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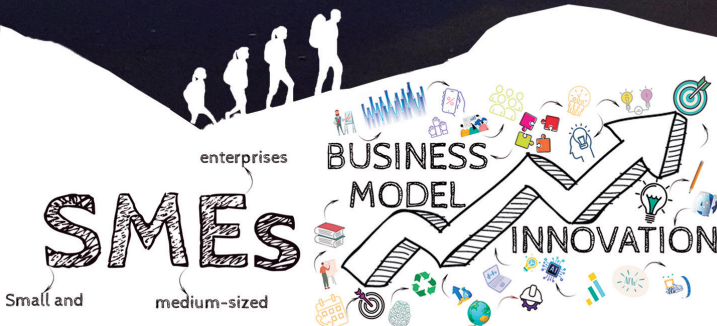
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Business model innovation in small and medium-sized enterprises within university-led cluster initiatives in Bolivia

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DEPARTMENT OF DESIGN SCIENCES | LTH | LUND UNIVERSITY



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within university-led cluster initiatives in Bolivia

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Franco Arandia Arzabe



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LICENTIATE THESIS

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<p>Abstract:</p> <p>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</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>	
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Franco Arandia Arzabe



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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.

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 recopilieron 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

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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)	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)
Contribution Roles Taxonomy (Credit)			
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			
<i>(In thousands of Bolivians)</i>			
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 Simón (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.

<i>BM value dimension</i>	<i>BM Elements</i>	<i>Descriptions</i>
<i>Value creation</i>	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
<i>Value delivery</i>	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
<i>Value capture</i>	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

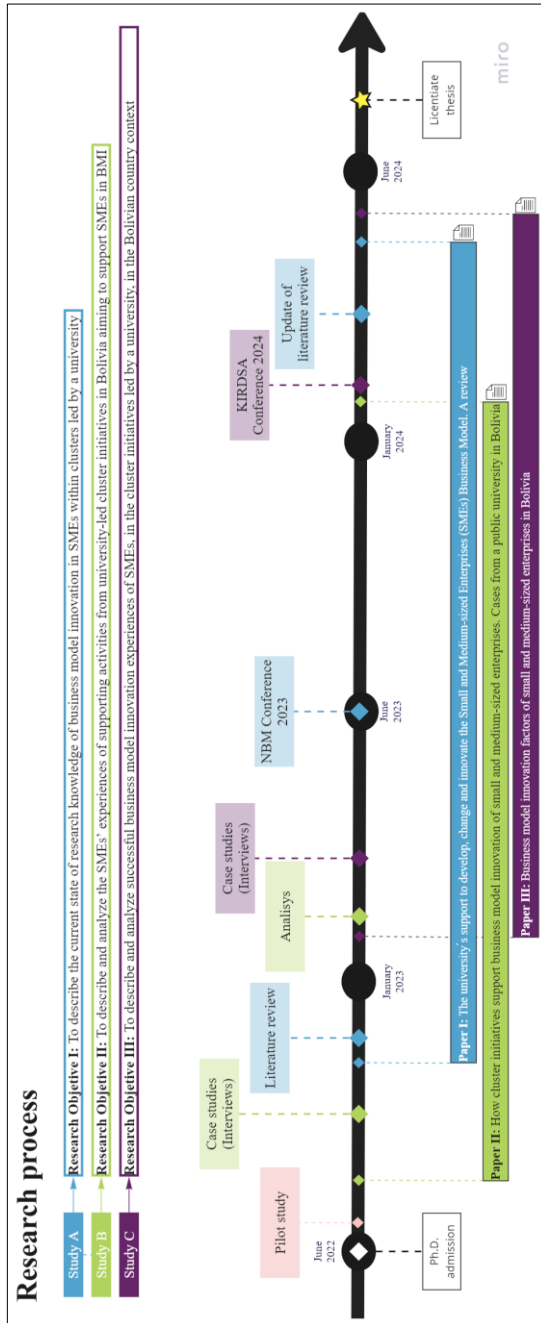


Figure 2. Research process

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

	<i>Paper I</i>	<i>Paper II</i>	<i>Paper III</i>
<i>Title</i>	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.
<i>Purpose</i>	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.
<i>Unit of analysis</i>	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
<i>Research design</i>	Literature review	Multiple case study	Multiple case study
<i>Data sources</i>	Literature	Semi-structured interviews, direct observations, documents	Semi-structured interviews, direct observations, documents
<i>Data analysis</i>	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 Zubieta 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 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.

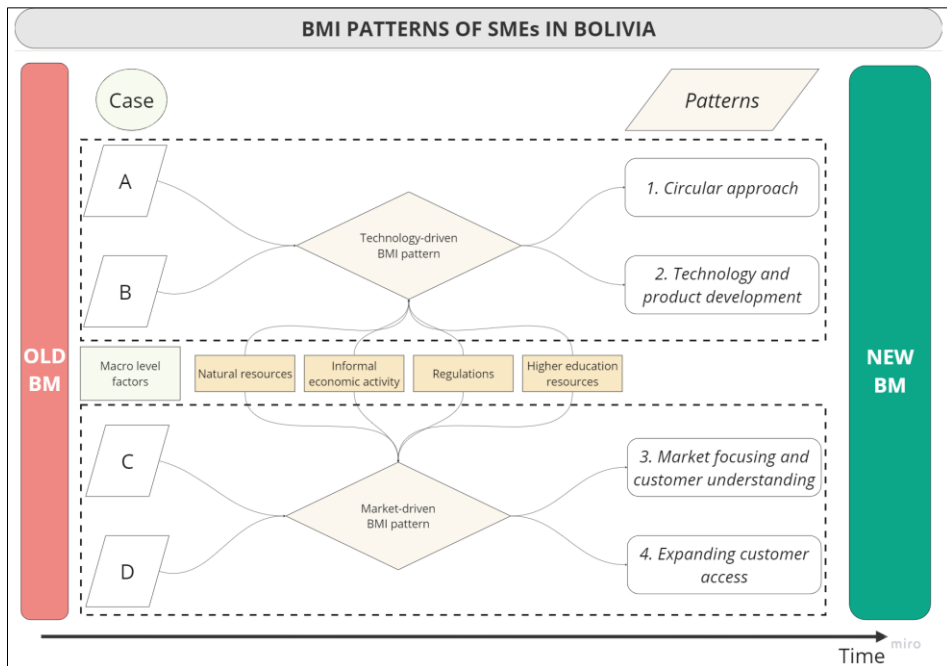


Figure 4. Main results paper III

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.

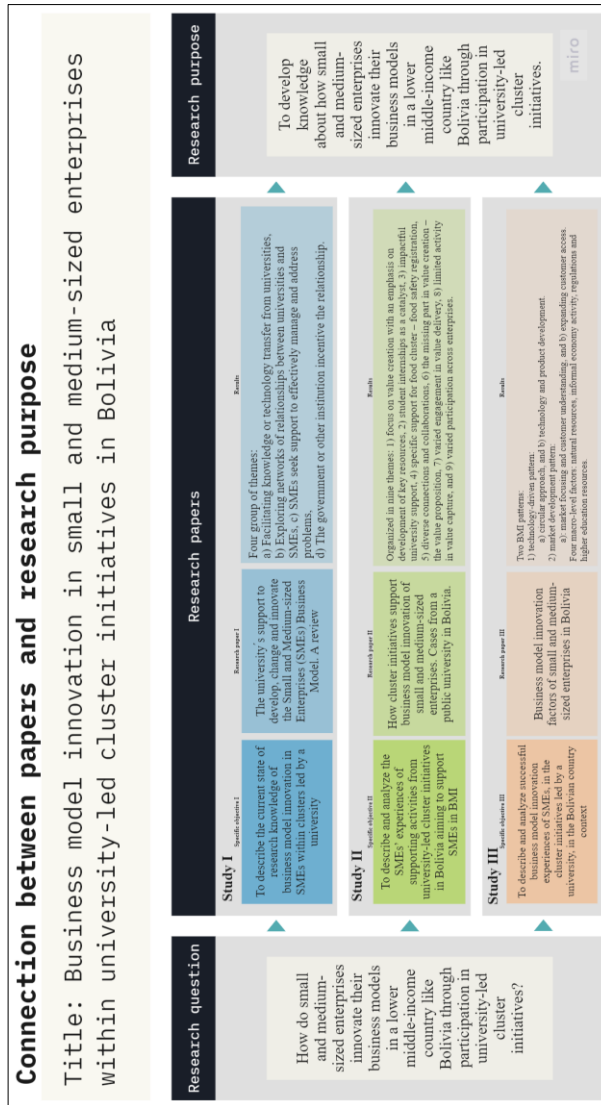


Figure 5. Connection between papers and research purpose.

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 Königgruber, (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 their 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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