services to SMEs, allowing data analysis and others without the high costs of employing data scientists, with universities ensuring data protection (Falahat et al., 2023). Entrepreneurs cannot work in isolation; ecosystems are vital for acquiring resources, knowledge, and capabilities necessary for social value creation (Diaz Gonzalez & Dentchev, 2021).

Various mechanisms exist to reduce the costs associated with research and development, which are crucial for projects aimed at democratizing development and access to manufacturing innovation tools for small and large companies, universities, institutes, and entrepreneurs (Beckmann et al., 2016). Compromising on research is considered a threat to overall development, encompassing both business and social progress (Alam et al., 2020). Given the importance of open innovation in transforming administrative and academic processes, it is anticipated that research proposals will be consolidated in this direction. This consolidation aims to enhance knowledge construction, analytical capacity, and the incorporation of new approaches and business models that benefit society. Consequently, it is expected to foster new ways of innovating and transferring knowledge continuously and differentially (Valencia-Arias et al., 2023).

Various institutions contribute to fostering innovation in the business models of small and medium-sized enterprises. To achieve this, SMEs must align their innovation strategies with national innovation support policies disseminated through these institutions. Strategic alliances can also provide significant support (Gupta et al., 2023). While these entities offer appropriate opportunities and support, knowledge about university-industry collaborations in emerging countries remains limited, particularly in regions where research resources and research and development are scarce (J. Roncancio-Marin et al., 2022).

Exploring business model innovation requires considering the influence of multiple stakeholders. The development and refinement of business model innovation research can be enhanced by using stakeholder constructs, which illustrate the impact of various stakeholders' power and influence on business model innovation (Miller et al., 2014).

Which business model design elements in SMEs are influenced by the activities supported by universities?

Modifying a single element of the business model, such as content, structure, or governance, suffices to innovate the business model (Amit & Zott, 2012). This suggests that firms can create a novel activity

system by introducing a solitary new activity. Scholarly literature indicates that examining business model dimensions involves content, structure, and governance (Haftor & Climent Costa, 2023). Content refers to the array of activities, structure denotes organizational units, and governance signifies control mechanisms (Foss & Saebi, 2015). According to (Amit & Zott, 2012), business model innovation manifests in several forms: firstly, by introducing novel activities, such as through forward or backward integration, termed as new activity system "content." Secondly, by establishing novel linkages among activities, termed as new activity system "structure." Thirdly, by altering the actors responsible for executing activities, termed as new activity system "governance." Content, structure, and governance thus emerge as the triadic design elements characterizing a firm's business model (Zott et al., 2011).

Figure 6.BM design elements affected

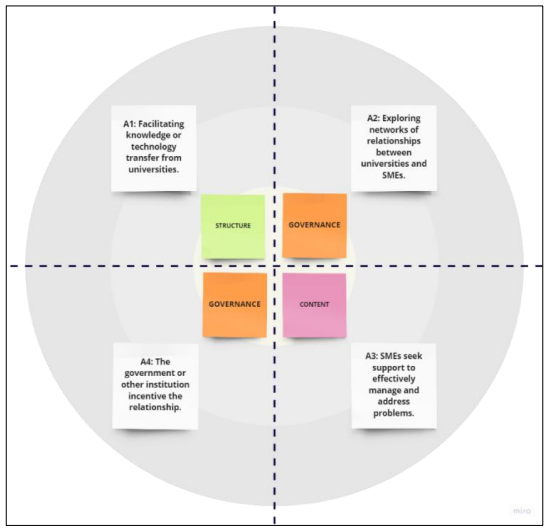


Figure 6 shows the different support activities facilitating BMI in SMEs alongside the business model design elements affected, involving that A1: facilitating knowledge or technology transfer from universities is involved in “Structure”. A2: exploring networks of relationships between universities and SMEs are involved in “Governance”. A3: SMEs seek support to effectively manage and addres problems considering “Content”. And lastly A4: the government or other institution incentive the relationship, affecting “Governance”.

6. Discussion and concluding remarks

This article contributes to identifying the principal activities through which universities support the development, change, and innovation of Small and Medium-sized Enterprises Business Models, identifying four overarching themes or areas of influence (see Figure 5): a) Facilitating knowledge or technology transfer from universities (A1); b) Exploring networks of relationships between universities and SMEs (A2); c) SMEs seeking support to effectively manage and address problems (A3); and d) Government or other institutional incentives promoting the relationship (A4).

Universities play a significant role in the development of new knowledge and its transfer to society through various means (Guerrero et al., 2019), such as publishing scientific articles, hosting seminars, and promoting knowledge transfer activities (Pereira & Franco, 2022). This is crucial for the relationship between universities and businesses, particularly in the area of Business Model Innovation (Rybnicek & Königsgruber, 2018). However, difficulties may exist in this relationship due to differences

in organizational culture and objectives between universities and companies (Bruneel et al., 2010). These difficulties can include differences in terms, activities, and perspectives(Miller et al., 2014).

By understanding the interplay between technological shifts, digitalization, entrepreneurial alertness, and collaborative frameworks, universities can design targeted support programs that empower SMEs to thrive in competitive markets (Cosenz & Bivona, 2021). Embracing a culture of innovation, sustainability, and strategic adaptation is essential for SMEs to navigate challenges, seize opportunities, and drive economic growth in the region (Anwar, 2018).

Regarding the location of the studies conducted and revised in the database, it appears that relatively few were focused on countries with limited resources (Guaratini, 2016; Guerrero et al., 2019, 2021; Ribeiro & Nagano, 2018). Most studies were primarily concentrated in traditional areas supported by universities (Bruneel et al., 2010) . This trend suggests that university support is more productive and engaged in high- or medium-income countries, as universities in these regions benefit from better political, economic, and stability issues, and various other forms of support (Arocena & Sutz, 2021). Consequently, this enhances their capacity to provide effective support to other organizations, such as SMEs (de Zubielqui et al., 2015).

A limitation of this study is that only one database, Scopus, was utilized. To enhance the inclusivity of the study and broaden the range of methodologies employed, it is imperative to incorporate a greater number of documents and explore more support activities.

Suggestions for further research include: a) further elucidating the thematic areas by identifying additional activities contributing to their development; b) extending the search to other databases and applying other resources bibliometric resources; and c) comparing studies over the years to observe developments in the area.

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Appendix 1

Classification	No.	Tittle (In chronological order)	Reference	Authors	Year	Type of publication	Journal/ Conference/ Book	Continent of application
Group A	1	Innovation for environmental sustainability: business models for SMEs	(Figueiredo et al., 2024)	Natalia Figueiredo, Lurdes D. Patrıcio and Manuel Reis	2024	Journal article	Journal of Small Business and Enterprise Development	Europe
	2	Circular entrepreneurial ecosystems: a Quintuple Helix Model approach	(Borrero & Yousafzai, 2024)	Juan D. Borrero, Shumaila Yousafzai	2024	Journal article	Management Decision	Europe
	3	Driving change in higher education: the role of dynamic capabilities in strengthening universities' third mission	(Guerrero & Menter, 2024)	Maribel Guerrero and Matthias Menter	2024	Journal article	Small business economics	Europe
	4	The impact of entrepreneurial passion on business model innovation on Turkish SMEs	(Dinibutun, 2024)	Sait Revda Dinibutun	2023	Journal article	Cogent Business & Management	Europe & Asia
	5	Do SMEs actually know what Business Model Innovation is? Evidence from Switzerland	(Meyer et al., 2023)	Rolf Meyer, Dario Meyer and Thérèse Schmutz	2023	Conference proceedings	Proceedings of the 18th European Conference on Innovation and Entrepreneurship	Europe
	6	Research trends around open innovation in higher education: advancements and future direction	(Valencia-Arias et al., 2023)	Alejandro Valencia-Arias, Ledy Gómez-Bayona, Gustavo Moreno-López, Noelia Sialer-Rivera, Olga-Vélez Bernal, Ada Gallegos and Francisco Javier Arias-Vargas	2023	Journal article	Frontiers in education	Worldwide
	7	Open innovation in SMEs: A process view towards business model innovation	(Albats et al., 2023)	Ekaterina Albats , Daria Podmetina and Wim Vanhaverbeke	2023	Journal article	Journal of small business management	Europe
	8	Business model innovation and digital technology: The perspective of incumbent Italian small and medium-sized firms	(Sabatini et al., 2022)	Andrea Sabatini, Marco Cucculelli, Gian Luca Gregori	2022	Journal article	Entrepreneurial Business and Economics Review	Europe
	9	University-Industry joint undertakings with high societal impact: A micro-processes approach	(J. Roncancio-Marin et al., 2022)	Jason Roncancio-Marin, Nikolay Dentchev, Maribel Guerrero, Abel Díaz-Gonzalez and Thomas Crispeels	2022	Journal article	Technological Forecasting & Social Change	America (South)
	10	Shaping the social orientation of academic entrepreneurship: an exploratory study	(J. J. Roncancio-Marin et al., 2022)	Jason Jahir Roncancio-Marin, Nikolay A. Dentchev, Maribel Guerrero, Abel Alan Diaz-Gonzalez	2022	Journal article	International Journal of Entrepreneurial Behavior & Research	America (South)
	11	Cooperation between universities and SMEs: A systematic literature review	(Pereira & Franco, 2022)	Rosivalda Pereira and Mario Franco	2022	Journal article	Industry & Higher education	Worldwide
	12	Does triple helix collaboration matter for the early internationalisation of technology-based firms in emerging Economies?	(Baier-Fuentes et al., 2021)	Hugo Baier Fuentes, Maribel Guerrero, Jose Ernesto Amoros	2021	Journal article	Technological Forecasting & Social Change	America (South)
	13	Intermediaries and social entrepreneurship identity: implications for business model innovation	(Guerrero et al., 2021)	Maribel Guerrero, Carlos A. Santamarıa-Velasco, Raj Mahto	2021	Journal article	International Journal of Entrepreneurial Behavior & Research	America (North)

	14	Collaboration potential between low-capacity SMEs and academic researchers determined by symmetry of motivation	(Rajalo & Vadi, 2021)	Sigrid Rajalo, Maaja Vadi	2021	Journal article	Technovation	Europe
	15	Ecosystems in support of social entrepreneurs: a literature review	(Diaz Gonzalez & Dentchev, 2021)	Abel Diaz Gonzalez and Nikolay A. Dentchev	2021	Journal article	Social enterprise journal	Worldwide
	16	Digital age business model innovation for sustainability in University Industry Collaboration Model	(Happonen et al., 2020)	Ari Happonen, Ulla Santti, Harri Auvinen, Teemu Räsänen, and Tuomo Eskelinen	2020	Conference proceedings	E3S Web of Conferences	Europe
	17	Inter-organizational collaboration and SMEs' innovation: A systematic review and future research directions	(Zahoor & Al-Tabbaa, 2020)	Nadia Zahoora, Omar Al-Tabbaab	2020	Journal article	Scandinavian Journal of Management	Worldwide
	18	Innovation practices in emerging economies: Do university partnerships matter?	(Guerrero et al., 2019)	Maribel Guerrero, David Urbano and Fernando Herrera	2019	Journal article	Journal of Technology Transfer	America (North)
	19	IM2, a Maturity Model for Innovation in SMEs	(Ignacio Igartua & Retegi, 2018)	Juan Ignacio Igartua, Javier Retegi, Jaione Ganzarain	2018	Journal article	Direccion y Organización	Europe
	20	Main dimensions that impact knowledge management and university-business-government collaboration in the Brazilian scenario	(Ribeiro & Nagano, 2018)	Suzana Xavier Ribeiro and Marcelo Seido Nagano	2018	Journal article	Revista de Gestão	America (South)
	21	Exploring business model innovation in business school – small business engagements: understanding and helping small business leaders through action learning programs	(Brown & Frame, 2018)	Christopher J. Brown, Philip Frame	2018	Journal article	International Journal of Innovation and Learning	Europe
	22	Real Contents and Channels of Open Innovation		Jinhyo Joseph Yun	2017	Book chapter	Management for Professionals	Asia
	23	The impact of Triple Helix agents on entrepreneurial innovations' performance: An inside look at enterprises located in an emerging economy	(Guerrero & Urbano, 2017)	Maribel Guerrero, David Urbano	2017	Journal article	Technological Forecasting & Social Change	America (North)
	24	Towards Innovation & Entrepreneurship		Low Teck Seng, Raj Thampuran, Tan Kai Hoe, and Philip Ong	2016	Book chapter	The Singapore research history	Asia
	25	Knowledge transfer between actors in the innovation system: a study of higher education institutions (HEIS) and SMES	(de Zubielqui et al., 2015)	Graciela Corral de Zubielqui, Janice Jones, Pi-Shen Seet and Noel Lindsay	2015	Journal article	Journal of Business & Industrial Marketing	Oceania
	26	The changing university business model: a stakeholder perspective	(Miller et al., 2014)	Kristel Miller, Maura McAdam and Rodney McAdam	2014	Journal article	R&D management	Europe
	27	Innovation and knowledge creation: Perspectives on the SMEs sector	(Purcarea et al., 2013)	Irina Purcarea, Maria del Mar Benavides Espinosa and Andreea Apetrei	2013	Journal article	Management Decision	Europe
	28	The case of a portuguese intermediary of open innovation: Inovamais	(Oliveira & Ramos, 2013)	Fabio Oliveira and Isabel Ramos	2013	Book chapter	Small and Medium Enterprises: Concepts, Methodologies, Tools, and Applications	Europe
	29	Management of technology for support center for enhancing competitiveness of small and medium enterprises in Egypt		Yasser Tawfik and Tarek Khalil	2010	Book chapter	Creating and Managing a Technology Economy	Africa

	30	An action research on open knowledge and technology transfer	(Ramos et al., 2009)	Isabel Ramos, Margarida Cardoso, Joao Vidal Carvalho and Jose Ismael Graca	2009	Conference proceedings	IFIP advances in information and communication technology	Europe
	31	The Role of SMEs in Commercialising University Research & Development: The Asia-Pacific Experience	(Milton, 2001)	John Milton-Smith	2001	Journal article	Small business economics	Oceania
Group B	32	Big Data Analytics Capability Ecosystem Model for SMEs	(Falahat et al., 2023)	Mohammad Falahat, Phaik Kin Cheah, Jayamalathi Jayabalan, Corrinne Mei Jyin Lee and Sia Bik Kai	2023	Journal article	Sustainability	Asia
	33	Growth of private university business following "oligopoly" and "SME" approaches: an impact on the concept of university and on society	(Alam et al., 2020)	Gazi Mahabubul Alam, Morsheda Parvin and Samsilah Roslan	2020	Journal article	Society and Business Review	Asia
	34	Financing innovation: Benefit of the innovation vouchers to foster the link between SME's needs and university capabilities	(Morel et al., 2019)	Morel Laure, Mauricio Camargo, and Pascal Lhoste	2019	Conference proceedings	proceedings of 28th International Conference for the International Association of Management of Technology (IAMOT 2019)	Europe
	35	Developing a Toolbox of supports for small and medium sized manufacturing companies	(John Moore et al., 2016)	John Moore, Anne Loughran, Edel McCusker, Wei Deng Solvang, Gabor Sziebig, Hao Yu, Asa Ericson, Johann Holmqvist, Johann Wenngren, Sakari Pieska, Juoni Yahasoyrinki and Heidi Kaartinen	2016	Conference proceedings	2016 International Symposium on Small-scale Intelligent Manufacturing Systems (SIMS)	Europe
	36	Knowledge-Intensive Business Services in Brazil: Entrepreneurship in a Stimulating Scenario	(Guaratini, 2016)	Thais Guaratini	2016	Conference proceedings	ACS Symposium SeriesVol. 1219	America (South)
	37	Cloud computing as a facilitator of SME entrepreneurship	(Ross & Blumenstein, 2015)	Peter K. Ross and Michael Blumenstein	2015	Journal article	Technology Analysis & Strategic Management	Oceania
Group C	38	Education of the Future: Learnings and Experiences from Offering Education to Industry Professionals		Tehseen Aslama, Ainhoa Goienetxeaa and Henrik Svenssona	2022	Conference proceedings	Proceedings of the 10th Swedish Production Symposium	Europe
	39	Foreign Embassies Internationalization Support for Small and Medium-Sized Enterprises: Need to Balance Innovation Strategy and Innovation Support Policies	(Gupta et al., 2023)	Varun Gupta; Chetna Gupta; Luis Rubalcaba; Anh Nguyen-Duc; Xiaofeng Wang; Marcin Butlewski	2023	Journal article	IEEE Engineering management review	America (North)
	40	Developing the Digital Manufacturing Commons: A National Initiative for US Manufacturing Innovation	(Beckmann et al., 2016)	B. Beckmann, A. Giani, J. Carbone , P. Koudal, J. Salvo and J. Barkley	2016	Conference proceedings	44th Proceedings of the North American Manufacturing Research Institution of SME	America (North)

Paper II

HOW CLUSTER INITIATIVES SUPPORT BUSINESS MODEL INNOVATION OF SMALL AND MEDIUM-SIZED ENTERPRISES.
Cases from a public University in Bolivia

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ABSTRACT:

While numerous studies have highlighted the benefits for small and medium-sized enterprises (SMEs) to innovate their business models, obtaining the necessary support and capabilities for such endeavours can prove challenging. SMEs encounter significant obstacles when attempting to explore various facets and components for innovation. In response to this, Cluster Initiatives were instituted at Universidad Mayor de San Simon in Bolivia. These initiatives seek to both establish and elucidate approaches for fostering innovation within SMEs' and help to innovate their business models.

Employing a multiple case study, this research examines the experiences of SMEs to analyze how Business Model Innovation may be facilitated by cluster initiatives and examining the implications of how cluster initiatives can support business model innovation of SMEs in a lower-middle income country like Bolivia.

The main findings are nine patterns that have been identified across the dimensions of business model value, highlighting activities that both strongly and weakly support the innovation of the business models in SMEs.

KEYWORDS: Business Model, Business Model Innovation, Cluster Initiatives, Lower middle-income economies, small and medium-sized enterprises

1.- Introduction

While there is a pressing need for small and medium-sized enterprises (SMEs) in lower-middle-income economies to innovate, the mechanisms to facilitate such innovation may not always be evident to researchers and practitioners (Maclean *et al.*, 2023). The organization of enterprises into Cluster Initiatives is recognized as an effective method for fostering improvement (Ketels and Memedovic, 2008; Klofsten *et al.*, 2015; Sölvell *et al.*, 2003). Clusters initiatives can be viewed as tools for improving regional and firm productivity and innovativeness (Navickas and Malakauskaite, 2009). One such Cluster Initiative can be found in the Cochabamba region, Bolivia with Universidad Mayor de San Simon as the coordinating actor that seek to establish and elucidate strategies for fostering innovation within SMEs in the region (Acevedo, 2018).

Cluster initiatives builds on the concept of clusters "geographic concentrations of interconnected companies, suppliers, service providers, firms in related industries, and associated institutions (e.g. universities, standards agencies, and trade associations) in particular fields that compete but also cooperate" (Porter, 1998, p. 197). Co-located firms in clusters enjoy competitive advantages due to external economies of scale, as well as eased access to resources, specialized suppliers and customers (Porter, 1998). While clusters may emerge spontaneously, due to market opportunities, such as the biotechnology cluster in the Copenhagen-Malmö region (Moodysson et al., 2008), the clusters in emerging and developing countries (Giacomin, 2019), in regions with declining economic performance (Delgado et al., 2014), or small and undeveloped clusters (Kowalski and Marcinkowski, 2014), often see a more managed form of clustering, called cluster initiatives, due to government policy initiatives. According to Ketels and Memedovic, (2008:384) cluster initiatives can be defined as "collaborative actions by groups of companies, research and educational institutions, government agencies and others, to improve the competitiveness of a specific cluster (... for

example) by raising the awareness of companies within a cluster and creating more effective platforms for interaction (... or providing) a platform for a better dialogue between the private and the public sector when making decisions about how to improve the cluster-specific business environment". Cluster initiatives are often coordinated by an intermediary organization, such as universities, providing platforms for interaction and other services (Klofsten et al., 2015).

Prior research on cluster initiatives has delved into the factors influencing the success or failure of cluster initiatives, including government policies, networking mechanisms, and knowledge spillovers (Ketels and Memedovic, 2008; Klofsten *et al.*, 2015; Sölvell *et al.*, 2003). Many cluster initiatives focus on development of SMEs in a specific region or industry (Karaev et al., 2007; Kowalski and Marcinkowski, 2014). Such studies have showed the positive effect of cluster initiatives on SMEs' productivity and product innovation located in higher income countries, but rarely in medium and low-income countries (Karaev et al., 2007; Kowalski and Marcinkowski, 2014). However, few studies have investigated cluster initiatives which includes that SMEs have a potential to enhance their business performance through the implementation of innovative changes in their business models (Bashir *et al.*, 2020; Foss and Saebi, 2017; Ibarra *et al.*, 2020; Latifi *et al.*, 2021), nor does extant research seem to offer much advice to practitioners that work with clusters or ecosystems (Lingens, 2023). Business model innovation may stimulate SMEs to develop their business model beyond the traditional ways of doing business as well as to stimulate development to develop more collaborative business models with other firms and actors in the region (cf. Osterwalder and Pigneur, 2010).

The purpose of this research is to describe and analyze the effects on business model innovation of SMEs due to the support of a cluster initiative managed by a public university in Bolivia, a country categorised as a Lower Middle-income economy (World Bank, 2023). In addition, the purpose is to examine the implications of how cluster initiatives can support the business model innovation of SMEs in a lower-middle income country like Bolivia.

Our study concludes that cluster initiatives managed by a public university in Bolivia can assist in the development and enhancement of the business model of SMEs by engaging them in a variety of activities. The main effect is a strengthening of value creation components such as key resources and key activities in terms support with prototyping of new production equipment enabling a resource-driven approach to business model innovation. However, as the cluster initiative included few activities supporting the SMEs' value delivery and value capture components much less progress in business model development was observed here. Moreover, progress in the SME's business model innovation depended substantially on the firm manager's motivation for participation in the cluster initiative's activities, their trust in university personnel as well as their own capabilities to innovate their business model. Implications include careful selection of SMEs participating in the cluster initiative, trust-building activities and additional support to innovation in value delivery and value capture components of the business model. The present research represents an initial contribution to what extent cluster initiatives support BMI in SMEs in lower-middle income countries as well as how it may be more efficiently organized.

This work is organized as follows: In Section 2, we outline the research objectives and the chosen methodological approach. Sections 3 and 4 provide a review of the pertinent literature, encompassing the principal assumptions about Cluster Initiatives, Business Models, and Business Model Innovation, to develop the foundation for this study. Section 5 presents the detailed analysis conducted in this research, as a description and the dimensions about BM and BMI used in this study. Section 6 is dedicated to the presentation and explanation of the results and findings. The subsequent section delves into the discussion of our findings. Finally, the last section, contains the conclusions obtained from this study.

2.- Research questions and methodological approach

Take in account the above stated research purpose we address the following research questions:

RQ1: How do cluster initiatives support SMEs' business model innovation in a lower-middle income country such as Bolivia?

RQ2: What are the implications of cluster initiatives supporting the innovation of the business models of SMEs in lower-middle income country such as Bolivia?

This study utilizes a qualitative methodological approach of multiple case studies (Yin, 2009) to investigate the support of cluster initiatives for BMI of SMEs in the context of Bolivia. The business model is divided in three distinct value dimensions, as categorized by Osterwalder & Pigneur (2010), identified as value creation, value delivery, and value capture. BMI occurs when at least one of the value dimensions are modified or improved (Abdelkafi *et al.*, 2013; Foss and Saebi, 2017; Sosna *et al.*, 2010; Teece, 2018).

In this study, for data acquisition, informed consent was verbally obtained during recorded interviews, with durations ranging from a minimum of 45 minutes to a maximum of 75 minutes approximately, through which the research scope was presented.

During the interview process, questions pertaining to the background and interest of the SMEs were asked in a general manner. The terms "Business Model" or "Business Model Innovation" were not introduced to avoid misunderstandings of the concept, rather the components of the value dimensions, such as important resources, products or service offered to customers etc, were introduced and subject to inquiry. It is important to note that every enterprise has a business model, whether explicit or not (Magretta, 2002).

The selection process for analysing the cases of SMEs participating in the cluster initiatives at Universidad Mayor de San Simon has been based on the following criteria:

1. The existence of a clearly defined involvement in cluster initiatives at Universidad Mayor de San Simon (UMSS).
2. The participation in any project with the support of the university aiming to support BMI, as research projects, machine design and prototyping, processes and product design, management assistance or other joint development activities.
3. The availability of historical data in the university at the Unit of Technology Transfer at UMSS in the context of cluster initiatives.

Based on the aforementioned criteria, we have identified five SMEs to be included in the multiple case studies. Table 1, inserted below, identifies the characteristics of the enterprises participating in this study:

Table 1. List of participating enterprises in the study

Small and medium-sized enterprise	*Description*	*Cluster Initiative*
Enterprise 1	Artisanal enterprise dedicated to producing and commercializing Hummus and snacks based on sesame and other spices, free of additives and preservatives.	Food Cluster Cochabamba
Enterprise 2	Enterprise dedicated to the production of herbs, spices, aromatic herbs, dehydrated natural fruits from the tropical region of Cochabamba city.	Food Cluster Cochabamba
Enterprise 3	Enterprise dedicated to planting and producing sunflower sprouts and wheatgrass extract for human consumption.	Food Cluster Cochabamba
Enterprise 4	Enterprise that produces handmade paper from banana fiber, leaves, and seed of other plants, 100% environmentally friendly.	Green Technology Cluster
Enterprise 5	Enterprise that uses recycled materials based on zeolites to produce cleaning and disinfection products for the home, 100% environmentally friendly.	Green Technology Cluster

3.- Cluster initiatives

In the context of Lower Middle-Income countries, particularly in Latin America, the concept of innovation systems serves as a foundational framework for guiding economic development initiatives (Arocena and Sutz, 2020). There exists a necessity to explore renewed avenues of inter-organizational collaboration in order to encourage the natural progression of relationships. Such collaboration will not only enhance innovation systems but also fortify the innovation capabilities of businesses within different organizations.

Cluster initiatives are collaborative efforts involving conglomerates of businesses, academic and research institutions, governmental bodies, and other stakeholders (Klofsten *et al.*, 2015;

Sölvell *et al.*, 2003). Their primary aim is to enhance the competitiveness of a selected cluster. The defining feature of these initiatives is their overarching objectives, rather than specific endeavours. They can be initiated by corporations, universities, or government entities (Ketels and Memedovic, 2008). Cluster initiatives operate on the premise that individual firms situated within them are strategically positioned for entrepreneurship, innovation, and growth (Navickas and Malakauskaite, 2009). Participation in cluster initiatives fosters the expectation that these firms will be exposed to and take advantage of opportunities to formulate successful and competitive strategies, ultimately contributing to the prosperity of their respective countries (Klofsten *et al.*, 2015). The involvement is viewed as beneficial, specifically due to the improved access to scarce resources and skills (Karaev *et al.*, 2007). Such benefits arise from the inherent complementarities in the structure of cluster initiatives, fostering mutual and reciprocal exchange or acquisition among the involved actors (Kowalski and Marcinkowski, 2014).

Cluster initiatives at Universidad Mayor de San Simón in Bolivia

In 2004, UMSS established the Unit of Technology Transfer (UTT-UMSS) in which the university promotes the democratization of knowledge through productive clusters initiatives (Acevedo, 2018). UTT-UMSS is recognized as a physical and virtual space for the convergence and assembly of social, economic, productive, and academic stakeholders aimed at promoting collaboration and generating synergies in influencing regional and local development processes.

Cluster initiatives were initiated at UTT-UMSS in 2007. In this cluster initiatives the participating SMEs obtain support from the UTT-UMSS to develop research projects, machine design and prototyping, processes and product design, management assistance and other competences and resources. The most developed and prominent cluster initiative is the Food Cluster Cochabamba. Another, newer cluster initiative, is the Green Technology Cluster,

established in 2021. The initiatives were developed as a strategy for the university to respond the demands requested by the business sector through leveraging the capabilities of the research centres, which allows strengthening the university-industry collaboration, recognizing the different dimensions and complexity of problems, enabling open discussions, and building bridges of collaboration between the heterogeneous capacities distributed (Acevedo, 2018).

Table 2 provides an overview of the main activities developed in Cluster Initiatives at UTT.

Table 2. Overview of main activities developed in Cluster Initiatives at UMSS

Main activities developed in Cluster Initiatives at UTT	1. Research and networking (i.e., a. research projects, b. joint project development, c. connection with research centers, d. connection with organizations, e. search for financing opportunities)
	2. Policy action (i.e., a. support in relation with government, b. develop and suggest of new policies)
	3. Innovation and technology (i.e., a. Develop of new products, b. Develop of new services, c. design of machine prototypes, d. food safety support)
	4. Commercial cooperation (i.e., a. participation in fairs, b. market studies, c. connection with other SMEs)
	5. Education and training (i.e., a. training, b. workshops, c. seminars, d. student internships, e. volunteering)

Own elaboration Based in base of five main guidelines described by (Sölvell et al., 2003)

In most cases, initiatives to engage with UTT-UMSS have originated from enterprises seeking novel approaches to their activities, while also searching for support in specific areas and solutions to minor challenges encountered in their regular development. Subsequently, the UTT-UMSS has played a pivotal role in strengthening these initiatives by offering a comprehensive array of support services, encompassing technological assistance, management guidance, and others, connect SMEs to various research centers within UMSS that may be involved in the specific requirement.

Prior experience from the facilitation and coordination of cluster initiatives within SMEs at UTT-UMSS has indicated an increased demand for skills in innovation management, co-design, the creation of business value, and increased collaboration within SMEs participating in cluster initiatives. Thus, UTT-UMSS has strengthened its efforts and focus to support the SME's development of capabilities related to business model innovation in the cluster initiatives than previously.

The preconditions in lower-middle income countries such as Bolivia for cluster formation and cluster initiatives are often not the best as the number of firms within a particular region and industry might be limited, infrastructure might be less developed making transportation and communication difficult and time-consuming, and trust in society at a low level due to low incomes and high levels of corruption, as is the case for Bolivia (World Bank, 2023). Also, regulations in some sense may negatively affect business model innovation if it makes it more difficult for firms to experiment with new business models or removes incentives for taking risks (Nielsen, 2023).

4.- Business Models and Business Model Innovation

Innovation is necessary for organizational growth and competitiveness, but relying solely on product or process innovation is inadequate in contemporary business environments (Chesbrough, 2007). Market shifts stem from rising competition, globalization, new rivals, and evolving products, altering dominant market positions (Gassmann *et al.*, 2014). According to Zott et al., (2011) business model innovation complements traditional process, product, and organizational innovation.

Academic literature (Bashir *et al.*, 2020; Foss and Saebi, 2017; Wirtz and Daiser, 2018) offers extensive empirical evidence for BMI as effective for SMEs, enhancing innovation and collaboration in dynamic environments. Foss & Saebi (2017) defined BMI as designed, novel, nontrivial changes to the key elements of a firm's BM and/or the architecture linking these elements. There are several definitions of the concepts of BM and BMI (Bashir *et al.*, 2020; Foss and Saebi, 2017, 2018; Miller *et al.*, 2021; Ramdani *et al.*, 2019; Wirtz and Daiser, 2018) but most would agree on a definition by Teece (2010) that a business model "Describes the *design and architecture* of the value creation, delivery and capture mechanisms" of a firm. The

architecture and components of value creation, value delivery and value capture have been operationalized in the Business Model Canvas (BMC) by Osterwalder & Pigneur, (2010).

For many authors value creation is one of the important dimensions of BM and BMI studies (Foss & Saebi, 2017, 2018; Magretta, 2002; Miller et al., 2021; Ramdani et al., 2019; Wirtz & Daiser, 2018). Value creation consists of the value proposition, the value in the form of products and/or services the firm offer to its customers, and the elements or mechanisms with which the firm creates the value proposition, i.e., key resources, key activities, and key partners (Osterwalder & Pigneur, 2010).

The second BM value dimension is a firm´s value delivery, as described by Abdelkafi et al., (2013) *"the means by which enterprises establish interactions with the customer in order to provide the value proposition"*. Value delivery consists of customer segments, customer relationships and channels to communicate and deliver value to the customers (Osterwalder & Pigneur, 2010).

The third and last BM value dimension is firm´s value capture, i.e., how the firm generates revenues and the cost related to the value creation and value delivery dimensions (Osterwalder & Pigneur, 2010).

The three value dimensions encompass nine components that define the business model. (Osterwalder & Pigneur, 2010; Keane et al., 2018).Table 3 delineates them.

Table 3. Business Model elements and their descriptions. Adapted from (Keane et al., 2018)

BM value dimension	*BM Elements*	*Descriptions*
Value creation	Value proposition	A firm offers a mix of products/services to create value for each customer segment
	Key partners	A firm may outsource some activities to its network of suppliers/partners
	Key activities	A firm performs a set of activities to create and deliver the business model elements
	Key resources	A firm requires resources (e.g., physical, financial, intellectual property, and people skillsets) to create and deliver the business model elements
Value delivery	Customer relationships	A firm establishes and maintains relationships with each customer segment
	Customer segments	A firm serves its value proposition(s) to one or more customer segments
	Channels	A firm communicates and delivers its value proposition to each customer segment via various channels
Value capture	Cost structure	Each element of a firm´s business model has a cost component
	Revenue structure	A firm generates revenue streams from the delivery of value to each customer segment

A BMI happens when the enterprise modifies or improves at least one of the value dimensions in accordance of the different components. Thus, starting with an existing business model, the level of BMI depends on how many dimensions have been improved and how radical the improvement within each dimension is (Abdelkafi et al., 2013; Foss & Saebi, 2017; Sosna et al., 2010; Teece, 2010).

5.- Analysis

Interviews were recorded to minimize data loss, in accordance with the explicit consent obtained from the interviewees. Transcriptions were executed verbatim, acquiring the interview content, and serving as an initial analytical tool. Subsequently, a secondary review process was undertaken, involving attentive listening and the enhancement of interviewees statements and vocabulary. This refinement was needed by the fact that the interviews were conducted in Spanish.

The principal idea involved was to explore how cluster initiatives can support business model innovation in SMEs, taking into account the dimensions of value described above, i.e,, the three BMI value dimensions, encompassing firm´s value creation, value delivery, and value capture (Osterwalder and Pigneur, 2010). We then classified the main and specific activities (table 2 above) performed within the cluster initiatives at UTT-UMSS with a specific BM value element and value dimension.

The participation of each SMEs in the various activities of the cluster initiatives were then classified into a BM value element and dimension resulting in an activity pattern along the BM value dimensions. We could then find out which BM value dimensions that have received the most and the least supporting activities for all five SMEs as well as for the individual SME. This approach enabled us to see how cluster initiatives contribute to BMI of SMEs in Bolivia.

Our study ensures data integrity and validity through triangulation, combining diverse perspectives and expertise among interviewees. We supplement primary data with reports and information from UTT, encompassing digital and manual data. The classification of SMEs activities into BM value elements and dimensions were done independently by three researchers and then compared. A couple of different classifications were identified, regarding the difference between key activities and key resources, were discussed and agreed upon.

When faced with uncertainties, we prioritize reliable sources, particularly interview data and the owner's expertise in cluster initiatives, aligning with Leuffen *et al.*, (2012) recommendations. Researchers independently review data, fostering discussions for a comprehensive understanding, enhancing theoretical and empirical results quality.

6.- Results and findings

Table 4 summarizes the impact of cluster initiatives on SMEs in Bolivia, specifically focusing on BMI. Employing a structured approach, the analysis explores the impact on three value dimensions: value creation, value delivery, and value capture, and the nine value elements, drawing on the framework proposed by Osterwalder and Pigneur (2010). In the affected value dimension, it can be discerned that value creation is the most significantly impacted, accounting for 83% of all activities. Value delivery is impacted to a lesser extent at 11%, while value capture is affected the least, with only a 6% of the activities.

The key findings have been organized in nine themes; 1) focus on value creation with an emphasis on deveplopment of key resources, 2) student internships as a catalyst, 3) impactful university support, 4) specific support for food cluster – food safety registration, 5) diverse connections and collaborations, 6) the missing part in value creation – the value proposition, 7) varied engagement in value delivery, 8) limited activity in value capture, and 9) varied participation across enterprises.

Table 4. Business Model Innovation and Cluster initiatives in Bolivia

BM Value dimension affected	*BM Elements affected*	*Detail of the main activity Based in table 1*	*Cluster Initiatives activities that support small and medium-sized enterprises at UTT*						
			Enterprise 1	*Enterprise 2*	*Enterprise 3*	*Enterprise 4*	*Enterprise 5*	*Number of activities per BM element*	Pct. %
Value creation	Value proposition	2b. Develop and suggest of new policies							
	Key partners	1c. Connection with research centers		Investigate raw material compounds in research center		Investigate other uses of raw material and durability		*2*	
		1d. Connection with organizations							
		2a. Support in relation with government							14%
		4c. Connection with other SMEs	Connection with logistic enterprises involved in Cluster Initiatives (Distribution)	Connection with suppliers jointly with other SMEs		Connection with logistic enterprises involved in Cluster Initiatives (Collect raw material)		*3*	
	Key activities	1a. Research projects							
		1b. Joint project development		Proposal to participate in joint project of acceleration				*1*	8%
		3a. Develop of new products	Trying to develop new products with the raw material		Trying to develop new products with raw material and similar			*2*	
		3b. Develop of new services							
	Key resources	3c. Design of machine prototypes	Design and prototype machine Sesame Extruder	Design and prototype machine Hammer mill	Design and prototype machine Wheatgrass extruder	Design and prototype machine Dutch Pile	Design and prototype mixer	*5*	
		3d. Food safety support	Certificate of laboratory analysis from Research center to obtain Food safety register	Certificate of laboratory analysis from Research center to obtain Food safety register				*2*	
		5a. Training		Participation in acceleration process		Participation in acceleration process	Participation in acceleration process	*3*	
		5b. Workshops		Participation in workshops of circular initiatives		Participation in workshops of circular initiatives	Participation in workshops of circular initiatives	*3*	61%
		5c. Seminars	Take part in seminars organized by UTT	Participate in seminars and congress organized by UTT	Take part in seminars organized by UTT		Participate in seminars organized by UTT	*4*	
		5d. Student internships	Student internship to design machine prototype and food safety support	Student internship to design machine prototype and market studies	Student internship to design machine prototype and food safety support	Student internship for market studies and design machine prototype	Student internship to design machine prototype	*5*	
		5e. Volunteering							
Value delivery	Customer relationship	-							
	Customer segments	4b. Market studies							
	Channels	4a. Participation in fairs	Participation in cluster fairs and innovation fairs	Participation in cluster fairs and innovation fairs	Participation in cluster fairs and innovation fairs		Participation in cluster fairs and innovation fairs	*4*	11%
Value capture	Cost structure	-							
	Revenue structure	1e. Search for financing opportunities		Search new financiering projects to apply		Search financiering projects to apply		*2*	6%
		Number of activities per enterprise	7	11	5	7	6	*Total: 36*	
		Percentage %	19%	31%	14%	19%	17%		100%

1. Focus on value creation with an emphasis on development of key resources

The study identifies a pronounced emphasis on the value creation dimension, with a particular focus on BM elements concerning key resources. Notably, 61% of the activities developed in collaboration with the university revolve around key resources, indicating their crucial role in cluster initiatives for fostering innovation in SMEs' business models.

Within key resources, the design of machine prototypes (3c) stands out as a critical aspect. This underscores the importance of technological advancement and product development in enhancing SME capabilities, as illustrated by enterprises engaging in diverse prototype designs. All SMEs participating in this study received support for design and prototyping of new production equipment/machines, in order to upgrade their production capabilities making production more cost efficient and/or enabling quality improvements. In the design and prototyping of new production equipment got access to rapid prototyping resources such as 3D-printers, CAD/CAM software and competent personnel. The SMEs did not have access to such resources in their own firms, thus providing them with support to innovate their production process.

2. Student Internships as a Catalyst

Student internships, particularly connected to machine prototype design and food safety support, emerge as pivotal activities influencing the value creation dimension. All enterprises demonstrate a commitment to innovation by leveraging these internships, reflecting a symbiotic relationship between SMEs and academic support. For this study, all SMEs had student interns acting as liaisons between the firm and the university, facilitating contacts and access to services, as well as providing the firm with technical knowledge in prototyping and laboratory analysis.

3. Impactful university support.

Seminars (5c), training activities (5a) and workshops (5b) play a crucial role in supporting SMEs. These activities contribute to the overall development of managers, fostering proficiency and skills pertinent to academic discourse. The commitment of enterprises to participate in these activities demonstrates the perceived benefits of such engagements. The seminars, training activities and workshops concerned different issues depending on the need of the SME. As an example, three of the SMEs involved themselves in workshops and acceleration programs focusing circular economy issues, exploring how their operations and business model could become more circular.

4. Specific support for food cluster – food safety registration

In order to be eligible for distribution in food retail chains in Bolivia food firms need to be registered in an official food safety register. This registration requires a laboratory analysis by a state certified laboratory certifying that the firm's food items are safe for human consumption as well as specifying the content in the food item. The three food firms did not have such a registration due to it being expensive and the firms until then had relied on distribution outside retail chains, i.e., at food markets. UMSS has a certified laboratory, thus two of the food firms, obtained such a registration for a subsidized fee giving them possibility to distribute their food items through retail chains in the country. The third food firm were in the process of obtaining such a registration at the end of this study.

5. Diverse Connections and Collaborations

Key Partnerships (1c) and Connection with other SMEs (4c) represent valuable dimensions in value creation. Collaborations with logistic enterprises, suppliers, and research centers signify a commitment to cooperation and shared learning, contributing to enhanced product delivery and innovation. The SMEs had different needs when searching for key partners. Enterprise 1 and 4 were searching for logistics partners to collect raw material and to distribute food items

respectively. Enterprise 2 searched for suppliers of certain items. The size and variedness of the network in the cluster initiatives limits the support that the cluster initiative can give when searching for specific partners.

6. The missing part in value creation – the value proposition

While all the food firms and enterprise 4 in the green technology cluster engaged in either development of new products or new raw materials, none of the firms involved themselves in activities to change or modify their value proposition. Only enterprise 1 performed some market studies to find out market needs and how customers value their products. To a large degree the activities in the UTT-UMSS support were designed by the espoused needs of the firm themselves. Thus, they identified needs primarily connected to technology development, i.e., new production equipment and laboratory analysis.

7. Varied engagement in value delivery

Enterprises actively engage in trade fairs (4a) and innovation fairs, reflecting the significance of value delivery, representing 11 % of the activities. The trade and innovation fairs are monthly university activity creating possibility for connections and synergies between SMEs and the university, establishing connections with novel channels. All firms, except enterprise 4, took part in these events. Enterprise 4 faces challenges due to its location, highlighting the importance of geographic considerations in the effectiveness of these initiatives.

8. Limited activity in value capture

Three of the firms made initial attempts to search for financing for scaling up their activities. These were limited activities, as the cluster initiative could not give any substantial support to the firms when talking to banks or other financiers.

9. Varied participation across enterprises:

Analysis of individual enterprises reveals varying degrees of involvement. Enterprise 2 emerges as the most engaged, participating in 31% of the activities, showcasing a proactive approach to BMI. Conversely, Enterprises 1, 3, and 5 exhibit participation ranging from 14% to 19%, reflecting diverse perspectives and needs.

Enterprise 1 is actively participating in a range of activities aimed at improving the overall performance of the organization, mostly involved in the improvement of production equipment with a new sesame extruder, obtaining a food safety registration and finding a new distribution partner. When is considered the impact on the value dimension from this study, we can interpret that this SME receives support and work with value creation dimension of the business model, but not with the whole architecture of their business model and not with their value offer. In summary, this enterprise is engaged in seven out of the 36 activities outlined in this study, representing approximately 19% of involvement in cluster initiatives activities that support in SMEs at UTT.

Enterprise 2 is the most involved SME in the cluster initiatives and is actively developing various activities in an attempt to innovate its business model with the support of UTT-UMSS. Similar to enterprise 1 it is mostly involved in the improvement of production equipment, a new hammer mill, obtaining a food safety registration and finding a new supplier. However, enterprise has also taken part in acceleration programs showing a more intense interest in scaling up issues of the firm. So far the firm has not involved itself in modifying or changing its value proposition or more deeply engaged itself in market issues. Enterprise 2 demonstrates a 31% engagement in cluster initiatives, as evidenced by eleven out of 36 activities. The active participation of enterprise 2 is influenced by the formation of the managers/owners at UMSS university, this facilitates an easy connection with research centres and with cluster initiatives. Additionally, the vision of this enterprise is to scale up to grow progressively with the guidelines and support of the university in these cluster initiatives.

Enterprise 3 is, similar to enterprise 1 and 2, is mostly active in the improvement of production equipment, a new wheatgrass extruder. It has also engaged in developing new products with the same raw material as they currently use. Overall, they are less involved in support activities than enterprise 1 and 2, i.e., in five out of 36 activities, it comprises approximately 14% of the total activities conducted for this study.

Enterprise 4 is part of the green technology cluster. Similar to the other enterprises it is mostly involved in the improvement of production equipment, a new dutch pile, and taken part in acceleration programs showing a more intense interest in scaling up issues of the firm, as well as workshops on circularity. However, its location in another city than UMSS, limits its active participation in various activities, having participated in seven out of the 36 activities, constituting approximately 19% of the total.

Enterprise 5 is part of the green technology cluster. Similar to enterprise 2 it is mostly involved in the improvement of production equipment, a new mixer, and taken part in acceleration programs showing a more intense interest in scaling up issues of the firm, as well as workshops on circularity. Approximately 17% of the activities are being participated in, encompassing six out of the total 36 activities. Enterprise 4 is a young firm, recently founded in 2021, making it, in a relative sense, very active in the cluster initiative activities, due to its size and young age.

The enterprises 1, 3 and 5, with the most limited participation, varying from 14% to 19% of the activities, were due to two main reasons: prioritized activities in their own business and different visions regarding the support of cluster initiatives. The first highlights that scale up of these enterprises are a long-term objective and more short-term goals are prioritized due to limited availability of time and financial needs. The second refers that these enterprises and their managers have limited capabilities to take more advantage of the different services supported by cluster initiatives.

Regarding the enterprise 4 as it is located in other city and could only in a limited way participate in onsite activities like fairs, seminars, and some trainings.

In summary, the study provides valuable insights into the symbiotic relationship between cluster initiatives and BMI among SMEs in Bolivia. The emphasis on value creation, the pivotal role of key resources, and the diverse engagement of enterprises underscores the multifaceted nature of this collaborative endeavour. The findings contribute to a nuanced understanding of how academic support through cluster initiatives can foster innovation in SMEs' business models, with implications for both academic research and practice.

7.- Discussion and implications

The findings concerning how cluster initiatives support BMI in SMEs reveals that value creation, especially through the design of machine prototypes and food safety support, is a central focus for SMEs, constituting 61% of activities. Student internships play a pivotal role supporting the firms in the processes of designing machine prototypes and obtaining food safety support registration. Additionally, seminars and training activities significantly contribute to SMEs' capabilities and skills development. Value delivery emphasizes market studies, participation in fairs, and seeking financing opportunities, with varying degrees of engagement across enterprises. Value capture, addressing revenue structure, shows that enterprises differ in their approach to activities such as searching for financing opportunities. Overall, the findings highlight the diverse ways in which cluster initiatives impact SMEs' business models in Bolivia, with Enterprise 2, affiliated with the food cluster, demonstrating the highest engagement (31%) across various activities. Enterprise 4, affiliated with the Green Technology Cluster, exhibits a distinctive perspective due to its recent establishment in 2021.

Previous research has highlighted the need for small and medium-sized enterprises to enhance their capabilities by collaborating with other organizations (Haddad *et al.*, 2020; Heikkilä and Heikkilä, 2017; Swasty, 2015; Zortea-Johnston *et al.*, 2012). This collaboration is essential for defining and improving their current business models in order to maintain competitiveness in an environment marked by significant and frequent changes, often presenting numerous opportunities for BM adaptation and innovation (Abdelkafi *et al.*, 2013; Foss and Saebi, 2018; Lingens, 2023; Rayna and Striukova, 2016; Teece, 2010). For SMEs in the context of lower middle-income economies (Maclean *et al.*, 2023), the opportunity of establishing connections through cluster initiatives becomes attractive (Klofsten *et al.*, 2015; Sölvell *et al.*, 2003).

Previous research on cluster initiatives present mainly these initiatives as a significant opportunity for the transfer of technology (Klofsten *et al.*, 2015; Sölvell *et al.*, 2003) to the SMEs. In this study we confirm this focus on technology transfer in cluster initiatives also in lower-middle income countries. For many SMEs in lower-middle income countries technical equipment and competence are expensive and the technical competence to utilize the technical equipment is often lacking in the firm. Cluster initiatives can support SMEs to overcome these barriers. In this case, the intermediary organization UTT-UMSS, possesses a strong understanding of the technical knowledge that can be generated through collaborations with research centers and other organizations. Even in a cluster initiatives oriented towards BMI, technology development becomes a focal point for development. The BMI process becomes resource-driven (Osterwalder & Pigneur, 2010), i.e., the BMI process starts from changing or developing key resources and then continues towards changing the value proposition and customer relationships, segments, and/or channels. The preference of a resource-driven BMI process might be due to the participating firms feel their most urgent need is in developing their key resources, i.e., technology development. It might also be explained by the intermediary

organization, UTT-UMSS, relative lack of supporting activities in marketing, organizational and cultural change, and related issues as well as overall BMI-supporting activities.

Thus, the full potential of BMI has not been leveraged for the benefit of SMEs in this cluster initiative. It is essential to foster a broader understanding of these activities and establish more connections to support the innovation of business models of SMEs and affect the value creation as a business model dimension (Abdelkafi *et al.*, 2013; Foss and Saebi, 2018; Lingens, 2023; Sjödin *et al.*, 2020; Teece, 2010).

Implications from this research project, aiming to improve the cluster initiative, to utilize the full potential of BMI for its cluster firms include careful selection of SMEs participating in the cluster initiative, trust-building activities and additional support to innovation in value delivery and value capture components of the business model.

The selection of participating cluster firms need to be careful and pre-conditions such as motivation for support, geographical proximity, available time and resources, type of needed support activities as well as a collaborative orientation need to be assessed before starting support activities. Several of the SMEs in this cluster initiative had time and resource restrictions being immersed in various day-to-day activities and have different alignments and sizes in their composition.

Trust-building activities should be part of *key activities* within the business model elements, to involve the SMEs in collaborative projects. It becomes essential to engage more actively, in collaborative initiatives such as cluster support to develop new products and services. This involves seeking support from universities, beginning with small-scale research activities and subsequently consolidating various approaches to achieve the objectives of the university and SMEs.

Also, it is possible to identify the value delivery as one of the elements related to customer relationship, customer segments, and channels, as outlined by (Osterwalder and Pigneur, 2010). Unfortunately, when examining the first two components, it becomes apparent that in most of the cluster initiatives studied here, there is a lack of attention to these aspects. In the sample, no SMEs are participating in activities that can influence the elements of customer relationship and segments. Possibly in the future, it would be a good opportunity to consider activities that encompass these perspectives in order to support the innovation of SMEs' business models. In terms of the channel's element, it emerges as one addressed activity promoted by cluster initiatives. While resource-driven BMI-processes might be a viable BMI process, the cluster initiatives have to provide also more market- or customer-driven BMI-processes.

The absence of support for working with cost and revenue structures in the cluster initiatives necessitates exploring connections with diverse research domains, like business administration. Collaborating with economic research centers can develop methodologies to influence and innovate SMEs business models, enhancing the value capture dimension (Euchner and Ganguly, 2014; Sjödin *et al.*, 2020).

The UTT-UMSS cluster initiatives significantly contribute to strengthening key resources in SMEs, identifying the support as resource-driven BMI (Osterwalder & Pigneur, 2010). However, its impact is limited when applied to other dimensions and elements of BMI.

8.- Conclusions

This study examines two research questions pertaining to the support of Cluster Initiatives to facilitate Business Model Innovation for SMEs in Bolivia, while also exploring the associated implications.

When considering how Cluster Initiatives could impact the Business Model Innovation of SMEs in Bolivia, it is worth noting that the support, significantly contributes to enhancing their

capabilities in value creation. These factors are important as they have the potential to improve interaction dynamics and, consequently, deliver better outcomes.

This study has delineated the concepts and interpretations of activities supported by cluster initiatives that contribute to the BMI of SMEs in Bolivia. Additionally, it scrutinizes the impact and implications of various variables in this context, considering their significance in the patterns presented as results. The findings consolidate the ideas and representations derived from the examination of a country categorized as a lower middle-income economy.

The investigation distinguishes itself as a unique exploration of BMI among SMEs in cluster initiatives within lower middle-income economies. It elucidates the indispensable role played by universities in supporting the innovation of SMEs' business models, advocating for diverse approaches that require comprehensive coverage to exert a more significant influence on the topic.

Identifying variables connected to BMI in this context that may serve as a foundation for subsequent, more comprehensive research endeavours involving a larger sample size and incorporating additional variables. Furthermore, it would be highly productive to explore other insights and engage in transdisciplinary studies focused on SMEs to encourage and support innovative business models in diverse regions and contexts. Such actions may strengthen the findings of this study and develop a broader understanding.

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Paper III

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Article

Business Model Innovation Factors of Small and Medium-Sized Enterprises in Bolivia

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Abstract: This paper aims to explore how four Bolivian small and medium-sized enterprises' business has overcome the gaps in reliance on traditional small and medium-sized enterprises' business models, i.e., to extract and sell raw unrefined natural resources in a local area, and instead make productive use of innovation inputs (technology, higher-educated people) by innovating their business models. We were particularly interested in how the small and medium-sized enterprises could manage to develop their business models in relation to the socio-cultural, economic, and technological contexts in a lower middle-income country such as Bolivia. We employ an exploratory multiple case study. The study's results show that the four selected small and medium-sized enterprises' business model innovation processes followed two different business model innovation patterns, a technology-driven pattern and market-driven pattern shaped by the macro-level factors of availability of natural resources, the informally organized economy, regulations, and access to higher education resources. The paper ends with presenting the managerial, policy, and theoretical implications of the study.

Keywords: business model; business model innovation; lower middle-income economies; small and medium-sized enterprise; macro level factors

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1. Introduction

No business model is an island. Business model research highlights that a company's business model is connected to and depends on an eco-system of partners, suppliers, customers, and other stakeholders (e.g., Zott et al. 2011). Less research attention has been given to business models' connection and dependence on the macro environment of a country (Foss and Saebi 2017; Wirtz and Daiser 2017). While the importance of technology development for business model innovation is often recognized in research (e.g., Chesbrough 2010; Zott et al. 2011) and factors such as regulations, globalization, and market shifts (Foss and Saebi 2017; Wirtz and Daiser 2017), the institutional environment of a country and how it tends to shape a company's business model is more seldom researched. Business model research is often done in resource-rich countries with economically and politically stable structures, indicating a need for research in resource-limited and more informally organized countries and how it shapes the companies' business models as well as their attempts to innovate their business models.

Small and medium-sized enterprises (SMEs) play a major economic role, representing approximately 90% of organizations worldwide and some 70% of jobs globally (OECD 2017). SMEs have the potential to become an essential wellspring of economic development; however, this potential is not always recognized by their host communities and countries (Imran et al. 2019). In Bolivia, the significance of SMEs for socioeconomic development is particularly notable, serving as they do as vital vehicles for both survival

strategies and avenues for growth, especially for low-income families (Dana 2011). In Bolivia, SMEs constitute 80% of economic activity among enterprises, generate 85% of the workforce, and contribute approximately 35% to the GDP (Encinas and Arteaga 2007). Thus, the need for Bolivian SMEs to increase their value creation, value offers, and value capture is vital for growing the whole economy. This is, however easier, said than done. Current BMI research holds that this requires both SME internal motivation and competence (e.g., entrepreneurial spirit, knowledge) and external opportunities such as new technologies and to look beyond value creation, combining it with product innovation and insights into customers' value processes (Visnjic et al. 2014; Müller et al. 2018; Attanasio et al. 2022).

Bolivia's reliance on the export of non-renewable natural resources has historically shaped its economic structure, leaving small and medium-sized enterprises (SMEs) with the task of finding their footing in a predominantly resource-driven market (GEM 2014; Schwab 2019). Business model innovation in Bolivian SMEs has further been influenced by the country's efforts to transition from reliance on natural resource exports to a more diversified economy (Acevedo 2018; Bolivian Long Term Plan for 2025 n.d.). This shift requires SMEs to adopt new business models that are resilient to commodity price volatility and aligned with sustainability trends. Moreover, the integration of SMEs into global value chains presents both opportunities and challenges, necessitating business model innovations that can leverage technologies to enhance competitiveness.

The macro environment, characterized by economic, political, and social factors, plays a significant, but understudied, role in shaping the business models and innovation pathways of SMEs (Foss and Saebi 2017). While there are structural challenges, such as regulations and environmental uncertainty (Foss and Saebi 2017), there are also opportunities for SMEs to leverage technological transformation and supportive government policies to innovate and thrive in both local and global markets (Foss and Saebi 2017). The need for technological and innovation capabilities is underscored by Bolivia's vulnerability to external shocks, such as commodity price volatility and climate-related damages (Bambe et al. 2024), which necessitate resilient and adaptable business models. Bolivia's performance in innovation inputs, such as increased higher education of human capital, has been relatively strong in recent years (Muyor-Rodríguez et al. 2021), but this has not translated effectively into innovation or entrepreneurial outputs (GEM 2014; Schwab 2019), indicating a gap in the innovation ecosystem. These gaps suggest that while there may be a foundation for innovation, most Bolivian SMEs struggle to convert these inputs into tangible business model changes that can drive growth and competitiveness.

This paper aims to explore how four Bolivian SMEs have overcome the gaps in reliance on traditional SME business models, e.g., extracting and selling raw unrefined natural resources in a local area, and instead make productive use of innovation inputs (technology, higher-educated people) by innovating their business models. To address the research aim, we will use an explorative and qualitative methodological approach researching four selected cases of Bolivian SMEs that have innovated their business models in the direction of less reliance on commodity price volatility, use of technology and market development, and more sustainable solutions.

The four exploratory case studies give micro-level examples of how lower middle-income countries, like Bolivia, traditionally dependent on exports of natural resources, may upgrade the economy relying on SMEs' ability to innovate their business model by combining unique resources, new technologies, and market adaptation in a sustainable way, drawing on university competence and networks. Our study concludes by identifying the functions of the SMEs' business model innovation in upgrading the Bolivian economy, being less dependent on price fluctuations on natural resources and adding value to their products. The SMEs' business models connect Bolivia's informal, small community businesses, extracting and selling unrefined natural resources with innovative capabilities in engineering, product development, market focus, customer development, and expanding distribution networks. In this way, the SMEs add value to their product offerings. Key to the SMEs' capability for business model innovation is their ability to draw on higher edu-

cation, both in terms of higher-educated labor and the university's competence, resources, and networks.

This work is structured as follows. Section 2 presents the empirical background of the study, focusing on the specific aspects of the economy and social situation and SMEs in Bolivia. Section 3 contains a review of relevant literature covering the fundamental frameworks of business models and BMI. Section 4 outlines the chosen methodological approach, case selection, and data collection and analysis procedures. Section 5 describes the four case studies. Section 6 is dedicated to the presentation and explanation of the results and findings. Section 7 discusses the findings, and the final section makes conclusions regarding policy, research contributions, and future studies.

2. Empirical Background for the Study: Small and Medium-Sized Enterprises in Bolivia

Bolivia is classified as a lower middle-income economy according to the World Bank (2023). The economy predominantly relies on the exploitation of natural resources, which has resulted in stagnation and a notable level of unemployment (Rhijanet Cristina and Rivera Chacon 2023). Due to the absence of strong market institutions, Bolivia has developed a large informal economy, characterized by clandestine activities such as street vending and others (Dana 2011). When the absence of these institutions is common, it is normal to observe a high proportion of clandestine activities. This contributes to the informal economy persisting with various popular and parallel situations, as individuals avoid bureaucratic paperwork and tax payments (Dana 2011). With limited formal employment opportunities available, informal self-employment stands as a primary source of income for the disadvantaged population, who discern opportunities in small retail and distribution (Garcia-Agreda et al. 2022). Family-based urban subsistence entrepreneurs engage in various daily small-scale activities within competitive local markets, including but not limited to food and beverages, textiles and leather, woodwork and metalwork, handicrafts, basic electronics and information technologies, repair services of various kinds, small-scale transport, and construction (Barja Daza 2020).

In Bolivia, both in rural and urban markets, business activities primarily revolve around exploiting marginal market gaps that are not profitable for larger firms (Ferraro et al. 2011). Additionally, these activities capitalize on profit opportunities through informal means, leading to business models that generally lack financial sustainability in the medium to long term (Barja Daza 2020). Dana (2011) describes the traditional Bolivian entrepreneur as navigating uncertainties and contending with unknown returns in an environment where prices and quantities remain uncertain. Furthermore, there are increasing acknowledgments that SMEs' functions and obligations extend beyond their owners to encompass all stakeholders, encompassing the host community and broader society (Imran et al. 2019).

In Bolivia, most SMEs operate informally, which poses numerous challenges when trying to promote their inclusion in economic growth (Garcia-Agreda et al. 2022). There are social barriers inhibiting the transition from the informal to the formal economy (Dana 2011). Transitioning from informality to formality and striving for increased productivity can be particularly challenging. In this specific context, the high level of informality is due to various factors and activities, including differences in regulatory issues, weak public institutions, and a lack of understanding regarding the benefits of formalization (Ferraro et al. 2011).

One such area of informal economic activity concerns waste picking, common in both Bolivia (Ferronato et al. 2020, 2021) and other lower middle-income countries (Scheinberg et al. 2011). Waste pickers collect solid waste such as plastics, cardboard, and paper, which can be recycled. Surveys have shown that 79% of the households in La Paz, Bolivia use this informal waste collection system, delivering their waste to informal recycling shops or individual waste pickers (Ferronato et al. 2021). The informal waste collection system in Bolivia reduces environmental impacts, adding to local economies (Ferronato et al. 2020). While this informal waste collection system implements a traditional business model for

waste collection by collecting and sorting of solid waste and selling it to local households and small informal firms, the waste pickers have very limited capabilities to innovate and add further value to the collected waste (Ferronato et al. 2020).

Another area of informal economic activity in Bolivia are smallholder farmers and communities living in rural areas where they can grow and harvest unique Andean grains such as quinoa. Typical for natural resources and commodity price volatility, quinoa, becoming a fashionable health food item in the developed world around 2010, demand and prices for quinoa sharply rose during 2010–2014 (Bonifacio et al. 2023). The Bolivian farmers in the southern and central Altiplano responded by expanding production, opening new land areas for quinoa production. At the same time, quinoa production in neighboring countries, e.g., Peru and Chile, also increased, causing increased competition in the world markets and resulting in falling prices (McDonell 2018). Moreover, the new land that had been taken for production during the quinoa boom was abandoned when prices fell, causing soil erosion by wind (Bonifacio et al. 2023). With intercropping of crops such as lupins and co-location of breeding of llamas, these soil erosion problems could be solved (Bonifacio et al. 2023). In addition, diversification of crops growing other unique Andean grains with high nutritional content, such as cañahua and amaranto, could provide more stable income to the farmers and communities (Padulosi et al. 2014). However, the Andean farmers and communities still have very limited innovative capabilities related to these natural resources (Padulosi et al. 2014), unable to innovate their traditional business models of extracting the crops and selling them unrefined.

The country's efforts to transition from reliance on natural resource exports to a more diversified economy is supported by the long-term plan for economic development titled Patriotic Agenda Bolivia 2025. Universities play an important role in increasing activities aimed at fostering economic and social advancement for SMEs (Acevedo 2018). For instance, a division within the Universidad Mayor de San Simón, a Bolivian public university, has facilitated technology transfer by bridging research centers with SMEs within the local context. Subsequently, cluster initiatives started to be organized in 2007, facilitating collaborative partnerships among SMEs and fostering productivity (Acevedo 2018). This innovative framework has proven successful, particularly evidenced by the establishment of thriving SME clusters such as the Food Cluster Cochabamba, comprising 100 firms, and the Green Technology Cluster, comprising 20 firms.

3. Theoretical Background: Business Models and Business Model Innovation and the Macro Environment

Business model innovation represents a new subject of innovation, which complements the traditional subjects of process, product, and organizational innovation and involves new forms of cooperation and collaboration (Teece 2010; Wirtz et al. 2016; Zott et al. 2011). It is important to note that every enterprise has a business model, whether explicit or not, that is crucial to the success of the organization, whether it is a new venture or an established enterprise (Magretta 2002; Osterwalder and Pigneur 2010).

A business model denotes a structured arrangement of activities that is devised and executed with the overarching goal of delivering a particular value proposition to the customer (Wirtz et al. 2016; Zott et al. 2011). Business models are systems of interconnected elements that firms organize to create, deliver, and capture value (Angelshaug et al. 2023; Foss and Saebi 2017, 2018). Osterwalder and Pigneur (2010) identify the business model as a division of nine building blocks: value proposition, key partners, key activities, key resources, customer relationships, customer segments, channels, cost structure, and revenue structure. Osterwalder and Pigneur (2010) identify BMI as a change in one or more of the building blocks of the business model that are new to the organization. In that regard, numerous organizations are actively seeking novel approaches to conducting their business, particularly in contexts where firms face resource constraints like SMEs located in countries with lower or middle incomes (Sánchez and Ricart 2010).

The academic literature provides empirical evidence supporting BMI as an effective approach for SMEs to adapt their business models, fostering innovation and collaboration in response to the dynamic nature of their environment (Haddad et al. 2020; Heikkilä and Heikkilä 2017; Swasty 2015; Zortea-Johnston et al. 2012). At its root, BMI refers to the search for new logic of the firm and new ways to create and capture value for its stakeholders: it focuses primarily on finding new ways to generate revenues and define value propositions for customers, suppliers, and partners (Casadesus-Masanell and Zhu 2013).

Recent research indicates that while BMI holds promise for establishing competitive advantages and improving firm performance, many SMEs face significant challenges in realizing expected benefits during the innovation process (Latifi et al. 2021). Effective BMI requires SMEs to go beyond their organizational boundaries by integrating both internal resources and external networks (Guo et al. 2017). The development of business models in SMEs is often an informal and unstructured attempt, often shaped by the entrepreneurial experiences and intuitive insights of the owners or leaders (Heikkilä and Heikkilä 2017; Latifi et al. 2021). Limited motivation and insights into the opportunities of BMI in an SME leads to no BMI activity or at best, if externally pressured, to focus on a few value creation innovations (Müller et al. 2018). Key to more successful BMI for an SME is to understand and envision the opportunities by combining value creation innovation with value offer and value capture innovations (Müller et al. 2018). This means that the SME and its managers need to develop innovative capabilities beyond product innovation (Visnjic et al. 2014), i.e., understanding the whole value flow (Attanasio et al. 2022).

Foss and Saebi (2017) hypothesize that the macro environment moderates BMI for enterprises through constraining or enabling factors in society. One such important factor is regulations, which encompass the diverse rules imposed by governmental bodies or authorities. These regulations can affect business model innovations, amongst others, like product safety, labor practices, environmental standards etc. A second factor is informal social institutions including norms, values, and traditions shaping behavior within a given society. Trust, reciprocity, and cultural traditions may be some of the examples. Lastly, environmental uncertainty may be a significant factor characterized by the complexity and unpredictability of factors such as technological change, market volatility, geopolitical instability, natural disasters, and others.

Apart from legal and social factors (Foss and Saebi 2017), the economic and technological resources available to SMEs in a country may be constraining as well as enabling factors for BMI. Comparative and relative advantages in a country compared to other countries represent opportunities for SMEs to exploit (Porter 1990) and innovate their business models. Such economic and technological factors may include access to natural resources, an educated workforce, and government and corporate R&D-activities. For SMEs in general, the scarcity of economic resources and technical capabilities is a common challenge, often demanding external assistance (Latifi et al. 2021). This may involve forming partnerships with other organizations and engaging in research projects and collaborative knowledge sharing (Ibarra et al. 2020). In these settings, and particularly in settings with limited economic and technological resources, business model innovation may claim novel collaborative strategies to effectively leverage the capabilities associated with the parties, looking for connectivity, exploring new value propositions, and developing enhanced governance capabilities (Bashir et al. 2020; Ramdani et al. 2019).

Scarcity of economic and technological resources may, in some instances, represent an opportunity for innovations if the constraints can be overcome. Porter (1990) identified comparative disadvantages, such as lack of certain resources, that if overcome, could turn into competitive advantages. Studies of this phenomenon in developing and lower-income countries have coined the concept of frugal innovation (Hossain 2018, p. 927), defining it as "frugal innovation as a resource scarce solution (i.e., product, service, process, or business model) that is designed and implemented despite financial, technological, material or other resource constraints, whereby the final outcome is significantly cheaper than competitive offerings (if available) and is good enough to meet the basic needs of customers who

would otherwise remain un(der)served." However, frugal innovation research seems to focus mainly on low-cost product innovations and less on business model innovation in resource-constrained economies.

In summary, based on prior research, we should expect to see SMEs innovate their business models in a macro environment with limited economic and technological resources, in a direction that would focus on enabling factors such as access to relatively cheap and unique natural resources, while making use of collaborative strategies and other possible positive factors such as legal and social factors.

4. Methodological Approach

For this study, a qualitative methodological approach of four exploratory case studies focusing on SMEs in Bolivia is used. Informed consent was obtained in written form during the initial meeting with the owner or representative of each SME. During this meeting, the research scope was presented and explained. The interviews for the case studies were conducted from April to August 2023, with duration ranging from a minimum of 90 min to a maximum of 150 min approximately.

Exploratory case studies encompass significant elements that draw upon a review of relevant literature, reports, and other studies pertinent to the topic (Yin 2018). A comprehensive understanding of the nature and complexity of the issue at hand is necessary (Yin 2018). Utilizing the exploratory multiple case method is advantageous for preliminary and exploratory investigations, especially when the variables are not yet defined and the phenomenon remains inadequately understood (Ebneyamini and Moghadam 2018). The choice of exploratory multiple case studies was made because there has been limited research conducted in these specific settings.

This methodological approach provides us with the opportunity to comprehensively investigate the innovative advancements within the SMEs' business models, as well as their subsequent transformation into instances of business model innovation in direct response to the evolving Bolivian landscape. Additionally, it can assist in the development and identification of how the macro environmental context could influence the innovation of business models in Bolivia.

For data collection in this study, we primarily focus on four central dimensions to describe the architecture of the business models of the SMEs participating. This approach follows the categorization proposed by Frankenberger et al. (2013) and takes into account the dimensions of "who," "what," "how," and "why." This will provide us with a comprehensive understanding of the BMI processes of the SMEs under examination. These dimensions were then related to the SMEs' changes in their value offers (what), value creation (who and how), and value capture (why). Building on the description of the characteristics of the Bolivian macro environment (see Section 2 above) and the PESTEL framework (Aguilar 1967), we related the case descriptions of the SMEs' BMI to the macro-level factors that had been instrumental in shaping the SMEs' business models.

Case Selection and Data Collection

The selection process for conducting the four case studies of small and medium-sized enterprises in Bolivia was established as follows.

a. To have received departmental or national awards that serve as a demonstration of being an innovative enterprise.
b. Qualify as a small or medium-sized enterprise and have demonstrated the ability to innovate their business model.
c. Confirming the availability of historical data related to the activities conducted by the SMEs within the context of cluster initiatives.

Based on these criteria, we identified four small and medium-sized enterprises in Bolivia for case studies. Two of them belong to the Food Cluster Cochabamba, while the other two are enterprises of the Green Technology Cluster. Like most Bolivian SMEs, they extract natural resources and sell them, but unlike most Bolivian SMEs, they refine their

products in different ways to increase their value. Table 1 briefly describes the four SMEs and their business activities.

Table 1. SMEs participating in the study.

Name	Description	Cluster Membership
Enterprise A	This enterprise comprises five business units: one collects plastic waste, the second recycles and produces tubes/bags. The third one grows organic food using recycled plastic tubes. The fourth builds eco-domes with tubes. The fifth manufactures durable cells for roads from recycled plastic. Together, the five units makes up an eco-friendly, integrated production chain.	Green Technology Cluster
Enterprise B	Bolivian social enterprise transforms used tires into outdoor floor tiles. Specializing in circular solutions and rubber recycling, it promotes local waste revaluation for sustainable construction materials, emphasizing impact, urban innovation, and restoring public spaces.	Green Technology Cluster
Enterprise C	Founded with cañahua and amaranto producers, prioritizing transparency and equity in traditional ecological farming. The enterprise has evolved, focusing on Andean grains like cañahua for nutritious processed products, catering to diverse tastes, especially for urban consumers, children, pregnant women, athletes, and intellectuals. Products include energy bars and juice powders.	Food Cluster Cochabamba
Enterprise D	Chuquisaca-based agro-industrial enterprise succeeds in producing and marketing popular food items like ground chili, seasonings, soft drinks, and cereals, enjoying strong local, regional, and national market presence. Pioneering in its field, it boasts distribution networks in cities including Cochabamba, Santa Cruz, La Paz, Tarija, Oruro, and Potosí, and provincial areas.	Food Cluster Cochabamba

In addition to the criteria for case selection, these enterprises possess different types of certifications and employ innovative approaches to consistently enhance and improve the conditions in which they operate. For instance, some enterprises hold ISO certifications and similar, including NB/NM 324:2013 for Good Manufacturing Practices in Bolivia. Meanwhile, other enterprises have the "B Corp Certification" and other relevant certifications.

With the explicit consent of the interviewees, interviews were recorded to minimize data loss. Transcriptions were then transcribed verbatim to acquire interview content and served as a tool for initial analysis. Subsequently, we conducted a secondary review process involving attentive listening and enhancing the interviewees' statements and vocabulary. This refinement was necessary since the interviews were conducted in Spanish.

We analyzed the data in search of various phrases, descriptions, or words related to the concept of innovation in the business models of the enterprises participating in the study. Whenever we encountered such instances, we made note of them and applied different codes accordingly. Through this process, we identified differing patterns of BMI between the SMEs in the food cluster and green technology cluster. Our objective was to understand how the Bolivian environment could impact the innovation of SMEs' business models and contribute to the transition of the Bolivian economy.

For this study, when encountering uncertainties, we addressed them following the guidelines proposed by Leuffen et al. (2012). We placed emphasis on using reliable sources, particularly interview data and the collective experiential insights of domain experts (SME owners). Researchers undertook an independent data review process to foster discussions aimed at developing a comprehensive understanding, thereby enhancing the quality of both theoretical constructs and empirical findings.

5. The Four Case Studies of BMI in Bolivian SMEs

5.1. Enterprise A

Enterprise A comprises five distinct units aimed at addressing the issue of plastic waste through collection and recycling. The company uses plastic waste as raw material and transforms it into recycled plastic products. The company is committed to fostering both social and environmental benefits while operating within the framework of a circular economy.

In its nascent stages, the enterprise initially concentrated solely on the manufacturing of pipes using virgin raw materials procured from external sources, subsequently converting them into finished products. However, it later identified a significant competitive advantage in incorporating various recycled materials into its operations. Driven by a recognition of the substantial waste issue within the city, characterized by informal waste collection practices, the enterprise addressed this challenge by integrating selected plastic waste materials into its production process, thereby reducing reliance on virgin resources and concurrently mitigating costs. This initiative not only presented a competitive advantage but also aligned with a social imperative to support local associations, such as small waste picking firms and communities. Recognizing the potential synergy with informal waste pickers, the enterprise formalized partnerships with various social groups engaged in informal waste collection. Subsequently, as the enterprise expanded its operations and required additional raw materials, it engaged in negotiations with both public and private entities. These negotiations encompassed collaboration with the municipal waste management system to procure raw materials, as well as partnerships with private enterprises such as the Cochabamba subsidiary of Coca-Cola, leveraging disused plastic materials for integration into its manufacturing processes.

The company's core operation centers on recycling food-grade plastics, facilitating their utilization for human consumption, and subsequently manufacturing a diverse array of products. This initiative significantly impacts many families and local communities engaged in waste picking and recycling, providing them with dynamic income opportunities. Furthermore, the company incentivizes waste pickers to enhance their efficiency, thereby reducing the dependence on virgin raw materials.

Following the initial recycling phase, the enterprise utilizes the recycled material to fabricate pipes, bags, and various other plastic products, prioritizing eco-friendly materials such as PET and polyethylene (first business unit). Subsequently, these items are employed in organic food production, optimizing resource utilization such as water through methods like drip irrigation and hydroponics (second business unit). Additionally, these types of plastic products are also developed to produce livestock feed (third business unit). Recycled plastic materials that are not fit for contact with food or drink have been finding applications in structural building, particularly in the assembly of eco-domes (fourth business unit). Another business unit specializes in fabricating durable cells from recycled plastic for constructing long-lasting roads (fifth business unit).

The development of the company shows a transition from a linear economic model to a circular one, underscored by principles of reuse, recovery, and recycling aimed at extending the life cycle of plastic materials. Innovation plays a pivotal role in the company's activities, product innovation as shown by the five business units, as well as process innovations exemplified through the development of adapted and custom-built machinery in their production workshop. Furthermore, the conversion of plastic waste into food-safe, environmentally friendly material underscores its commitment to sustainability.

The founder and owner is highly aware of the company's business model and has, through his structuring of the company into five business units, created five different business models, one for each type of product, such as water pipes for public utilities and other industrial businesses, and eco-domes for tourist companies. The structure of five business units also gives tax advantages compared to a unified structure. Enterprise A sells its products not only locally in the Cochabamba area but also nationally. International exports are low, as trade tariffs between countries in Latin America are generally high.

However, the owner has set up an independent company with the same business model in the Dominican Republic to supply the Dominican market with similar products.

The enterprise actively pursues connections with various entities, including different universities, with the aim of fostering collaborations for research activities and attracting talented young professionals and engineers who bring fresh perspectives and innovative ideas to realization. The collaboration with the Unit of Technology Transfer at UMSS assumes particular significance within the framework of the Green Technology Cluster initiative, facilitating the development of diverse solutions in conjunction with research centers. For some of the process innovations, e.g., the custom-built machinery, the company has been given technical support by the university.

5.2. Enterprise B

The company specializes in the manufacture and marketing of sustainable construction materials aimed at creating sustainable cities, with a particular emphasis on the re-use of rubber materials. Its business model focuses on the reutilization of rubber from discarded tires in the fabrication of various indoor and outdoor rubber floors. In addition to providing safety to its users and clients, the company's value proposition centers on mitigating environmental impact by addressing the issue of improper disposal of rubber waste.

The company's origin traces back to its participation in the Innova Bolivia competition with a nascent idea, leading to the development of a prototype rubber piece. Initially lacking machinery, materials, or necessary labor for rubber floor production, the company relied solely on knowledge and enthusiasm. At that moment, they successfully presented the first commercial sample, secured victory in the competition, and utilized the ensuing funding to establish an industrial-scale facility for shock-absorbing floor production.

Operating within the framework of the circular economy, the company's production process involves sourcing its primary raw materials from various local suppliers, including rubber artisans, rubber companies, rubber cultivators, and informal waste pickers of discarded rubber. Following a technological refinement process, the raw material is marketed under the premise of receiving the product at its end-of-life stage for reuse as raw material. With support from a European supplier, the company has enhanced its product offerings and penetrated the national market with uniquely tailored flooring solutions. This success has engendered trust among prominent industrial entities. One notable project undertaken aims to enhance playgrounds, with a focus on ensuring safety for society, particularly children. The company's inaugural safe children's park in Cochabamba stands as a testament to this attempt.

Currently, the company's primary objective is to expand its market reach through floor exports, leveraging existing contacts and actively pursuing opportunities to introduce its sports and industrial flooring solutions to diverse international markets. Reflecting on the company's evolution, the owner attests, "In 6 years, we transitioned from tile manufacturing to the construction of sustainable cities."

The company's strategy revolves around promoting sustainable cities through a distinctive product-centric approach. Supported by a dedicated research and development laboratory, the company innovates products with a view toward nationwide market coverage and efficient distribution facilitated by network partnerships. Moreover, the enterprise is participating in different networks and connections. One important relationship is with the Green Technology Cluster of UMSS, with the idea to develop different research projects and activities, also in the development of new knowledge and technologies, as well as sourcing new young talent such as engineers. In competitive markets, the company prioritizes sustainability and product distinctiveness.

5.3. Enterprise C

This enterprise was established in 1996 in collaboration with producers of cañahua and amaranth under the guiding principles of transparency, equity, and support for traditional organic cultivation practices. Since its inception, it has undergone various stages of

growth. The impetus to work with Andean grains, particularly cañahua, stemmed from the social observation of Andean inhabitants migrating to urban areas in pursuit of better opportunities. Recognizing the natural food resources abundant in the Andean region as potential sustainable solutions, the company aimed to improve economic conditions, particularly in regions where cañahua, quinoa, and amaranth are cultivated.

Cañahua emerged as the primary raw material for producing new, nutritionally rich products tailored to urban consumers' tastes and preferences, especially targeting children, pregnant women, athletes, and individuals engaged in intellectual pursuits. The company's objective is to provide accessible alternatives to people facing nutritional deficiencies. To achieve this, numerous formulation tests were conducted to design and ascertain the nutritional value of the products.

The company is deeply committed to the natural food resources of Bolivia, with a long-term vision of utilizing raw materials from both tropical regions and the Andes. Its motto, "We bring the best of the Andes and the Tropics to your hands in the form of healthy snacks; We do it with a team of people eager to promote well-being and harmony with Mother Earth," reflects this commitment.

Future prospects entail exporting cañahua products, leveraging its current organic certification and Good Manufacturing Practices certification granted by IBNORCA, as well as other types of certifications, vital for getting national retail distribution. In the certification processes they have received support from research centers at UMSS in Cochabamba through the activities and networks by belonging to Food Cluster Cochabamba. Over its operational history, the company has received several awards, including the prestigious Golden Seal—National Award for Excellence for Living Well 2014, recognizing its contribution to generating employment, offering quality products, utilizing technology, and environmental stewardship.

The company's research and development team, in collaboration with experts from collaborations with the university and other companies, focuses mainly on product development. Notably, it has developed various types of cookies, including gluten-free cookies enriched with Andean grains, expected to have a positive impact due to their organoleptic and nutritional qualities. Based in Quillacollo for more than two decades, the company engages in not only raw material collection but also industrial processing, marketing, and promotion within the natural foods segment. Its product line focuses on Andean grains such as cañahua, amaranth, and quinoa, sourced from both Andean and tropical regions, complemented by sesame, chia, flaxseed, and other semi-tropical varieties.

The company underscores the importance of incorporating natural foods into family diets, particularly for children, and has actively participated in local and national exhibitions to display the nutritional properties of cañahua and amaranth through a range of natural products.

The founder and owner of enterprise C has a university education in food and biochemistry, enabling her to understand and develop the chemistry of food ingredients and how they interact in the production process and finished products, as well as safety and nutritional issues. Enterprise C has been given support by the university, particularly when it comes to certification processes for safety and nutritional content, as the university has provided support from certified labs. The certifications are vital to get national retail distribution and for exports.

5.4. Enterprise D

Enterprise D is a family business established in 1963 that initially relied on familial efforts and initiative to pioneer the grinding and packaging of ground chili in wooden envelopes due to the absence of plastic bags at the time. This marked the genesis of the enterprise, with the subsequent formulation and preparation of purple api and yellow api recipes, utilizing ingredients sourced directly for boiling. Purple and yellow api are thick, smoothy-like beverages made from fermented corn and various other Andean food

ingredients. These endeavors propelled the abovementioned product to the forefront, cementing its status as the company's flagship offering, a distinction it retains to this day.

Early engagements in the 1990s encompassed active participation in national fairs organized by governmental ministries and federations of small producers, facilitating robust business development and networking opportunities at a national scale. This relentless pursuit of excellence facilitated the introduction of a diverse array of innovative products, now exceeding 80 in number.

Firmly rooted in its locality, the enterprise elected to remain in Sucre. Presently, the brand enjoys ubiquitous presence in Bolivian households, a testament to its enduring appeal and market penetration. Subsequent periods saw the introduction of an array of innovative products, including corn soups, lawas, and chuño, utilizing locally available raw materials. Through iterative processes, these raw materials were transformed into a diverse array of products, including the iconic "coconut horchata," catering to market demands. Diversification further ensued with the introduction of instant preparations such as peanut chicha, quinoa, barley soda, amaranth, and oat horchata, reinvigorating traditional Bolivian cuisine.

In 2020, the completion of new processing facilities equipped with various production plants marked a significant milestone, enhancing the company's product offerings and solidifying the company's aspirations into tangible reality. Rigorous adherence to food safety standards is ensured through the acquisition of requisite food safety certifications, in which the enterprise receives the support of the Unit of Technology Transfer through the research centers and laboratories at UMSS, while operational spaces are outfitted with facilities conducive to business expansion.

Over time, concerted efforts were directed towards meeting stringent regulatory requirements, including those pertaining to prenatal and breastfeeding subsidies across seven of Bolivia's nine departments, underscoring the company's national outreach. Additionally, efforts were made to establish backward linkages by initiating local production of certain raw materials to enhance value chains. Collaborative agreements with producer associations were forged to procure high-quality raw materials from diverse geographical areas, ensuring compliance with market standards and demands.

6. Results

The findings and the analysis derived from the case studies have been bifurcated into two parts. The first part offers an analysis of the business models, identifying patterns of BMI of the SMEs. In the second part, we examine the impact of macro-level factors on these identified patterns.

6.1. BMI Patterns

The key finding in this study is two patterns of BMI among the four case studies. The first BMI pattern centers on enterprises employing a technology-driven pattern. The other BMI pattern focuses on a market development pattern. Both BMI patterns have been moderated by macro-level factors, i.e., availability of natural resources, the informally organized economy, regulations and access to higher-education resources.

The technology-driven BMI pattern

Enterprises A and B have innovated their business models following a technology-driven driven BMI pattern (cf. Osterwalder and Pigneur 2010), i.e., basing their new product offerings on the organization's existing technology and development resources. We identified two key patterns in the technology-driven BMI: (1) a circular approach, and (2) technology and product development.

(1) Circular approach

This BMI pattern builds on the availability of plastic and rubber waste collected by waste pickers and informal recycling shops in Bolivia (Ferronato et al. 2020, 2021). By further sorting of the plastic and rubber waste, for instance, sorting out plastic waste

approved for food and drink containment such as PET bottles, or other fractions of plastic or rubber waste, the two green technology SMEs (enterprises A and B) have been able to develop new product offerings. To complement the plastic and rubber waste from waste pickers, the enterprises have made deals with companies, for instance, Coca-Cola Bolivia, to deliver disused plastic waste to them.

(2) Technology and product development

The second factor concerns an emphasis on technology to develop new plastic and rubber (polymer) products and applications. Plastic and rubber waste come in many forms and fractions of polymers. Some of them may be used for contact with food and drink, such as PET bottles, and thus may be used to produce, e.g., water pipes. Other forms or fractions of polymers cannot be used for food and drink purposes, but instead are used as, e.g., construction materials in indoor or outdoor environments. To sort and mix polymer waste to create new products with certain properties and qualities requires use of technologies, labs and test spaces to experiment with new materials and products. Both enterprises A and B have invested in technologies, test areas and engineering competence to develop new products based on plastic and rubber waste. Adapting existing machinery to meet the evolving requirements of new products or processes has been key for the enterprises to limit the financial needs.

Market-driven BMI pattern

Enterprises C and D have innovated their business models following a market-driven pattern (cf. Osterwalder and Pigneur 2010), i.e., basing their new product offerings on understanding of specific customer needs like urban consumers, children, pregnant women, and athletes, in order to develop new product offerings, such as energy bars, cereals and seasonings. Moreover, these two SMEs have continuously facilitated the access to these products through an expanding distribution network as well as the convenience of buying and consuming these products. We identified two key patterns to implement customer driven BMI: (3) market focus and customer understanding, and (4) expanding customer access.

(3) Market focus and customer understanding

In the specific context of enterprises operating within the food sector, where resources are often limited, adopting a market-focused approach emerges as a critical strategy for innovation in the SMEs' business models. By identifying niche markets, these enterprises penetrate specific segments where they tailor their product offerings accordingly. This necessitates conducting diverse market research to comprehend various ideas, customer needs, trends, and competitor strategies, thereby guiding the development of solutions that address unmet needs or gaps in the market. The focus on urban markets with higher buying power than rural areas and large enough customer segments, such as pregnant women and athletes with unique needs, has been key in this market focus process.

Another crucial aspect is enhancing customer understanding, which may have been overlooked previously in the context. Detailed profiling of target customers is essential for gaining insights into their preferences, behaviors, and pain points. Embracing a customer-centric design approach places customers at the core of the innovation process, enabling the development of products focused on delivering customer value and requisite support.

(4) Expanding customer access

The two SMEs have expanded their national distribution network to cover the largest cities in Bolivia, mainly bigger retail stores and/or stores with a healthy food orientation. Having national distribution coverage is unusual among Bolivian SMEs. Moreover, their products come in variants that are easy to buy and consume such as energy bars, cookies, and ready-made seasonings and cereals.

To get access to retailers and other distributors' food product needs, according to regulations, nutritional ingredients need to be declared on the package. The tests have to be done by government-certified labs, which are often connected to or part of a university organization. In this case, the two SMEs have used the certified lab at UMSS to perform these tests and obtain the certificates. Their memberships in the Cochabamba Food Cluster have facilitated contacts with the lab, as well being offered a discount at UMSS laboratories.

6.2. Macro-Level Factors

The second part of the results relates to the impact of macro-level factors on the BMI patterns presented above. The access to natural resources has been an important and moderating factor in these four SMEs' original business models and subsequent business model innovation. Bolivia has abundant access to oil, gas, and rubber material, as well as good natural conditions for growing of crops like Andean grains and tropical fruits. Enterprise A started with using virgin plastic material, but soon found that the Bolivian informal waste picking system provided a cheaper and more environmentally friendly sourcing of plastic material. Enterprise B started from the beginning with reuse of rubber material provided in part by informal waste pickers. Both enterprises C and D started their operations buying Andean grains and tropical fruits from small informal firms and rural communities with an idea to provide these with economic support. Thus, connecting to the large informal economy, in these cases the informal waste pickers and the Andean rural communities and small family firms, stands out as another macro-level moderator.

These two macro-level factors, good access to natural resources and reliance on the informal part of the economy, do not differentiate these four SMEs' business models from most other Bolivian SMEs' business models. So how come these four SMEs have been able to refine their products and create higher values in their product offerings?

The cases point to two other moderating macro-level moderators, regulations and higher-education resources. While most Bolivian SMEs try to avoid regulations, these four SMEs have tried to enjoy the advantages of adhering to regulations. In three of the cases, enterprises A, C, and D, adhering to food safety regulations has been key to getting access to markets and distribution channels that are close to companies that do not have appropriate certifications for their products. For enterprises A and B, it has also been vital to adhere to regulations in general, as their customers, in part, are public entities and public organizations.

Most Bolivian SMEs follow a traditional business model selling unrefined natural resources. The four SMEs in this study have all put a lot of effort into product development as well as process development (production machinery and equipment). The cases point to the use of higher-education resources, i.e., knowledge from higher education, support from university resources and networks, and sourcing of new educated talent, as enablers of the product and process development activities.

In all four cases, the founder and owner of the SME has a tertiary degree and regularly recruits new talent, mostly engineers, from the universities. In all cases, they have received mostly technical support in various technical development issues. For enterprises C and D, the technical support in the form of certified lab tests has been vital to open up markets that require these certifications.

Derived from the BMI patterns and macro-level factors of SMEs in Bolivia, Figure 1 illustrates the interaction of these factors on the development of new business models for SMEs.

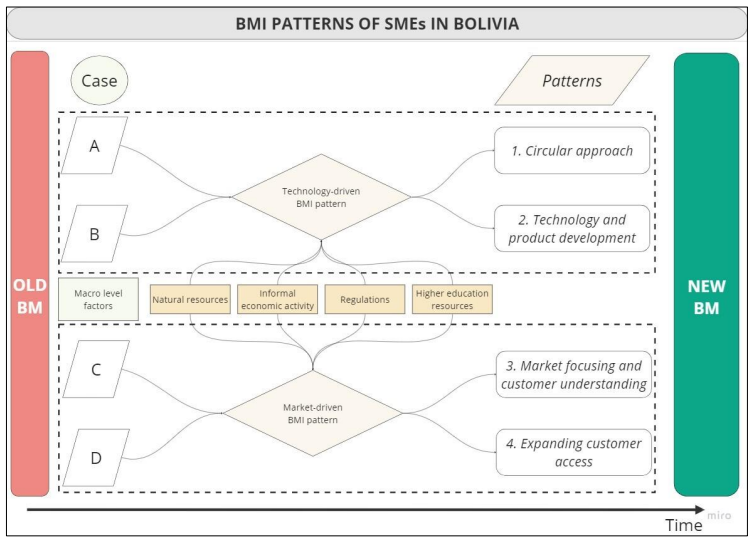

Figure 1. BMI patterns and macro-level factors of four SME-cases (A,B,C,D) in Bolivia.

7. Discussion: BMI in SMEs in a Bolivian Context

BMI underscores the importance of understanding and strategically managing the links between different components or modules within a business model and the interconnection to the broader macro environment (Foss and Saebi 2017, 2018). Chesbrough and Rosenbloom (2002) emphasize the interconnected nature of business models, stating that successful innovation involves considering the entire system rather than isolated elements. Resource-limited environments, such as in the Bolivian context, constitute a significant contingency factor for SMEs (Clauss et al. 2021).

Historical, socio-cultural, and economic contexts emerge as pivotal factors influencing the business environment (Dana 2011). SMEs and other organizations often operate independently, contributing to the collective without necessarily considering the effects on other organizations or stakeholder entities. Nonetheless, it is evident that even with partial interconnections between entrepreneurs, SMEs and other stakeholder organizations, tangible benefits can increase for other entrepreneurs and SMEs. This is illustrated in all four cases, as they source their raw materials (plastic/rubber waste and Andean grains) from communities and small firms, creating stable incomes for them as well as providing their customers (distributors, retailers and other SMEs) with valuable products, creating a value flow between the stakeholders involved in the SME's business model (Attanasio et al. 2022).

Traditionally Bolivian SMEs utilize the macro-level factors of natural resources and informal organizing trying to avoid or minimize following regulations. The four SMEs in this study see the advantages of following regulations and organize their business in a formal way. Formalization of the SME in resource-constrained economies has been shown to increase both investments and profits compared to informally organized SMEs (Rand and Torm 2012). Moreover, their access to and utilization of university resources enables them to develop their products and processes, enjoying the benefits of cluster initiatives (Klofsten et al. 2015).

The technology-driven BMI pattern illustrates how this is done in the Bolivian context. Enterprises A and B have taken advantage of the existing informal waste collection system in Bolivian cities (Ferronato et al. 2020, 2021) and included waste pickers and informal

recycling shops as key partners in their business model, supplying them with plastic and rubber waste. These waste pickers and informal recycling shops receive a stable income and may over time develop and expand their own waste collection business as enterprises A and B are growing and demand more waste for their production. The polymer technology utilized by both enterprises enables them to develop products for several industries as diverse as water and sewage, infrastructure, gardening, construction, and tourism, i.e., the enterprises enjoy economies of scope. Thus, the general purpose technology, in this case the polymer technology, drives the value creation, enabling the enterprises to develop and offer products to customers in diverse industries (Gambardella and McGahan 2010; Visnjic et al. 2014).

The process in the market-driven BMI pattern is different. Long-term purchasing contracts with small family firms and communities in rural areas for unique Andean grains and other natural food items provide these small firms and communities with stable incomes, providing them a better life and stable means to invest in their operations. In a market-driven pattern, it is vital to understand the customers' needs and the differences in needs between different market segments and develop products that align with these needs (Annarelli et al. 2020). By developing new products for different market segments, such as urban consumers, athletes, children, and pregnant mothers and so on, by varying the mix of ingredients, taste, size of package, distribution and other marketing variables, the two SMEs show a BMI pattern driven by skillful market segmentation and designing new products and marketing activities for these market segments.

Obviously for the two SMEs that follow a technology-driven BMI pattern, the access to engineers and various equipment and testing areas for development of new products based on plastic and rubber waste is key. To a large degree, through their owners and managers with higher education, they have managed to develop and access these resources themselves. However, the access to educated young engineers from the university and some assistance with technical problems from the university research centers has been important to maintain and develop their innovative capabilities.

For the enterprises in the food sector following a market-driven BMI pattern, the use of advanced technology in product development is not so important. However, to obtain distribution through national or regional retailers of food products, national regulations state that their products need to be tested for safety and nutritional contents by certified labs. Universities, such as UMSS in Cochabamba, can provide these services through their certified labs. To expand distribution beyond local and informal markets, a Bolivian SME in the food sector needs to get these lab tests done and their products found safe, as well as be able to declare nutritional values on the package. Instead, they have been following the logic of identifying market niches with specific demands such as urban consumers, athletes and pregnant women, and developing specific higher-value products for these market segments (Annarelli et al. 2020).

8. Managerial, Policy, and Theoretical Implications

Our findings show that SMEs can change their business models in different ways in the same macro environment. We have in this study shown two types of BMI responses from SMEs: the technology-driven BMI and market-driven BMI. Moreover, our findings show that SMEs are able to deviate from the common business model pattern in resource-constrained economies of extracting and selling raw materials.

These findings have important managerial and theoretical implications. From a managerial point of view, there are two implications. First, SMEs in a lower middle-income country context can change their business model in principally two ways, by adding value to their products through the use of technology or by use of marketing activities. The combination is of course preferable, but given SMEs' general lack of resources, amplified by the lower middle-income macro environment's resource constraints, the SME maybe better off focusing its efforts one of these patterns, at least initially (cf. Visnjic et al. 2014). Second, to change the business model requires not only investment in time and efforts but also to

add knowledge in order to create new values. The technology-driven BMI pattern requires mainly technological knowledge, such as engineers and learning through technology and product development activities. The market-driven BMI pattern requires added input of marketing knowledge, i.e., knowledge about distribution, logistics, branding, market segmentation, advertising pricing, etc. For both of these BMI patterns, this knowledge may, at least partially, be sourced from the university, e.g., educated persons, lab resources and technology development resources.

In terms of policy for economic and social development, in a lower middle-income country context with a large informal economy consisting of small informal firms and communities extracting and selling commodities, the case studies speak for a cluster view of the economy (Porter 1990) and more concretely the organizing of cluster initiatives (Klofsten et al. 2015) with the university as a leading actor. This cluster approach focuses on supporting SMEs with innovative capabilities that can act as intermediaries between the informal small firms and communities on the one side and the formal economy with its retailers, larger companies, and government on the other side in the value chain.

From a theoretical point of view, there are several important implications. From an ontological and epistemological point of view this study points to two types of studies how the factors in the macro environment shape SMEs' business models. One type of study views SMEs as "victims" of the country's macro-level factors, and thus the SMEs must "adapt" their business models to the macro environment. These type of studies follow the logic of contingency theory or alternatively institutional theory (Donaldson 2006). Another type of study views the SMEs as a more "strategic" actor, i.e., the SME and its managers are capable of actively responding to the macro environment and thus to "shape" their business models in different ways. That does not mean that all options are open to the SMEs. There are still restrictions and limits such as laws, cultures, financial and other resources, but the SMEs are able to respond to these in different ways in pursuit of superior performance. This type of study follows the logic of strategic management studies that firms strive for superior performance and competitive advantage (e.g., Porter 1990). Our study is obviously of the second type, viewing the SMEs as a strategic actor. Both types of studies are valuable to increase knowledge on the link and intricate mechanisms of macro-level factors and SMEs' (and other types of firms') BMI. A second theoretical implication is that this study shows the opportunity to undertake studies on frugal BMI, i.e., following the logic of studies of frugal innovation (Hossain 2018). However, these studies tend to focus mainly on low-cost product innovations and not on BMI. Frugal BMIs could be an inspiration and source of new business models for SMEs in more affluent economies. A well-known example is the business model for mobile banking pioneered in Kenya in 2007 by the leading mobile phone company M-PESA, the SMS-based money transfer system based on ordinary mobile phones without involvement of banks that quickly penetrated the Kenyan countryside (Jack and Suri 2011) and later inspired banks and other financial firms in affluent economies in the West to develop mobile banking services.

9. Conclusions

The aim of this paper was to explore how four Bolivian SMEs have overcome the gaps in reliance on commodity pricing and productive use of innovation inputs (technology, higher-educated people) by innovating their business models. We were particularly interested in how the SMEs managed to develop their business models in relation to the socio-cultural, economic and technological contexts, i.e., the macro-level context in a lower middle-income country such as Bolivia (Dana 2011).

We found that the four selected SMEs and their BMI processes followed two different patterns: a technology-driven BMI pattern and market-driven BMI pattern moderated by the macro-level factors of availability of natural resources, an informally organized economy, regulations, and access to higher-education resources. Both BMI patterns included the sourcing of natural resources from small family firms, rural communities, waste pickers, and informal recycling shops, i.e., the informal part of the Bolivian economy, as key partners

in their business models. The four SMEs developed product offerings to distinct market segments on a national level and sometimes an international level.

The technology-driven BMI patterns required support from the university in terms of higher-education players, specifically engineers, and support with some technical problem solving. The market-driven BMI pattern required support from the university in terms of certification of product safety and a declaration of content and marketing competence.

Regarding macro-level factors, similarly to most Bolivian SMEs' business models, the four SMEs in this study utilized the easy access to natural resources and sourcing from informally organized economic activities in waste picking and food production. In contrast to most Bolivian SMEs the four SMEs tried to adhere to regulations, specifically food safety regulations and public procurement, perceiving them as advantages and keys to opening up national and international markets. Utilization of university resources enabled the four SMEs to invest in and develop new products and processes.

This study is inspired by the call for research by Foss and Saebi (2017) and Wirtz and Daiser (2017) to better understand how macro-level factors shapes SMEs' BMI processes in a context of lower middle-income countries. In such countries, the economy is to a large part based on extracting and selling natural resources as commodities, often with large price fluctuations and an informally organized economy with small informal firms and communities with very limited innovative capabilities. In this study, we show how the four SMEs through their BMI have included the informal economy of waste and rubber picking and informal recycling shops, as well as small farmers and communities of natural food products, in their business models, adding value to these commodities through a technology- and market-driven BMI process, supported by the access to and use of university resources.

This exploratory study examines how different aspects of the Bolivian macro-level environment impact business model innovation in a multiple case study. The findings suggest significant links between the Bolivian macro-level environment and business model innovation, indicating that these links influence how SMEs innovate their business models. It also shows that given an understanding by the SME of how BMI drives development, growth and competitive advantage, the SME can deviate from the common BMI pattern in lower middle-income countries of extracting and selling raw materials. Even though our exploratory study has produced some interesting results, we have to acknowledge some limitations of our research. Our results are based on a selected number of Bolivian SMEs. Our results should be integrated with additional multiple case studies and/or larger-scale survey studies to confirm, modify, add to or refute our findings. This could be done by future studies in other lower middle-income countries and other industries. Future research should provide a more comprehensive understanding of the interplay and shaping effects between macro-level factors and business model innovation in SMEs to fully address the call by Foss and Saebi (2017) and Wirtz and Daiser (2017) to better understand how macro-level factors shape SMEs' BMI processes.

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