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Sustainable business model (SBM) theory of SMMEs for black youth within the South African context

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A research article submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Business Administration

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TABLE OF CONTENTS

DECLARATION v

ACKNOWLEDGEMENTS vi

SUPPLEMNTARY INFORMATION vi

LIST OF FIGURES vii

LIST OF ACRONYMS viii

ABSTRACT 1

1. Introduction 2

1.1 Challenges experienced by SMMEs 2

1.2 Examples business impact of SBMs in Africa 4

1.3 Research problem statement 5

1.4 Hypothesis 7

1.4.1 Null Hypothesis: 7

1.4.2 Alternative Hypothesis: 8

1.5 Structure of article 8

2. Literature review 9

2.1 Literature review on youth unemployment and sustainable youth entrepreneurial SMMEs 9

2.2 Literature review on SBMs 16

2.2.1 Value and SBMs 17

2.2.2 Value systems and collaborative partnerships 19

2.2.3 Product-Service Systems (PSS)..... 22

3. Research methodology..... 24

3.1 Major focus constructs..... 24

3.1.1 Dependent variable (A): Product-Service Systems (PSS)24

3.1.2 Independent variables (B)..... 24

3.1.3 Demographics variables:..... 25

3.2 Methodological approach..... 25

3.3 Population for data collection..... 26

3.4 Data analysis..... 27

3.5 Ethical consideration..... 29

4. Results and Findings..... 30

4.1 Reliability of dependent and independent variables..... 32

4.1.1 For the independent variable 1 question for “Value and SBMs” (BFI 1):..... 32

4.1.2 For the independent variable 2 questions for “Value system and collaborative partnerships”..... 34

4.1.3 For the dependent variable questions for “Product-Service Systems (PSS)” (BFI 4)..... 40

4.2 Relationship between the dependent and independent variables..... 43

4.3 Relationship between dependent variable and demographic variables..... 49

4.3.1 ANOVA..... 49

4.3.2 MANOVA 52

5. Discussion 62

5.1 PSS 62

5.2 Value and SBMs 65

5.3 Value system and collaborative partnerships 66

6. Conclusion 68

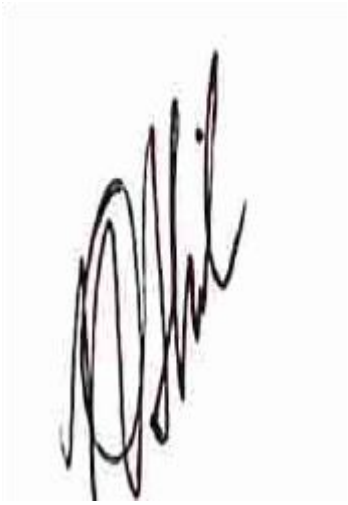
6.1 Recommendation and limitations 69

References 72

Appendix A – Online Quantitative Questionnaire Qualtrics Survey 86

DECLARATION

I, Nokuthula Audrey Shiba, declare that this research article is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the Graduate School of Business Administration, University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.



Nokuthula Audrey Shiba

Signed at Johannesburg, Midrand

On the 20 day of June 2023

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Supplementary files:	Online Quantitative Questionnaire

LIST OF FIGURES

Figure 1: Hypothesis Matrix (HM) on SBM theory developed by researcher ____ *7*

Figure 4: Reliability Statistics and Inter-Item Correlation Matrix for BFI 1 "Value and SBMs" independent variable 1 from SPSS ____ *33*

Figure 5: BFI 1 "Value and SBMs" independent variable 1 from Qualtrics XM survey ____ *33*

Figure 6: Reliability Statistics and Inter-Item Correlation Matrix for BFI 2 "Value system and collaborative partnerships" independent variable 2 question 1 from SPSS ____ *35*

Figure 7: BFI 2 "Value system and collaborative partnerships" independent variable 2 question 1 statistics from Qualtrics XM survey ____ *35*

Figure 8: Reliability Statistics and Inter-Item Correlation Matrix for BFI 3 "Value system and collaborative partnerships" independent variable 2 question 2 from SPSS ____ *37*

Figure 9: BFI 3 "Value system and collaborative partnerships" independent variable 2 question 2 statistics from Qualtrics XM survey ____ *37*

Figure 10: BFI 3 "Value system and collaborative partnerships" independent variable 2 question 2 graph from Qualtrics XM survey ____ *38*

Figure 11: Reliability Statistics and Inter-Item Correlation Matrix for BFI 4 "Product-Service Systems (PSS)" dependent variable from SPSS ____ *40*

Figure 12: BFI 4 "Product-Service Systems (PSS)" dependent variable statistics from Qualtrics XM survey ____ *41*

Figure 13: "Product-Service Systems (PSS)" dependent variable graph from Qualtrics XM survey ____ *42*

Figure 14: Descriptive statistics from SPSS ____ *44*

Figure 15: Model summary from SPSS ____ *44*

Figure 16: ANOVA from SPSS ____ *45*

Figure 17: Coefficients from SPSS ____ *45*

Figure 18: Collinearity Diagnostics from SPSS ____ *46*

Figure 19: Correlations from SPSS ____ *47*

Figure 20: Histogram from SPSS ____ *48*

Figure 21: Normal P-P Plot of Regression Standardized Residual ____ *48*

Figure 22: Descriptive for Age and PSS (BFI4Total) from SPSS ____ *50*

Figure 24: Test of Homogeneity of Variances from SPSS ____ *51*

Figure 25: ANOVA Effect Sizes from SPSS ____ *51*

Figure 26: Box's Test of Equality of Covariance Matrices from SPSS ____ *53*

Figure 27: Multivariate Test ____ *54*

Figure 28: Levene's Test of Equality of Error Variances from SPSS ____ *55*

Figure 30: Estimated Marginal Mean - Gender ____ *57*

Figure 31: Estimated Marginal Mean - Race ____ *58*

Figure 32: Estimated Marginal Mean - Education ____ *59*

Figure 33: Estimated Marginal Mean - Location ____ *60*

Figure 34: Test of Between-Subjects Effects from SPSS _____ *61*

LIST OF ACRONYMS

Abbreviation	Definition
A	Dependent variable
ANOVA	Analysis of Variance
B	Independent variables
BFI1	The independent variable 1 question for “Value and SBMs”
BFI1Total	The aggregated independent variable 1 question for “Value and SBMs”
BFI2	The independent variable 2 question 1 for “Value system and collaborative partnerships”
BFI2Total	The aggregated independent variable 2 question 1 for “Value system and collaborative partnerships”
BFI2Total	The aggregated dependent variable questions for “Product-Service Systems (PSS)”
BFI3	The independent variable 2 question 2 for “Value system and collaborative partnerships”
BFI3Total	The aggregated independent variable 2 question 2 for “Value system and collaborative partnerships”
BFI4	The dependent variable questions for “Product-Service Systems (PSS)”
BM	Business Model
GC	Global Impact
H0	Null Hypothesis
H1	Alternative Hypothesis
HM	Hypothesis Matrix
MANOVA	Multivariate analysis of variance
NDP	National Development Plan
NPO	Not for Profit Organization
PSS	Product-Service Systems
Q3	Quarter 3
Qualtrics	Digital survey data collection tool
SA	South Africa
SAICA	South African Institute of Chartered Accountants
SCP	Sustainable production and consumption
SDGs	Sustainable Development Goals
sedan	Small Enterprise Development Agency
SBM	Sustainable Business Model
SMMEs	Small, Medium, and Micro Enterprises
SPSS	Statistical tool used to analyse data
Triple bottom line	Performance financially, ecologically, and socially
UN	United Nations
WBS	Wits Business School
YU	Youth Unemployment

ABSTRACT

Orientation: The purpose of the study is to use SBM theory to understand how SMMEs can invest in innovation and adopt sustainability to reduce youth unemployment among South Africa's black youth and achieve economic growth. The South African unemployment rate of 34.5% is the highest in history of SA with the youth being the majority. There are 2.4 million SMMEs contributing to the SA's economic growth by providing approximately 10 million jobs.

Research purpose: To establish whether SBM theory explains how SMMEs can invest in innovation and adopt sustainability to reduce youth unemployment and drive economic growth among South Africa's black youth.

Motivation for the study: SMMEs located in Johannesburg, Gauteng do not have sustainable business models that can overcome the SA challenges of youth unemployment and lack of economic growth which affects the majority of South African being the black youth.

Research design, approach, and method: A quantitative approach was selected, whereby a questionnaire was used to characterize the perceptions, viewpoints, habits, observations, or other representativeness of the sample, which is SMMEs in the Gauteng province in the City of Johannesburg. The variables are defined in the Qualtrics XM used to collect observations from respondents, and SPSS used to analyse the database from Qualtrics XM. The sample size was 103 respondents from out of the population size of 1 050 SMMEs in Johannesburg. According to Conroy (2016), a population size of 1 000 requires a sample size of 88 to achieve an acceptable margin of error of 10% thus achieving a confidence level of 90%. Therefore, the sample size of 103 has a 10% acceptable margin of error and 90% confidence level with regards to representation of the sample size on the total population defined in this research.

Main results: The results demonstrate that SBM theory, which focuses on developing a conceptual model, explain the relationship between the investment in innovation and the adoption of sustainability by South African SMMEs. Further, that SMMEs with SBMs can achieve a reduction in youth unemployment and drive economic growth. In conclusion, the results of this research indicate that the SBM theory explains how SMMEs can invest in innovation and adopt sustainability to reduce youth unemployment and drive economic growth among South Africa's black youth.

Recommendations: Further research should be done on how SMMEs can be up skilled and educated on the SBM theory. To enable SMMEs to invest in innovation and adopt sustainability to reduce youth unemployment among South Africa's black youth and achieve economic growth.

Keywords: business models; business model innovation; sustainability innovation; sustainable business models; sustainable value creation; triple bottom line, Product-Service Systems

1. Introduction

1.1 Challenges experienced by SMMEs

The South African unemployment rate of 34.5% is the highest in the country's history, as per the first quarter of 2022 (Q1 2022) (Stats SA, 2021). Youth Unemployment (YU) in Q1 2022, for the age group between 15 and 24 years, is currently 63.9% and for the age group between 25 and 34 is 42.1% (Stats SA, 2021). The South African government has developed numerous actions over the past years to drive Small, Medium, and Micro Enterprises (SMMEs) growth through entrepreneurial initiatives; however, there has been minimal growth as entrepreneurial SMMEs activities have been low (Government Communication and Information System, 2021). Furthermore, there is evidence of a 6% participation in these entrepreneurial initiatives by the youth between the age range of 18 to 34 (Government Communication and Information System, 2021).

The September 2021 Quarter 3 (Q3) report indicates that the 2.4 million SMMEs are contributing to the SA's economic growth (Seda, 2022). In addition, the looting and unrest in July 2021 in the province of KwaZulu-Natal and Gauteng impacted 55% of SMMEs in SA (SA SME Business Confidence Hits All-Time Low Heading into 2022, 18 CE). The SMME industry revenue increased by 15.7% year on year by 2021 Q3 compared to big corporations that grew by 11.4% over the same period (Seda, 2022). As a result, the informal economy was the only SMME segment with considerable economic growth during this time (Seda, 2022), estimated to be about 63% of the total SMME market (OECD, 2022).

In 2015 the United Nations (UN) initiated collaborative solutions across the globe for the state, businesses such as SMMEs, entrepreneurship, education, and non-profit organization (NPOs) to pursue the 17 sustainable development goals (SDGs) by 2030 (Sustainable Development Goals | UNDP in South Africa, 2015). The SDGs require a holistic collaboration to ensure the sustainability of the environment, people, and ecosystem. (Sustainable Development Goals | UNDP in South Africa, 2015). The research article focuses on the SDG goals aligned to the SA National

Development Plan (NDP) of decent work and economic growth, and SDGs “industry, innovation, infrastructure, reduced inequalities, gender equality, sustainable cities, and communities” (Sustainable Development Goals | UNDP in South Africa, 2015). The cornerstone to unleashing Africa's commercial viability is youth which will enable major growth potential to increase sustainability. Africa is ideally positioned to expand, since it has the universe largest youth demographic (approximately 60% of the community is still under 25 years old). Building a strong, vibrant, and sustainable market is the greatest manner to leverage the benefits of a youth demographic. It will begin with a continued emphasis on the SDGs that provide the new commercial prospects. (CNBCAFRICA, 2022).

Developing sustainability initiatives appears overwhelming to SMMEs that are struggling with daily problems. Adopting these ideas, on the other hand, can help them decrease uncertainties and increase profits. The UN Global Compact (GC) is around to collaborate with both large businesses and SMMEs. The UN GC Africa Strategy intends to connect and grow a group of African firms that are significant enablers of sustainable and ethical corporate activities. With an initial 10 Community group Channels and a reach in 45 nations that has an increasing footprint in Africa. The Community groups in SA aligns its goals with those of the NDP, assisting businesses in integrating and delivering on the SDGs. Furthermore, it helps businesses build and incorporate sustainability into the business strategy, which is becoming significantly important for accessing funding support and participating in the multinational value-added supply stream (CNBCAFRICA, 2022).

The SA SMME’s challenges are rooted in the increasing rate of youth unemployment rate which can be solved by promoting youth entrepreneurship using sustainable solutions such as the SDGs highlighted above. According to Porter and Kramer (2011), these enormous issues might be seen as "the biggest business opportunity of our times". To address these issues according to Adams, Jeanrenaud, Bessant, Denyer, and Overy (2016), significant innovation is needed both at the level of specific goods and services as well as more widely at the scale of commercial models, societal innovations, and significant improvements at the system level.

The theory of Sustainable Business Models (SBMs) by Evans, Vladimirova, Holgado, Fossen, Yang, Silva, and Barlow (2017), outlines the development of a collective theory unpacking business model innovations enabling businesses to create, adapt and perform in financial, ecological, and societal (triple bottom line) outcomes. Evans et al. (2017) SBM model enablers are theories in "business model innovation, sustainable innovation, network theory, stakeholder theory and product-service systems (PSS)." Evans et al. (2017) SBM theory explain how SMMEs can invest in innovation and adopt sustainably to reduce YU among South Africa's black youth and achieve economic growth.

1.2 Examples business impact of SBMs in Africa

The UN Global Compact (GC) is around to collaborate with both large businesses and SMMEs (CNBCAFRICA, 2022). The UN GC Africa Strategy intends to connect and grow a group of African firms that are significant enablers of sustainable and ethical corporate activities (CNBCAFRICA, 2022). In Africa, according to CNBCAFICA (2022), the following SBMs have been adopted:

1) *In Rwanda, a project called "My Green Home" is a business that constructs homes through recycled, melted waste plastic and soil (Vetter, 2021).*
2) *"Greencare," in Rwanda creates fertilizer from organic garbage (*Greencare Rwanda - #1. Waste Management Company in Rwanda*, n.d.).*
3) *In Nigeria, "Chanja Datti" operates the collection, sorting, and packaging of recyclable material for innovative packaging (Murungi, 2020).*
4) *AngloGold Ashanti, a SA mining business (*AngloGold Ashanti Limited LOCAL PROCUREMENT POLICY*, 2018), and Safaricom (*Safaricom News & Latest Press Releases - Safaricom*, 2021), a Kenyan telecoms business, are currently both have adopted sustainable procurement management practices.*
5) *A Tunisian firm, Cogitel, offers innovative packages for the food service market and reducing waste, in power consumed in manufacturing (*Sustainability Case Study: Cogitel (Tunisia)*, n.d.).*

According to an article by Weybrecht (2017), these are some of the SA SBMs:

1) *Zoona is a digital payment company that facilitates electronic payments in Zambia, Mozambique, and Malawi (*International Money Transfers*, n.d.).*
2) *In SA, AllLife Insurance provides inexpensive lifetime accident insurance coverage to patients with HIV and diabetes (*Home | AllLife Insurance*, n.d.).*
3) *GreenCape is a SA government initiative to assist sustainable economic firms and investments by reducing obstacles to entry and expansion (*Home» GreenCape*, n.d.).*

1.3 Research problem statement

The goal of the project is to gain a better understanding of how sustainable innovation might help SMMEs address the many business issues that lead to poor performance leading to business failure, many of which are related to youth unemployment.

This will be evaluated by analysing how the SMMEs can invest in sustainable innovation using the theory of Sustainable Business Models (SBMs) as described by Evans, Vladimirova, Holgado, Fossen, Yang, Silva, and Barlow (2017). The theory of SBMs by Evans et al. (2017), outlines the development of a collective theory unpacking business model innovations enabling businesses such as SMMEs to create, adapt and perform in financial, ecological, and societal (triple bottom line) outcomes. SMMEs may be able to provide employment possibilities, particularly for young people, thanks to these triple bottom line results, which will ultimately promote economic growth. Evans et al. (2017) SBM model enablers are theories in “business model innovation, sustainable innovation, network theory, stakeholder theory and product-service systems (PSS).” To analyse how SMMEs may invest in innovation and adopt sustainably to lower youth unemployment among South Africa's black youth and achieve economic growth, Evans et al.'s (2017) SBM theory will be applied.

Therefore, the study's goal is to determine whether employing Product Service Systems (PSS) has any positive benefits on SBM development. This will make it possible to determine whether South African SMMEs' investments in innovation and

adoption of sustainability, together with the SBM theory, can lower youth unemployment and stimulate the country's black youth's economy.

The purpose of this study is to examine the link between the independent and independent factors that constitute the SBM theory's enablers, such as value, value systems, and collaborative partnerships, and to determine if PSS can be adopted by SMMEs to maximize the advantages of SBMs.

This would shed light on whether the SBM theory, which concentrates on creating a conceptual model, can explain the connection between South African SMMEs' investment in innovation and adoption of sustainability. Additionally, if SMMEs with SBMs may promote economic growth and reduce youth unemployment.

Since an online survey will be undertaken to evaluate SMMEs opinions on the enablers of SBM theory, PSS compared to value and SBMS; value systems and cooperative partnerships, this research paper has been created as quantitative study (Mertler, 2021). The key inquiries will be these ones :Is there a connection between the SBM theory's enablers—such as value and SBMs, value systems and cooperative partnerships, and Product Services Systems (PSS)—that SMMEs might use to maximize the advantages of SBMs?

- *Does the relationship between the SBM theory's enables explain the connection between South African SMMEs' investments in innovation and their adoption of sustainability?*
- *Whether SMMEs with the advantages of SBMs can achieve a reduction in youth unemployment and drive economic growth?*

1.4 Hypothesis

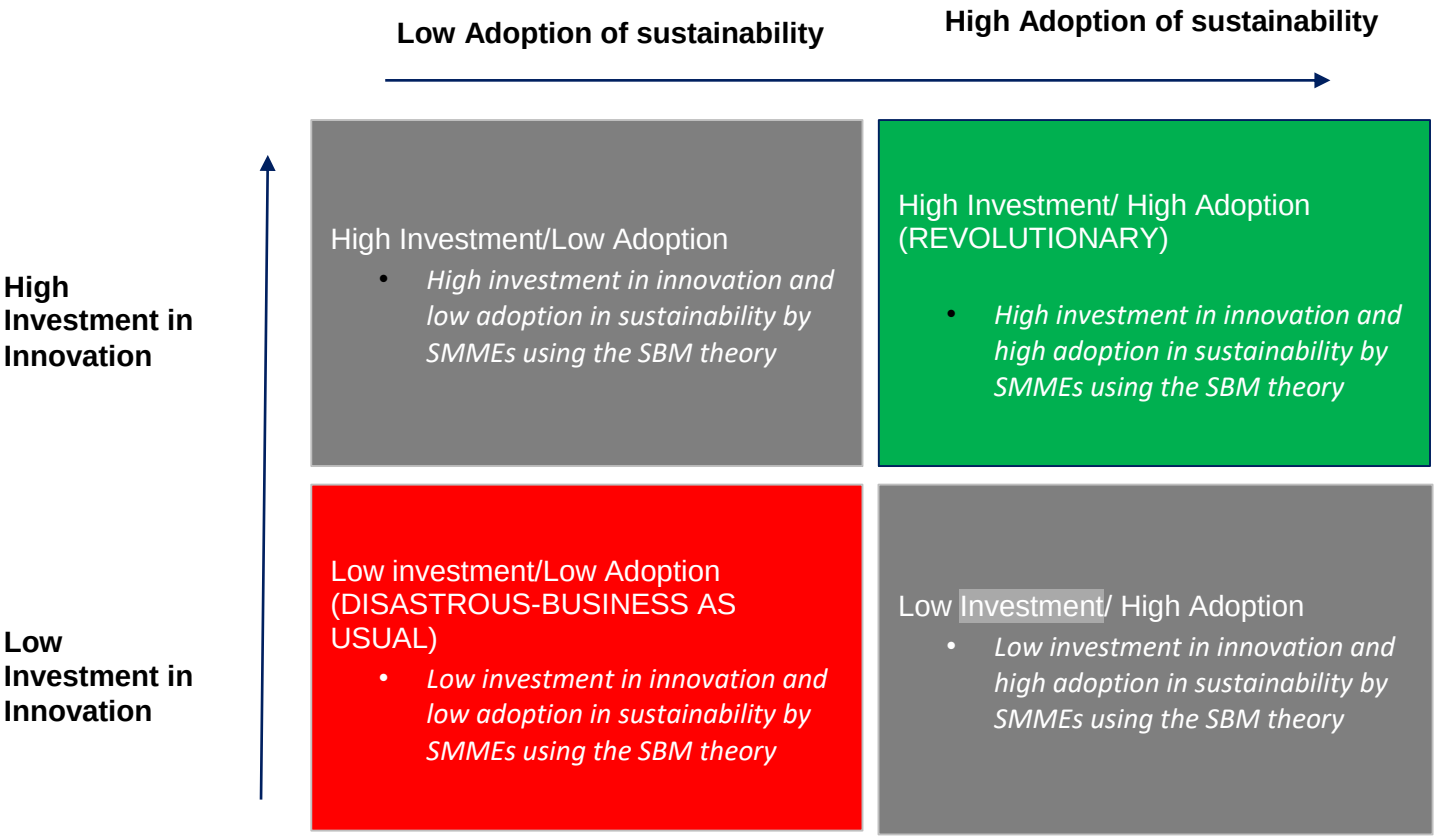


Figure 1: *Hypothesis Matrix (HM) on SBM theory developed by researcher*

1.4.1 Null Hypothesis:

A SBM deterministic theory follows a logical structure of the hypothesis in the research Hypothesis Matrix (HM) on SBM theory; if the independent variables (B) are scored highly on the online survey, this results in a high investment in innovation and increased adoption of sustainability by SMMEs (dependent variable (A)) (Bitektine, 2007). As a result, it disproves the null hypothesis (H0), testing the positive correlation between A and B (Bitektine, 2007).

H0: SBM theory explains how SMMEs can invest in innovation and adopt sustainability to reduce youth unemployment and drive economic growth among South Africa's black youth.

1.4.2 Alternative Hypothesis:

The research HM on SBM theory, a deterministic SBM theory, follows a logical structure of the hypothesis. If the independent variables (B) have low scores on the online survey, then SMMEs will not spend much in innovation and will not embrace sustainability (dependent variable (A)), according to Bitektine (2007). As a result, when the alternative hypothesis (H1) is tested, it confirms the hypothesis that claims there is no association between A and B (Bitektine, 2007).

H1: How SMMEs should invest in innovation and adopt sustainability to reduce young unemployment and drive economic growth among South Africa's black youth may not be fully explained by SBM theory.

1.5 Structure of article

The article will be structured as follows:

An introduction: A description of the difficulties faced by SMMEs in addressing youth unemployment and business sustainability. The research's purpose, objective, and research questions will be descriptions of how SBMs might help SMMEs function in the face of adolescent unemployment.

A literature review: The available literature and research on youth unemployment, entrepreneurial SMMEs, and SBMs will be summarized and evaluated in this paper.

Research Methodology: This will outline the research design, including the sample plan, online data collection technique, and quantitative research approach.

Results & Findings: This will include an explanation of the findings from the data analysis, their interpretation, and a discussion of how they relate to the goal and issue of the study.

Discussion: An explanation of how the research findings relate to the research question and goals. Compared to the wider business consequences for SMMEs,

youth unemployment, and SBMs, the results of the available research should be understood in light of each other.

Conclusion: This will be a summary of the research article's key results and analysis. Reiterate the research topic's importance and relevance to SMMEs. Talk about the study's shortcomings and make suggestions for future studies.

2. Literature review

2.1 Literature review on youth unemployment and sustainable youth entrepreneurial SMMEs

According to De Lannoy, Graham, Patel, and Leibbrandt (2018), the current youth incentives are incoherent and tend to focus on supply-side incentives, leaving significant room for improvement on demand-side incentives such as government employment programs and better uptake of the Employment Tax Incentive Scheme for entrepreneurial SMMEs, as well as rapid actions taken to link with employment-seeking support services to reduce YU. Mago (2019) proposes promoting youth entrepreneurship as the solution to the challenge of YU in South Africa (SA). According to De Lannoy et al. (2018), SA's high unemployment rate impedes inclusive growth development. As a result, the unemployment challenge can put pressure on exacerbate ethnicity, economic, geographical, and gender inequalities (De Lannoy et al., 2018). According to De Lannoy et al. (2018), the SA unemployment challenge is projected to prolong the transmission of poverty from generation to generation. As a result, according to De Lannoy et al. (2018), economic growth that produces employment in many of the countries sectors by developing capabilities is important in tackling the YU challenge. De Lannoy et al. (2018) emphasis how unemployment has been a wicked problem that can be difficult to define because it has numerous interconnections such as education,

training, skills and socioeconomic factors that frequently causes multiple other problems such as poverty, homelessness and lack of quality education and health care. De Lannoy et al. (2018) conveys that the attempts to address unemployment frequently result in unforeseen challenges that cause social and economic instability that lack a clear resolution or needs multi-facet solutions that never fall neatly within the purview of any single government office. Adeola (2021) believes instant focus is needed to reduce the rate of YU using a more end-to-end methodology by promoting entrepreneurial SMMEs using a sustainable solution to these challenges of YU.

According to Camba (2020) the business cycle theory of Schumpeter (1934) does provide a clear illustration of how unemployment might be decreased. The main factor reducing unemployment is innovation, which generates greater employment opportunities, according to Camba (2020). Camba (2020) believes entrepreneurial SMMEs who innovative boost the money they spend to bring such innovations to life. Thus, according to Camba (2020), entrepreneurial SMMEs and unemployment have an inversely proportionate connection, according to the Schumpeter Effect (Schumpeter, 1934). Camba (2020) believes, unemployment falls as entrepreneurial SMMEs investment rises.

According to Shastri, Kumar, and Ali (2009), youthful business ownership is significant to the person andsocietal and international scales as it allows the youth to make improvements to both their personal and overall standard of living by using their drive, abilities, and capacity for innovation. Dzemyda and Raudelinien (2014) highlight a variety of critical elements that support social progress and higher standards of living. Young entrepreneurs have many benefits, according to Dzemyda and Raudelinien (2014), since it empowers the youth to continually seek out and encourage transformation to be unaware of the hazards associated with transformation from internationalization, and to understand how choices could potentially be employed for societal advancement. The youth have the ability to develop and sustain connections on an international basis, which helps them offer in innovative concepts and money invested in creative thinking and engage in the international community. This supports the enthusiasm of the youth with regards

to worldwide challenges in addition to their decision-making (Dzemyda and Raudelinien, 2014). Young business ownership also has the advantage of creating employment opportunities. According to Dzemyda and Raudelinien (2014), internationalization encourages youth entrepreneurial activity in a way that raises the youth's knowledge of international concerns and a sense of accountability for what is occurring globally so that they may collaborate to address challenges and advance a successful life. According to Chigunta (2002), youthful business ownership has financial and societal benefits that largely affect young people's rights to own businesses, society's increasing participation in both socioeconomic affairs, and youths' enhanced accountability for fostering social transformation. The youth who are given the appropriate circumstances and possibilities to develop their entrepreneurial dreams possess the following qualities: a clear business goals, business control, an upbeat mind-set toward the business industry, the capacity to recognize and take advantage of emerging business possibilities, diligence with the outcomes of persistence and resilience, and the capacity to bounce back rapidly from disappointment (Chigunta, 2002). According to Chigunta (2002), the primary requirements that must be met to encourage youthful business ownership are accessibility to financial funding, use of the most sophisticated technology and tools available, the creation of novel goods, and the opportunity the youth to put their theories into action while adding value to the business. According to Chigunta (2002), providing the youth with the resources and training they need to grow and hone their abilities as entrepreneurs is of the highest priority to the development of young business owners. There is no youth-entrepreneurial method or system that is going to be effective, claim Clemensson and Christensen (2010) as an independent part of the youthful business ownership approach, if their youth are unable to learn about the company and its growth as well as acquire and improve the competencies required for business growth and administration. Clemensson and Christensen (2010) stress, however, that entrepreneurial instruction includes the proper regulations regarding business ownership and expertise for the advantage of youth in various facets of living and society as a whole. This is important because it ensures that students are equipped with the understanding and abilities necessary to succeed in different fields of society as well as in company operations. Dzemyda and Raudeliūnienė

(2014) highlight that entrepreneurial sustainability is recognized as a financial and social trend. Dzemyda and Raudeliūnienė (2014) highlight that by starting innovative SMMEs that offer novel goods and solutions, sustainable entrepreneurial SMMEs meets market demands, generates employment, boosts the economy as a whole, and improves the standard of living in communities while managing monetary benefits, requirements for local growth, and sustainability concerns. Dzemyda and Raudeliūnienė (2014) indicates that youth business owners have received a lot of focus because it is thought that youths possess a great deal of abilities to start, grow, and operate businesses of their own, which would help solve a number of societal issues like YU and joblessness overall.

According to Starchenko, Samusevych, and Demchuk (2021), the emergence of SMMEs ownership has historically been linked to the accomplishment of monetary objectives. In addition, Starchenko et al. (2021) note that there are frequently unfavourable social implications, such as youth unemployment in SA. According to Starchenko et al. (2021), the resolution of these issues becomes more pertinent in view of the rising focus on equitable growth, which calls for balancing the triple bottom line at signs of any type of social engagement. This phase requires scientific confirmation of the beneficial correlation amongst the growth of conventional types of business and the socioeconomic factors set forth by the SDGs, while the relationship with ecological variables stays reversed (Dhahri and Omri, 2018). According to Starchenko et al. (2021), all of this results in the formation of new types of entrepreneurships that have their sights not only on generating profitability but also on attaining particular objectives that are significant to the SMME's outside stakeholders. Socially responsible SMMEs and SMMEs that care about the environment were two examples of this mentions' Starchenko et al. (2021). According to Starchenko et al. (2021), the growth of such kinds of businesses has demonstrated the need of developing an entrepreneurial culture that is sustainable and seeking for elements that impact the accomplishment of accomplishing the objectives of long-term SMMEs development. Delivering beneficial outcomes for community is essential to long-term SMMEs since Greco and de Jong (2017) point out that the purpose of sustainable SMME is to have a beneficial effect on the community and our planet, which makes it even more significant than the

manufacturing of commodities and rendering services. Furthermore, according to Lüdeke-Freund (2020), the benefit of sustainable SMMEs is the creation of economic benefit for a broad spectrum of users. According to Starchenko et al. (2021), the adoption for long-term imaginative thinking, that enables addressing the financial challenges of the SMME concurrently with the accomplishment of an ecological or impact society, forms the foundation of the shift of the business approach to entrepreneurial SMMEs sustainability. Similarly to other definitions, Urbaniec (2018) describes entrepreneurial SMMEs sustainability as an array of company techniques that open doors for new business operations in tandem with societal and ecological problems. According to Rodrguez-Garca, Guijarro-Garca, and Carrilero-Castillo (2019), technology is also recognized as a crucial factor in the development of “ecopreneurship”, also known as sustainable entrepreneurial SMMEs. On the contrary hand, entrepreneurial SMMEs creativity has an external impact on the expansion of SAs social capital (Sajjadm Orangzab and Chani, 2020), indicating the broader repercussions of a creative strategy that promotes accelerating the development of entrepreneurial sustainability. Additionally, it is established that technological advances in the financial sector offer enormous opportunities for worldwide growth in economies in addition to serving as a catalyst for SMMEs growth (Umadia and Kasztelnik, 2020). Financial, ecological, and societal entrepreneurship are the three components that Tarnanidis and Papathanasiou (2015) see as making up entrepreneurial sustainability. Regarding the characteristics of these three categories of business ownership, Starchenko et al.'s (2021) statistical evaluation of both inside and outside characteristics reveals that the greatest degree of connection to additional characteristics indicate factors such as enhance living, protect the interests of others, conserve power, investing strategically, and offer products for earnings. These elements can serve as the foundation for profitable business ownership, claim Starchenko et al. (2021). By means of a literature review, Konys (2019) analysed the primary groups of the idea of long-term business ownership and found that creative thinking, SMMEs, charitable enterprise, business viability, ecological business ownership, and businesses that are socially responsible are the primary drivers behind the growth of the conceptual foundations of SMMEs long term success. According to research on entrepreneurial sustainability in relation to accomplishing SDGs, nations that

make investments in reaching socioeconomic objectives can offer opportunities for viable entrepreneurial activity to develop strategically (Moya-Clemente, Ribes-Giner, and Pantoja-Di'az, 2020). The long-term viability of the idea of long-term business can be ensured by a number of elements, according to research on the growth of sustainability small businesses conducted by Berard and Saleilles (2016). It consists of a variety of development tactics, a high degree of normal personality, and a distinction of employee capabilities and expertise with an emphasis on continuous improvement (Jahanshahi, Brem, and Bhattacharjee, 2017). Businesses that prioritize long-term viability for instance, have been found to have strong relationships with other parties that place a premium on values, forecasting for the future, and a feeling of justice in addressing customers' requirements and wants (Starchenko et al., 2021). Additionally, Starchenko et al. (2021) have found that, the impact of influencing factors had been significant, indicating that the youth of business owners, the substantial upside of their branding and expertise in technology, as well as the health of the business during the beginning phases of its expansion, are the factors that determine business ownership long-term viability. Abereijo (2016), in contrast to earlier scholars, emphasizes outside factors that will guarantee the growth of long-lasting business. According to Starchenko et al. (2021), schooling process holds an important role because it enables prospective business owners to develop a long-term strategy of the equilibrium between values related to the economy, society, and ecological, as well as the possibility of realizing this equilibrium within their own businesses. The accessibility of government assistance, as demonstrated by Starchenko et al. (2021), serves a substantial influence with fiscal advantages, environmentally friendly financing, venture capital, etc. Paunescu, Dragan, Cantargiu, and Filculescu (2013) also highlight the importance of the educational institution in fostering socially conscious business and change in society. Biewendt, Blaschke and Bonhnert (2020) examines outside variables that influence company viability in terms of the constraints and environmental effects of business. According to Starchenko et al. (2021), subsidies must be put in place to encourage the adoption of novel innovations and the manufacturing of goods that use fewer raw materials because economic processes fail to result in this decrease. According to Starchenko et al. (2021), the presence of resource-monitoring processes within a nation is a determinant in the commercial

industry’s viability. According to Starchenko et al. (2021), it's crucial to examine patterns in the emergence of speculative enthusiasm for the primary factors connected to the problems with long-term business. Therefore, according to prior research, Starchenko et al. (2021) conclude that "external values," "stakeholder network," and "public acceptance" are frequently the essential variables in the setting of long-term business.

Starchenko et al. (2021) analysed the claims and refutations made throughout the scholarly debate on the growth of sustainable SMMEs. The main traits and crucial factors that determine the accomplishment of sustainable entrepreneurship SMMEs efforts are identified by Starchenko et al. in 2021. The systematization of literature sources by Starchenko et al. (2021) revealed that the construction of a sustainable future is what distinguishes the existing phase for entrepreneurial SMMEs from the idea of optimizing profits. According to Starchenko et al. (2021), sustainable entrepreneurial SMMEs are an endeavour targeted at integrating issues related to the triple bottom line. The theoretical analysis done by Starchenko et al. (2021) indicates that the basic According to Starchenko et al. (2021) a number of important external and internal factors have been found that support the growth of sustainable entrepreneurial SMMEs. It has been discovered that the degree of encouragement and competence are the essential internal traits of the entrepreneurial SMME. The schooling process, the availability of governmental, societal, and ecological legislation, as well as the general awareness and backing of ecologic and societal activities, serve an essential part in developing sustainable entrepreneurial SMMEs, though, amongst the external elements (Starchenko et al., 2021).

This literature review supports that sustainable entrepreneurial SMMEs led by the youth can achieve triple bottom line outcomes for SMMEs such as social outcomes to reduce youth unemployment, financial outcomes of being profitable and environmental outcomes by using sustainable business models.

2.2 Literature review on SBMs

Evidence from the study of the literature on youth unemployment and sustainable youth entrepreneurial SMMEs shows the need of using sustainable business models to address the problem of unemployment and create such businesses. The literature review on SBMs is done in light of this.

Evans et al. (2017) investigate if and how SMMEs might reimagine structures to meet SDGs. Evans et al. (2017) identify many aspects that represent SBMs based on studies in “business model innovation” (Teece, 2010; Amit and Zott, 2012; Spieth et al., 2014) and “sustainability innovations” (Hellström, 2007; Adams et al., 2012; Boons et al., 2013). Evans et al. (2017) incorporate advancements from “networks” (Provan et al., 2007; Allee, 2008) and “stakeholder theories” (Haigh and Griffiths, 2009), which support the aspects of “sustainable value flows” between numerous different stakeholders invoking the intricacies of SBMs; and PSS (Evans et al., 2007; Tukker, 2015), which offers information into distinctive factors of a successful SBM. Evans et al. (2017) explain how enhancing SBMs necessitates transformation, creativity, or a repositioning of an SMME enabling ecosystem. According to Adams et al. (2012), as cited in Evans et al. (2017), either minor changes that grow gradually or significant, transformative developments, the adaptability in the field of sustainability needs to be an essential SMMEs skillset. Innovativeness in business modelling is gaining traction as a means of integrating sustainability into operations such as SMMEs (Schaltegger et al., 2012; Jolink and Niesten, 2015 as cited in Evans et al., 2017). Evans et al. (2017) characterize the notion of SBMs using five theories that will enable the evaluation of SBMs theory of SMMEs for black youth within the South African context.

Lüdeke-Freund (2010) believes that the BM itself may be open to greener, supporting the development of sustainable business propositions. Adequacy, productivity, and reliability techniques are presumed to be the natural preliminary stage in a larger study agenda on "enterprise models for sustainability" because they aid in recognizing major difficulties according to Lüdeke-Freund (2010). Terminology of terms like "business model eco-innovation" and "extended customer

value" are included in the model by Lüdeke-Freund (2010), along with suggestions for how these ideas interact.

Jørgensen and Pedersen (2018) focuses on the outcomes that innovative BMs can produce, particularly sustainable business performance. The methods that various business models influence company efficiency are also investigated by Jørgensen and Pedersen (2018).

2.2.1Value and SBMs

In academia, according to Evans et al. (2017), the idea of ‘value’ underpins the theory of the ‘business model.’ Linking with other topics, the recognition of financial benefits (Chesbrough and Rosenbloom, 2002 as cited in Evans et al., 2017), brand equity (Magretta, 2002 as cited in Evans et al., 2017), and the interrelated factors that generate intrinsic worth (Johnson et al., 2008 as cited in Evans et al., 2017), and the sustainability of the customer satisfaction and experience (Teece, 2010 as cited in Evans et al., 2017). Adam Smith’s concept of ‘exchange value’ is the historical foundation of economics philosophy and still holds sway in the current corporate world (Ueda et al., 2009, as cited in Evans et al., 2017). The aspects of’ value-in-use (Vargo and Lusch, 2007 as cited in Evans et al., 2017), which focus on how producers transition to more customer-centric services; and ‘shared value’ (Porter and Kramer, 2011 as cited in Evans et al., 2017), which suggests that economic value development incorporate societal value. The idea of examining value is not only through the perspective of economics (Evans et al., 2017). Behaviourism, social science, and eco-friendliness provide views on value (Den Ouden, 2012 as cited in Evans et al., 2017), providing both absolute and relative elements to topics like connection, environmental imprint, and personal value. A SMMEs organic growth rationale should address the combination of societal and ecological objectives into an integrated sense of value for sustainable development (Schaltegger et al., 2011, as cited in Evans et al., 2017). The term “sustainable value” also refers to ecological but societal and financial worth (Ueda et al., 2009 as cited in Evans et al., 2017) to achieve the triple bottom line. SBMs are accomplished not just via technological, commercial, or consumer experience but

also through the BM's continuous improvement (Girotra and Netessine, 2013; Yang et al., 2017, as cited in Evans et al., 2017). Stakeholder relationships impact a business's operations and drive SMME's choices through ties that link to their stakeholders (Perrini and Tencati, 2006, as cited in Evans et al., 2017). Businesses are altering these connections by embracing a broader, longer perspective, allowing companies to shift from a commercial attitude to building integrity, cohesive, and long-term partnerships with the necessary parties involved (Gulati and Kletter, 2005, as cited in Evans et al.,2017). According to Clarkson (1995), as cited in Evans et al. (2017); staff members, providers, customers, and stockholders are main stakeholders, supplementary stakeholders that are not involved in operations with the company and are not necessary for its continued existence, such as all forms of advertising. External stakeholders can provide additional assistance to the business, such as municipalities, academic institutions, societies, and multinationals (Evans et al., 2017). The durable performance of the company, according to Edgeman and Eskildsen (2014) as cited in Evans et al. (2017), is a result of integrating both the conflicting and mutually reinforcing objectives of major stakeholder groups, such as societal and ecological, to raise the possibility of exceptional and sustained strategic advantage.

Evans et al. (2017) conclude that the definition of value should cover not just financial activity but also collaborative partnerships, agreements, and engagements that capture value channels (Allee, 2011, as cited in Evans et al., 2017). Mapping all value channels among partners, especially core stakeholders such as the ecological and societal communities, might reveal prospects for BM innovation (Den Ouden, 2012 as cited in Evans et al., 2017). Evans et al. (2017) define two theories:
Theory 1: The triple bottom line advantages conceptualise value components in creating long-term value for SMMEs.
Theory 2: SBMs necessitate a network of long-term value channels among numerous stakeholders and ecological and societal communities.

Lüdeke-Freund (2010) discusses the development of both commercial and societal advantages via innovative BMs. According to Lüdeke-Freund (2010) BM innovation is a method for designing, putting into practice, and changing business models in

order to gain and maintain market edge. Business models are said by Lüdeke-Freund (2010 to be capable of facilitating environmental strategies. If businesses adopt green initiatives according to Lüdeke-Freund (2010) their business models can aid in reconciling corporate governance variables, competitive positioning, and new technologies. Lüdeke-Freund (2010) supports theory 1 by Evans et al (2017) that the triple bottom line advantages conceptualise value components to achieve sustainable value SMMEs.

2.2.2 Value systems and collaborative partnerships

Incorporating sustainability into BMs necessitates a comprehensive approach that considers the overall picture and the many aspects of the system and their interrelationships (Stubbs and Cocklin, 2008, as cited in Evans et al., 2017). Value systems analysis gives this perspective and can help guide improvements to a SMMEs strategy (Kothandaraman and Wilson, 2001; Allee, 2011, as cited in Evans et al., 2017). The concept ‘network’ describes a set of companies in the start-up or well-established phase that are interconnected to fulfil both their company and mutually beneficial objectives, such as the SDGs (Borgatti and Foster, 2003; Provan and Kenis, 2007, as cited in Evans et al.,2017). Researchers in management research apply terminology like “partnerships, strategic alliances, inter-organizational relationships, coalitions, cooperative arrangements, and collaborative agreements” to describe these phenomena (Gulati and Kletter, 2005; Provan et al., 2007 as cited in Evans et al., 2017). The network’s main differentiating factor leads to a variety of identities, including innovation systems (Dhanaraj and Parkhe, 2006; Corsaro et al., 2012, as cited in Evans et al., 2017), supply chain management (Harland et al., 2004; Van Bommel, 2011 as cited in Evans et al., 2017), and production process systems (Rudberg and Olhager, 2003 as cited in Evans et al., 2017). A value system defines a collection of activities and relationships in which companies trade real and conceptual value to gain financial or societal goals (Allee, 2008, as cited in Evans et al., 2017). Because value networks comprise a range of functions and businesses with varying demands, distinct ideas produce value for partners in the system (Den Ouden, 2012, as cited

in Evans et al., 2017). Conventional network study has concentrated on the businesses that constitute the network; while the entire network as a system of authority has received less attention (Provan et al., 2007 as cited in Evans et al., 2017). Learning context information would impact leaders' judgments about forming new partnerships by offering information about present relationships' restrictions (Gulati, 1998, as cited in Evans et al., 2017). To ensure networks with an objective are productive, they require network oversight (Provan and Kenis, 2007, as cited in Evans et al., 2017). Robust networks strengthen partnerships and guarantee that value is distributed fairly (Dhanaraj and Parkhe, 2006, as cited in Evans et al., 2017). Thus far, incorporating sustainability in networks has lacked a comprehensive solution with the emphasis mostly on environmental conservation and the societal elements limited to the latest advancements of standards and practices of ethics (Van Bommel, 2011 as cited in Evans et al., 2017). According to Evans et al. (2017), reassigning the company's objective as a value chain member might pave the way for future SBMs. Balancing the triple bottom line components of a network necessitates a strategy based on the concept that all the main components should be sustainable and productive for the entire network to thrive (Ehrenfeld and Hoffman, 2013, as cited in Evans et al., 2017). According to Argandoa (2011) as cited in Evans et al. (2017), any strategy selected would be inadequate if the business's success depends on commercial benefit since the method of extracting that value would be prone to disputes. The value generated by businesses should be multifaceted as it is feasible to identify improved strategies to generate both financial and non-financial value over time, to enable all stakeholders contributing to the value creation to experience the advantages (Argandoa, 2011, as cited in Evans et al., 2017). According to Pandey and Gupta (2008), as cited in Evans et al. (2017), social-oriented businesses are built on collaborative acknowledgment and agreement by primary and secondary stakeholders. It is necessary to engage in purposeful engagement, collaboration, connection, and training of various and different stakeholders to achieve an organized and structured network (Winn and Kirchgeorg, 2005, as cited in Evans et al., 2017). Better stakeholder participation, increased confidence, and BM innovation are some of the major adjustments that companies must make to achieve a lifelong goal of being sustainable (Krantz, 2010; Bolton and Landells,

2015, as cited in Evans et al., 2017). Examining the network's value streams reveals how alternative decisions impact stakeholders' areas of agreement and, as a result, the network's long-term viability (Shaw, 2010 as cited in Evans et al., 2017).

Two theories arise according to Evans et al. (2017):

Theory 3: SBMs necessitates the creation of a value network with a repurposed goal, structure, and management.
Theory 4: For collaborative value, SBMs need a holistic examination of stakeholder relationships and roles.
According to Lüdeke-Freund (2010) the development of a theoretical model that integrates sustainable development tactics, environmental, the function of business models, and crucial notions regarding creating value in terms of both commercial and societal advantages. According to Lüdeke-Freund (2010) this strategy is cited as a key engine for greener innovation to achieve collaborative value according to theory 4 from Evans et al (2017).
Jørgensen and Pedersen (2018) study examines business strategy and management in this respect, as well as the contribution that various stakeholders, primarily clients and partnerships, participate in the lifecycle that results in business sustainable development. Jørgensen and Pedersen (2018) supports theory 4 of Evans et al. (2017) that SBMs need a holistic examination of stakeholder relationships and roles in order to achieve collaborative value.
According to Whelan and Fink (2016) capability to operate a business is not sector specific a SMME with a sustainability strategy is uniquely equipped to foresee and adapt to commercial, sociological, ecological, and legislation as they happen via regular discussion with stakeholders and continuous improvement. According to Whelan and Fink (2016) when a business does not build positive connections with their stakeholders, they risk increasing disagreement and decreasing stakeholder collaboration. This might make it difficult for a SMME to stay on track and stay within costs if they do not maintain a good relationship with their supplier and lose out on leveraging from business savings, therefore keeping costs low is key according to Whelan and Fink (2016. According to Whelan and Fink (2016), a large part of the strategic value of the SMMEs sustainability initiative is derived from the

need to communicate with and learn from important stakeholders on a regular basis, such as employees, suppliers, and customers.

2.2.3 Product-Service Systems (PSS)

The assessment of complex network limits that incorporate ecological consequences, consumption of products and when they reach their life cycle, and societal effects on the value network leads to technological capabilities (Evans et al., 2009 as cited in Evans et al., 2017). In environmental and social sciences, a discussion evolved over ecological impacts, their relationship to sustainable development, and the inherent consequences of eco-friendly legislation (Baumgärtner and Quaas, 2010, as cited in Evans et al., 2017). They viewed climate change effects from such perspective as unintended consequences of economic and environmental degradation that can socialize via mainstream monetary and fiscal reforms such as tariffs and licenses (Bithas, 2011, as cited in Evans et al., 2017). Maxwell and Van der Vorst (2003), as cited in Evans et al. (2017), propose a complementary method in which climate change effects, such as the expenses in the entire product life cycle, are monetized to maximize commercial elements as the primary incentive for agile production and quality customer service. Service-oriented BMs are an instance of innovative BMs that incorporate task effectively and quality assessment when customers are consuming the products (Lay et al., 2009 as cited in Evans et al., 2017). Another new business model is PSS, which defines the mixture of physical goods and customer-centric services (Tukker, 2015, as cited in Evans et al., 2017). PSS may help promote sustainable development by reducing climate change and encouraging SBMs to manufacture and use goods (Tukker, 2015; Vezzoli et al., 2015, as cited in Evans et al., 2017). The product life-cycle approach is crucial for constructing sustained PSS (Aurich et al., 2006; Linder and Williander, 2015, as cited in Evans et al., 2017). From a system standpoint, distribution network planning is critical in PSS architecture (Vezzoli et al., 2015, as cited in Evans et al., 2017). PSS legal arrangements may indicate the integration of several functions in the service level agreement that covers the product usage and the end of the product life cycle. Title and copyright protections,

employee and customer experience, transaction system, and future life-cycle processes in legal terms and conditions (Lay et al., 2009, as cited in Evans et al., 2017).

According to Evans et al. (2017), the essence of PSS is to offer clients capabilities and results rather than a good, which then makes companies accountable for economic, ecological, and societal inequalities for the entire product life cycle. The PSS approach incorporates the effects of product-oriented BMs as a foundation embracing life-cycle reasoning principles and develop governance models that hold businesses accountable (Evans et al., 2017). The last theory:
Theory 5: Understanding the effects of using PSS allows for SBM advancements.

Lüdeke-Freund (2010) stress the significance of business for advancement in sustainable production and consumption (SCP). BMs are explored in Lüdeke-Freund (2010) framework as macro elements that can aid in the uptake of greener goods and operations, more environmentally friendly supply chains, and other SCP benefits. As SCP is a form of PSS, Lüdeke-Freund (2010) supports Evans et al (2017) theory 5 that understanding the effects of using PSS allows SBM growth.

The findings Jørgensen and Pedersen (2018), offer guidance to producers in emerging economies on how to break out from their reliance on competitive goods and customized production while preserving a culture of sustainability. These findings by Jørgensen and Pedersen (2018) that benefit producers is a form of PSS, therefore supporting Evans et al (2017) theory 5 that understanding the effects of using PSS allows SBM growth.

As per the literature review contemplating SBMs is challenging to determine how to analyse the effect of SBMs and understand the implications on the SMME system. The goal of Evans et al. (2017) study is to give a coherent framework for SBM innovation that leads to improved triple bottom line efficiency.

3. Research methodology

3.1 Major focus constructs

The central focus constructs identified in this study are the dependent, independent, and demographic variables.

3.1.1 Dependent variable (A): Product-Service Systems (PSS)

The objective of this variable is: Understanding the effects of using PSS allows for SBM advancements.

- This will enable the analysis of whether there a connection between the SBM theory's enablers—such as value and SBMs, value systems and cooperative partnerships, and Product Services Systems (PSS)—that SMMEs might use to maximize the advantages of SBMs.

3.1.2 Independent variables (B)

Independent variable 1 (B): Value and SBMs

- The objective of this variable is: The triple bottom line advantages conceptualize value components in creating long-term value for SMMEs.
- This will enable the analysis of whether SMMEs with the advantages of SBMs can achieve a reduction in youth unemployment and drive economic growth.

Independent Variable 2 (B): Value system and collaborative partnerships

- The objective of this variable is: For collaborative value, SBMs need a holistic examination of stakeholder relationships and roles.
- This will enable an analysis of whether the relationship between the SBM theory's enables explain the connection between South African SMMEs' investments in innovation and their adoption of sustainability.

3.1.3 Demographics variables:

The objective of these variables is to collect demographic information such as age to determine the youth respondents, race to determine black respondents, location to identify respondents from Gauteng, and other general information such as gender and level of education.

3.2 Methodological approach

The selected digital survey approach was preferred because responders would be routed to a Wits online platform called Qualtrics XM and be able to post their replies there (Creswell and Creswell, 2018). Because the cost and time requirements for data information gathering for this online questionnaire are cheap, the intended participants have easy access to the technology (Creswell and Creswell, 2018). However, according to Creswell and Creswell (2018), digital questionnaires have disadvantages in that vast records of participant email accounts are unavailable, and other participants feel uncomfortable utilizing websites or sharing confidential data online. In addition, constraints of digital questionnaires, according to Mertler (2002) as cited in Creswell and Creswell (2018); technical difficulties aged internet devices or internet services prohibiting participants from evaluating and filling the questionnaire; multiple emails sent out to participants not received due to being classified as “spam” on their mailboxes; and predictive ability of the generated sample and pattern recognition of the survey results.

3.3 Population for data collection

The primary goal of the survey questionnaire is to define the attributes of SMMEs in South Africa (SA), which is the population (Fraenkel et al., 2012, cited in Creswell and Creswell, 2018). A quantitative approach was chosen because it uses a questionnaire to characterize the perceptions, viewpoints, habits, observations, or other representativeness of the sample, which is SMMEs in the Gauteng province in the City of Johannesburg, or in some cases, an existing population of all SMMEs in the Gauteng province in Johannesburg (Creswell and Creswell, 2018).

As of September 2021, there are approximately 2.4 million SMMEs in SA and the majority of 917 043 (38.1%) SMMEs are in the Gauteng province (seda, 2022); approximately 37% are in the formal sector. Therefore, the population of formal SMMEs in Gauteng is approximately 339 305 SMMEs. According to Simon Shiya the seda Johannesburg Branch Manager the statistic on the number of SMMEs assisted through the Seda Johannesburg branch as of February 2023 is 1 052 SMMEs (S. Shiya, personal communication, February 17, 2023).

A close-ended ten-question questionnaire was developed and attached as a supplementary document to this report. The questionnaire collects the primary data for the analysis, which will be a quantitative method of collecting data with the following attributes.

- *Dependent Variable: One questions have been formulated as ratio continuous running data, fine-scale from low to high natural zero (Chapter 1 Introduction to data, 2015). Respondents are requested to allocate scores for each of the two questions so that the total adds to 100% or 100 points.*
- *Independent Variable 1: There are two questions:*
    - *One questions have been formulated as ratio continuous running data, fine scale from low to high natural zero (Chapter 1 Introduction to data, 2015). Respondents are requested to allocate scores for each of the two questions so that the total adds to 100% or 100 points.*

    - *One multi-item scale, four questions, no reversed, 1-7 Likert scale, individual items ordinal, aggregated scale continuous (Chapter 1 Introduction to data, 2015).*
- *Independent Variable 2: One question with a multi-item scale, four questions, no reverse, 1-7 Likert scale, individual items ordinal, aggregated scale continuous (Chapter 1 Introduction to data, 2015).*
- *Demographics variable: This consists of five questions. The demographic variables provide continuous data regarding age measures years. (Chapter 1 Introduction to data, 2015). The other demographic information provides categorical data. (Chapter 1 Introduction to data, 2015).*

3.4 Data analysis

The selected methodology is a way of identifying and selecting respondents to participate in the research (Chapter 1 Introduction to data, 2015). SMMEs in the Gauteng province in Johannesburg is the study's areas of focus and inclusion criteria. As a result, this study employed a systematic selection strategy to choose responders from a sample of SMMEs in the Gauteng province in Johannesburg (Chapter 1 Introduction to data, 2015). I will request a random sample of the above-mentioned potential responders to complete a questionnaire after receiving an online link via Qualtrics XAM. The disadvantage of this strategy is that some respondents either not answer the whole survey or can be detected as "Easter eggs"; which would require that their responses be declared inadequate and unusable for this study and hence eliminated (Chapter 1 Introduction to data, 2015). On the other hand, this sampling strategy is simpler, faster, and more accessible for the researcher (Chapter 1 Introduction to data, 2015). However, one of its flaws is that it is sometimes skewed and may not reflect the entire population, making it extremely hard to generalize the study's findings (Chapter 1 Introduction to data, 2015).

The Likert-item scales will first evaluate each set of variable items for consistency reliability [typically using the Cronbach alpha] (Chapter 1 Introduction to data, 2015) using IBM SPSS Statistics [Version 28] (Chapter 2 Basic data analysis in SPSS,

2015). Then, if feasible, utilise factor analysis to assess the multi-item scales' concurrent criterion validity (Chapter 1 Introduction to data, 2015). Secondly, assuming intrinsic reliability and validity are acceptable, combine the many components of each variable group into one-factor rating for each inference by adding the sub-items in the group and aggregating the results (Chapter 1 Introduction to data, 2015).

Data collected will be analysed using IBM SPSS Statistics (Version 28) to assess the model's fitness (Chapter 2 Basic data analysis in SPSS, 2015). The causal link between the independent and dependent variables testing using descriptive statistics and the Linear Regression analysis approach (Chapter 5 Regression theory, 2015). The presence of a link between the variables will be determined using correlation analysis (Chapter 5 Regression theory, 2015). The association between the dependent variable and the independent demographic factors such as respondents' age, race, locality, and education level investigation use an ANOVA analysis (Chapter 5 Regression theory, 2015). According to Creswell and Creswell (2018), because surveying the total population of SMMEs in the Gauteng province in Johannesburg is not practical nor viable, a sample of participants who are primarily SMMEs in Johannesburg will be chosen from the population. Because the survey aims to characterize the descriptive design, the sample selection will apply probabilistic sampling procedures to guarantee that the population is accurately represented (Creswell and Creswell, 2018). No sampling strategy can provide a flawless depiction, although statistical methods can help (Creswell and Creswell, 2018). Since the questionnaire survey seeks to define the total population by gathering and analysing information from a fraction of the wider population, a precise depiction is required (Creswell and Creswell, 2018). This survey study may also be utilized in a comparative survey methodology (Black and McMillan, 2012, as mentioned in Creswell and Creswell, 2018) to look at variations in views amongst two or more demographic variables of the population, such as gender, age, race, educational level, and location using multivariate data analysis techniques by Hair, Black, Babin and Anderson (2010).

3.5 Ethical consideration

Using the principles of Stacey and Stacey (2012), I have designed the consent agreement on the Qualtrics online survey (Appendix A) to include the following research ethics customs and guidelines:

- *First, participants' completion of the survey is voluntary.*
- *Therefore, participants may stop participating in the study at any stage.*
- *The survey has no personal identifiers (such as name or surname or identity number, email address) or personal information collected, ensuring their identity will be completely anonymous.*
- *The data collected will be kept confidential.*
- *The information included is how long the survey will take to complete and how many questions.*
- *The survey outlines the eligibility criteria for participating in the survey.*
- *The universities contact information should participants have any concerns or complaints regarding the ethical procedures of this study.*

In preparing this research, I used Reinecke, Arnold, and Palazzo (2016) to show that the questionnaires, supporting evidence, and theory statements are compatible. Then I used Reinecke et al. (2016) recommendations on how to achieve the following anticipations:

1) Proved why the survey is worthy of academic interest by demonstrating in the research problem statement how SBM theory explains how SMMEs can invest in innovation and adopt sustainability to reduce youth unemployment among South Africa's black youth and achieve economic growth.

2) Used robust quantitative methodologies, such as assessing the model's fitness using SPSS software and testing the causal link between the independent and dependent variables using descriptive statistics and the Linear Regression analysis approach.

3) Offered plausible supporting evidence for theories assertions by designing the research correctly in ensuring the independent variables are ratio and interval data, with demographic data focusing on categorical data. In addition, the questions are designed as open-ended and using a 7-Likert scale, ensuring answers are more specific and evaluating some variables through multiple questions, which are 7-Likert scale.

4) Included enough statistical studies in the practical examples of SBMs in Africa in the research problem statement section.

5) Demonstrated the interaction of hypothesis testing and theory by outlining the SBM theory in the literature review and using the SBM theory from the literature review to develop the hypothesis, dependent, and independent variables for testing.

6) Others can apply findings to scenarios as the SBM theory applies not only to SMMEs but to all businesses, whether small or large corporations. It can also apply to entrepreneurs, governmental institutions, academic institutions, NPOs, and social initiatives who can benefit from adopting and investing in SBMs within their business.

I am a qualified and registered Chartered Accountant in South Africa and bound by the SAICA and comply with the International Code of Ethics for Professional Accountants) according to the International Ethics Standards Board for Accountants' (IESBA) (SAICA Code of Conduct, n.d.).

I completed the WBS Plagiarism Comprehension Test. A Turnitin in similarity index will be generated for this report, although there are some limitations in the information to detect plagiarism. I will make an ethical clearance application on this proposal to ensure all potential ethical problems are addressed and mitigated to a reasonable level.

4. Results and Findings

The results of the survey were derived from the 10 questions distributed to respondents via the Qualtrics XM resulting to a database. The Qualtrics XM

database was then analysed to detect whether there were any errors, the range in each column for the minimum and maximum values was checked (Chapter 1 Introduction to data, 2015). The next item that was checked was whether there were any missing dataset issues, firstly the study was designed to ensure that there were minimum omission items with multi-item scale and ensuring that the online survey did not allow missing data. However, from analysis this had discouraged some participants from completing the survey (Chapter 1 Introduction to data, 2015).

The final phase was to assess the missing dataset from dependent variable and the fundamental section missing. From the analysis that was done, missing information for dependent and independent variables were deleted from the dataset, as some respondents only stopped answering after they completed the demographics information (Chapter 1 Introduction to data, 2015).

After the database was cleaned, the sample size was 103 respondents out of the population size of 1 050 SMMEs in Johannesburg. According to Conroy (2016) as per Figure 3 below, a population size of 1 000 requires a sample size of 88 to achieve an acceptable margin of error of 10% thus achieving a confidence level of 90%. Therefore, the sample size of 103 had a 10% acceptable margin of error and 90% confidence level with regards to representation of the sample size on the total population defined in this research.

Table 1.1 Sample sizes for prevalence studies

Acceptable margin of error	Size of population					
	Large	**5000**	**2500**	**1000**	**500**	**200**
±20%	24	24	24	23	23	22
±15%	43	42	42	41	39	35
±10%	96	94	93	88	81	65
±7.5%	171	165	160	146	127	92
±5%	384	357	333	278	217	132
±3%	1067	880	748	516	341	169

Figure 2: Table 1.1 Sample sizes for prevalence studies (Conroy, 2016)

4.1 Reliability of dependent and independent variables

The analysis of the results focused on three elements, firstly the reliability of each of the dependent and independent variables, secondly the relationship between the dependent and independent variables: and lastly the relationship between the dependent and demographic variables. The variables were defined as follows in the Qualtrics XM that was used to collect observations from respondents, and SPSS used to analyse the database from Qualtrics XM:

- ***BFI 1:*** *The independent variable 1 question for "Value and SBMs"*
- ***BFI 2****: The independent variable 2 question 1 for "Value system and collaborative partnerships"*
- ***BFI 3:*** *The independent variable 2 question 2 for "Value system and collaborative partnerships"*
- ***BFI 4:*** *The dependent variable questions for "Product-Service Systems (PSS)"*

4.1.1 For the independent variable 1 question for "Value and SBMs" (BFI 1):

"Which are the most important elements of achieving triple bottom (economic/profit, environmental and social) line advantages as value components in creating long-term value for SMMEs? Allocate a score between 1 and 100 across these choices to represent those which you believe are more or less important. Which are the most important value components for creating a sustainable triple bottom line?"

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.948	.950	13

Inter-Item Correlation Matrix

	BFI 1_1	BFI 1_2	BFI 1_3	BFI 1_4	BFI 1_5	BFI 1_6	BFI 1_7	BFI 1_8	BFI 1_9	BFI 1_10	BFI 1_11	BFI 1_12	BFI 1_13
BFI 1_1	1.000	.547	.540	.556	.547	.604	.522	.555	.519	.511	.520	.561	.541
BFI 1_2	.547	1.000	.696	.751	.718	.657	.575	.505	.343	.565	.615	.586	.686
BFI 1_3	.540	.696	1.000	.794	.652	.675	.647	.602	.323	.614	.628	.598	.672
BFI 1_4	.556	.751	.794	1.000	.763	.775	.560	.492	.269	.563	.599	.582	.670
BFI 1_5	.547	.718	.652	.763	1.000	.714	.630	.558	.413	.559	.656	.584	.741
BFI 1_6	.604	.657	.675	.775	.714	1.000	.662	.634	.384	.681	.677	.623	.730
BFI 1_7	.522	.575	.647	.560	.630	.662	1.000	.691	.453	.634	.622	.491	.769
BFI 1_8	.555	.505	.602	.492	.558	.634	.691	1.000	.597	.589	.530	.523	.666
BFI 1_9	.519	.343	.323	.269	.413	.384	.453	.597	1.000	.447	.346	.435	.392
BFI 1_10	.511	.565	.614	.563	.559	.681	.634	.589	.447	1.000	.667	.657	.752
BFI 1_11	.520	.615	.628	.599	.656	.677	.622	.530	.346	.667	1.000	.716	.742
BFI 1_12	.561	.586	.598	.582	.584	.623	.491	.523	.435	.657	.716	1.000	.710
BFI 1_13	.541	.686	.672	.670	.741	.730	.769	.666	.392	.752	.742	.710	1.000

Figure 3: Reliability Statistics and Inter-Item Correlation Matrix for BFI 1 "Value and SBMs" independent variable 1 from SPSS

BFI 1 - Which are the most important elements of achieving triple bottom (economic/profit, environmental and social) line advanta... Page Options

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Have easy to understand terms and conditions: _____ (1)	4.00	100.00	68.21	28.39	805.84	103
2	Treat customers fairly: _____ (2)	4.00	100.00	82.30	25.32	641.14	103
3	Provide good quality service to customers: _____ (3)	9.00	100.00	88.64	19.98	399.30	103
4	Treat its employees fairly: _____ (4)	15.00	100.00	84.68	21.97	482.80	103
5	Provide good opportunities to its employees: _____ (5)	6.00	100.00	79.95	22.29	497.04	103
6	Pay its employees well: _____ (6)	11.00	100.00	79.16	23.50	552.13	103
7	Comply with all laws and regulations: _____ (7)	8.00	100.00	81.74	25.22	635.98	103
8	Be responsible towards the environment and climate change in their product and service lifecycle: _____ (8)	7.00	100.00	72.48	25.72	661.49	103
9	Provide a report on Corporate Social Responsibility initiatives and role in United Nations 17 SDGs: (9)	0.00	100.00	59.41	27.24	742.18	103
10	Have SBMs that accomplished via technological, commercial, or consumer experience and continuous improvement: _____ (10)	9.00	100.00	70.86	26.00	676.08	103
11	Provide good returns to its shareholders: _____ (11)	7.00	100.00	73.59	26.61	708.12	103
12	Treat its shareholders fairly: _____ (12)	7.00	100.00	73.67	25.09	629.54	103
13	Be transparent in its dealings with shareholders: _____ (13)	13.00	100.00	79.28	24.34	592.30	103

Figure 4: BFI 1 "Value and SBMs" independent variable 1 from Qualtrics XM survey

There were 13 options (Figure 5 above) in the question that measured the scale of between 1 and 100 across the respondents to determine the most important value components for creating a sustainable triple bottom line.

The 13 value components (Figure 5 above) had a mean ranging from 59.4 to 88.6 points and a standard deviation ranging from 20.1 to 28.5 which indicated that the value components are important to respondents for creating a sustainable triple

bottom line. The most important value components that had a mean above 80 points components such as treating customers fairly, providing good quality service to customers, treating employees fairly, and complying with laws and regulations. Providing a report on Corporate Social Responsibility was the least important value component for creating sustainable triple bottom line to the respondents as it had the lowest mean of 59.4 points.

The 13-item scale was first evaluated for each set of variable items for consistency reliability using the Cronbach alpha (Chapter 1 Introduction to data, 2015). The internal consistency of the "Value and SBMs" independent variable single set 13 item scale had a 94.5% Cronbach alpha (Figure 4 above) which indicated that the 13 items scale was reliable (Chapter 2 Basic data analysis in SPSS, 2015). As the intrinsic reliability and validity were acceptable, the 13 important value components of each variable group had been combined into one-factor rating for each inference by adding the sub-items in the group and aggregating the results to **"BFI1Total"** (Chapter 1 Introduction to data, 2015). The inter item correlation (Figure 4 above) indicated that the 13 important value components had a positive correlation ranging between 30% and 70% (Figure 4 above), which indicated that the variables were associated with each other (Chapter 2 Basic data analysis in SPSS, 2015).

4.1.2For the independent variable 2 questions for "Value system and collaborative partnerships"

Question 1 (BFI 2): *"For collaborative value, SBMs need a holistic examination of stakeholder relationships and roles. Allocate a score between 1 and 100 across these choices to represent those which you believe are more or less important. I believe that the most important stakeholders to achieve a SBMs collaborative value:"*

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.919	.920	10

Inter-Item Correlation Matrix

	BFI 2_1	BFI 2_2	BFI 2_3	BFI 2_4	BFI 2_5	BFI 2_6	BFI 2_7	BFI 2_8	BFI 2_9	BFI 2_10
BFI 2_1	1.000	.701	.808	.488	.611	.443	.408	.338	.377	.457
BFI 2_2	.701	1.000	.728	.520	.613	.553	.485	.444	.458	.551
BFI 2_3	.808	.728	1.000	.455	.564	.434	.398	.351	.338	.496
BFI 2_4	.488	.520	.455	1.000	.447	.629	.554	.709	.527	.448
BFI 2_5	.611	.613	.564	.447	1.000	.585	.515	.368	.443	.551
BFI 2_6	.443	.553	.434	.629	.585	1.000	.586	.641	.639	.654
BFI 2_7	.408	.485	.398	.554	.515	.586	1.000	.632	.618	.549
BFI 2_8	.338	.444	.351	.709	.368	.641	.632	1.000	.710	.533
BFI 2_9	.377	.458	.338	.527	.443	.639	.618	.710	1.000	.698
BFI 2_10	.457	.551	.496	.448	.551	.654	.549	.533	.698	1.000

Figure 5: Reliability Statistics and Inter-Item Correlation Matrix for BFI 2 "Value system and collaborative partnerships" independent variable 2 question 1 from SPSS

BFI 2 - For collaborative value, SBMs need a holistic examination of stakeholder relationships and roles. Allocate a score between ... Page Options

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	_____ Customers (1)	9.00	100.00	83.95	23.24	539.91	103
2	_____ Suppliers (2)	8.00	100.00	78.77	21.42	458.92	103
3	_____ Employees (3)	8.00	100.00	83.49	22.03	485.26	103
4	_____ Society and Non-Profit Organisations (4)	6.00	100.00	62.92	26.98	727.97	103
5	_____ Shareholders (5)	8.00	100.00	72.73	24.66	608.14	103
6	_____ Advertisers (6)	3.00	100.00	62.81	26.76	716.00	103
7	_____ Government institutions (7)	2.00	100.00	59.75	27.14	736.64	103
8	_____ Academic institutions (8)	7.00	100.00	57.28	28.32	801.83	103
9	_____ Global corporations and organisations (9)	7.00	100.00	59.53	26.95	726.19	103
10	_____ Professional Service Providers (Bankers, Lawyers, Accountants) (10)	5.00	100.00	69.42	26.59	707.21	103

Figure 6: BFI 2 "Value system and collaborative partnerships" independent variable 2 question 1 statistics from Qualtrics XM survey

There were 10 options (Figure 7 above) in the question that measured the scale of between 1 and 100 across the respondents that determined the most important stakeholders to achieve a SBMs collaborative value.

The 10 stakeholders (Figure 7 above) had a mean ranging from 57.3 to 83.9 points and standard deviation ranging from 21.5 to 28.3 which indicated that all the stakeholders were important for achieving a SBMs collaborative value according to the respondents. The most important stakeholders that had a mean above 80 points were customers and employees, followed by suppliers and shareholders that had a mean greater than 70 points. Academic institutions were the least important stakeholders to the respondents as they had the lowest mean of 57.3 points.

The 10-item options scale was first evaluated for each set of variable items for consistency reliability using the Cronbach alpha (Chapter 1 Introduction to data, 2015). The internal consistency of the "Value system and collaborative partnerships" first question independent variable that had a single set 10 item scale had a 92.2% Cronbach alpha (Figure 6 above) which indicated that the 10 items scale was reliable (Chapter 2 Basic data analysis in SPSS, 2015). As the intrinsic reliability and validity were acceptable, the 10 important stakeholders of each variable group had been combined into one-factor rating for each inference by adding the sub-items in the group and aggregating the results to **"BFI2Total"** (Chapter 1 Introduction to data, 2015). The inter item correlation (Figure 6 above) indicated that the 10 important stakeholders have positive correlation ranging between 30% and 70% (Figure 6 above), indicating that the variables were associated with each other (Chapter 2 Basic data analysis in SPSS, 2015).

Question 2 (BFI 3): *"For collaborative value, SBMs need a holistic examination of stakeholder relationships and roles. What is your personal view of the following statements?"*

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.872	.873	4

Inter-Item Correlation Matrix

	BFI 3_1	BFI 3_2	BFI 3_3	BFI 3_4
BFI 3_1	1.000	.810	.584	.464
BFI 3_2	.810	1.000	.689	.615
BFI 3_3	.584	.689	1.000	.625
BFI 3_4	.464	.615	.625	1.000

Figure 7: Reliability Statistics and Inter-Item Correlation Matrix for BFI 3 "Value system and collaborative partnerships" independent variable 2 question 2 from SPSS

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	It is necessary to engage in purposeful engagement, collaborating, connecting, and training from various and different stakeholders to achieve an organized and structured network (1)	1.00	7.00	5.78	1.53	2.35	102
2	Better stakeholder participation, as well as increased confidence and Business Model innovation, are some of the major adjustments that companies must make in order to achieve a lifelong goal of being sustainable (2)	1.00	7.00	5.75	1.40	1.95	102
3	Collaborative value creation in SBMs necessitates systematic assessment of a diverse group of stakeholders with an interest and obligation focused on the future growth of the network (3)	1.00	7.00	5.54	1.37	1.88	102
4	Innovation systems and supply chain management should be common networks(4)	1.00	7.00	5.66	1.32	1.74	102

#	Field	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)	Total
1	It is necessary to engage in purposeful engagement, collaborating, connecting, and training from various and different stakeholders to achieve an organized and structured network (1)	4.90% 5	1.96% 2	1.96% 2	3.92% 4	13.73% 14	35.29% 36	38.24% 39	102
2	Better stakeholder participation, as well as increased confidence and Business Model innovation, are some of the major adjustments that companies must make in order to achieve a lifelong goal of being sustainable (2)	3.92% 4	0.98% 1	2.94% 3	5.88% 6	8.82% 9	49.02% 50	28.43% 29	102
3	Collaborative value creation in SBMs necessitates systematic assessment of a diverse group of stakeholders with an interest and obligation focused on the future growth of the network (3)	1.96% 2	2.94% 3	5.88% 6	5.88% 6	15.69% 16	47.06% 48	20.59% 21	102
4	Innovation systems and supply chain management should be common networks(4)	1.96% 2	1.96% 2	3.92% 4	8.82% 9	10.78% 11	49.02% 50	23.53% 24	102

Figure 8: BFI 3 "Value system and collaborative partnerships" independent variable 2 question 2 statistics from Qualtrics XM survey

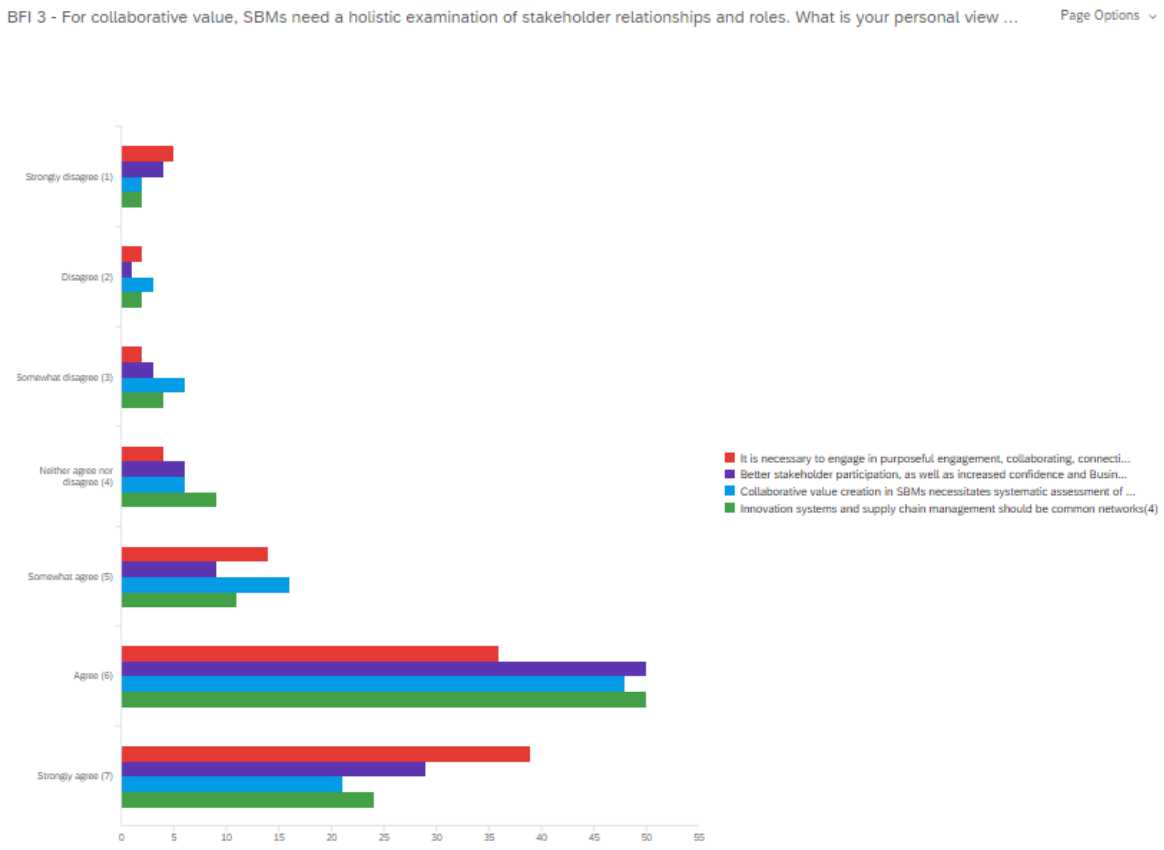


Figure 9: BFI 3 "Value system and collaborative partnerships" independent variable 2 question 2 graph from Qualtrics XM survey

There were 4 statements (Figure 9 above) in the question that measured the 7 item-Likert scale (Figure 10 above) of the respondents that determined the personal view of the statements for "Value system and collaborative partnerships" independent variable.

The 4 statements (Figure 9 above) had an average mean of 5 and standard deviation ranging from 1.3 to 1.5 which indicated that on average respondents "somewhat agree" or "agree" that the 4 statements were important factors for establishing value systems and collaborative partnerships. As per Figure 10 above:

- The second statement, third and fourth statement had the similar rating and the highest number of respondents, ranging between 48 and 50 respondents each (Figure 9 above), the respondents were in agreement that *"Better stakeholder participation, as well as increased confidence and Business Model innovation, are some of the major adjustments that*

companies must make in order to achieve a lifelong goal of being sustainable"; "Innovation systems and supply chain management should be common networks" and *"Collaborative value creation in SBMs necessitates systematic assessment of a diverse group of stakeholders with an interest and obligation focused on the future growth of the network".*

- The first statement *"It is necessary to engage in purposeful engagement, collaborating, connecting, and training from various and different stakeholders to achieve an organized and structured network"* had the lowest number of respondents being 36 respondents (Figure 9 above) who agreed to the statement, when compared to the other four statements.

One respondent out of the 103 did not answer the questions for variable BFI 3, therefore the average of the variables was used to bring the sample for BFI 3 to 103 to align to the sample size of the other variables. The 4 statements that had the 7 item-Likert scale were first evaluated for each set of variable items for consistency reliability using the Cronbach alpha (Chapter 1 Introduction to data, 2015). The internal consistency of the "Value system and collaborative partnerships" second question independent variable single set 4 item scale had an 87.2% Cronbach alpha (Figure 8 above) which indicates that the 4 items scale was reliable (Chapter 2 Basic data analysis in SPSS, 2015). As the intrinsic reliability and validity was acceptable, the 4 statements of each variable group had been combined into one-factor rating for each inference by adding the sub-items in the group and aggregating the results to **"BFI3Total"** (Chapter 1 Introduction to data, 2015). The inter item correlation (Figure 8 above) indicated that the 4 statements had a positive correlation ranging between 40% and 80% (Figure 8 above), that indicated that the variables were associated with each other (Chapter 2 Basic data analysis in SPSS, 2015).

4.1.3For the dependent variable questions for "Product-Service Systems (PSS)" (BFI 4)

"*Understanding the effects using Product Service Systems (PSS) allows for SBM advancements. PSS, which is defined the mixture of physical goods and rendering services that are customer centric. What is your personal view of the following statements?"*

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.908	.908	4

Inter-Item Correlation Matrix

	BFI 4_1	BFI 4_2	BFI 4_3	BFI 4_4
BFI 4_1	1.000	.708	.677	.685
BFI 4_2	.708	1.000	.800	.674
BFI 4_3	.677	.800	1.000	.731
BFI 4_4	.685	.674	.731	1.000

Figure 10: Reliability Statistics and Inter-Item Correlation Matrix for BFI 4 "Product-Service Systems (PSS)" dependent variable from SPSS

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Climate change effects, such as the expenses in the entire product life-cycle, are important in order to maximize commercial elements as primary incentive for agile production and quality customer service (1)	1.00	7.00	5.19	1.42	2.02	103
2	The product life-cycle approach is crucial idea for constructing comprehensively sustained PSS. Distribution network planning is critical in PSS architecture from a system standpoint (2)	1.00	7.00	5.51	1.33	1.76	103
3	PSS legal arrangements may indicate the integration of several functions in the service level agreement that covers how the product should be used and the end product life-cycle (3)	1.00	7.00	5.29	1.38	1.92	103
4	Principles of life-cycle reasoning and developing governance models are necessary to hold businesses accountable (4)	1.00	7.00	5.66	1.35	1.84	103

#	Field	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)	Total
1	Climate change effects, such as the expenses in the entire product life-cycle, are important in order to maximize commercial elements as primary incentive for agile production and quality customer service (1)	2.91% 3	2.91% 3	6.80% 7	11.65% 12	25.24% 26	35.92% 37	14.56% 15	103
2	The product life-cycle approach is crucial idea for constructing comprehensively sustained PSS. Distribution network planning is critical in PSS architecture from a system standpoint (2)	2.91% 3	0.97% 1	5.83% 6	3.88% 4	24.27% 25	42.72% 44	19.42% 20	103
3	PSS legal arrangements may indicate the integration of several functions in the service level agreement that covers how the product should be used and the end product life-cycle (3)	2.91% 3	1.94% 2	7.77% 8	7.77% 8	23.30% 24	42.72% 44	13.59% 14	103
4	Principles of life-cycle reasoning and developing governance models are necessary to hold businesses accountable (4)	2.91% 3	0.97% 1	3.88% 4	8.74% 9	11.65% 12	46.60% 48	25.24% 26	103

Figure 11: BFI 4 "Product-Service Systems (PSS)" dependent variable statistics from Qualtrics XM survey

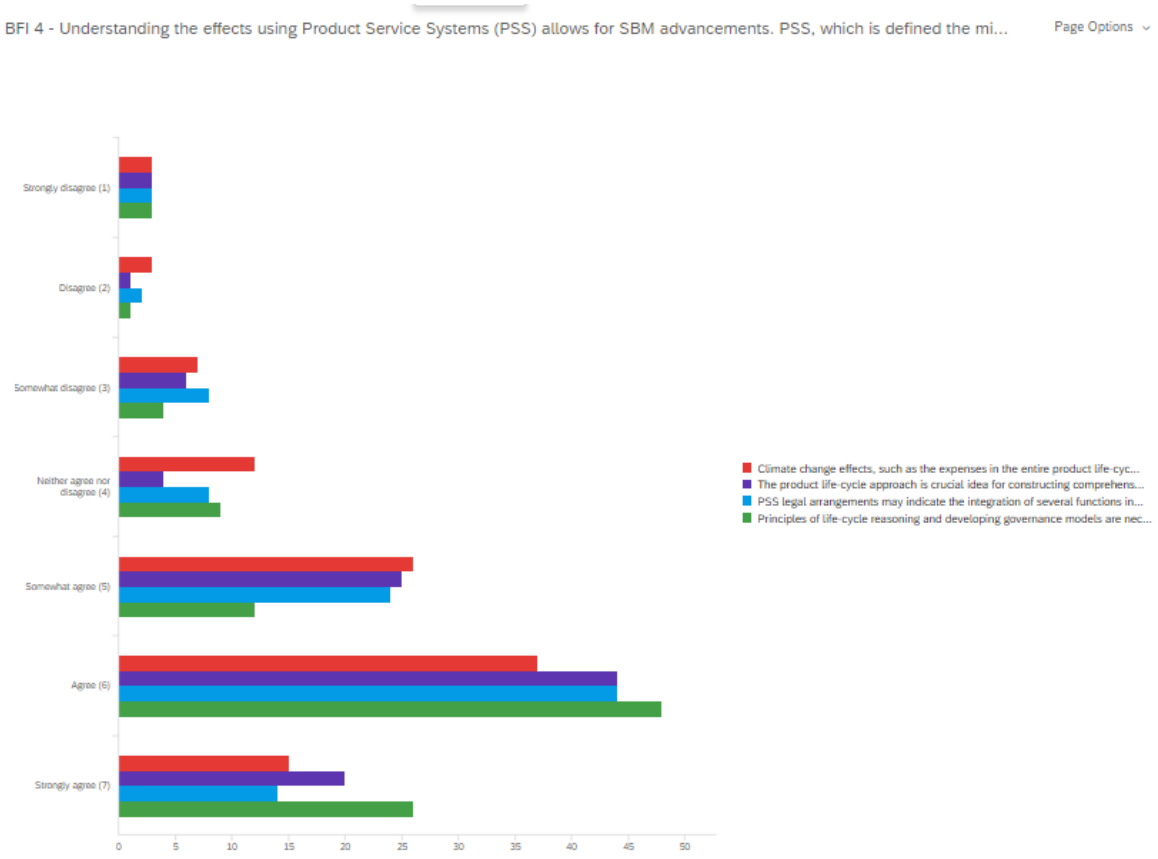


Figure 12: "Product-Service Systems (PSS)" dependent variable graph from Qualtrics XM survey

There were 4 statements (Figure 12 above) in the question that measured the 7 item-Likert scale (Figure 13 above) for the respondents that determined their personal views of the statements for the "PSS" dependent variable.

The 4 statements (Figure 12 above) had an average mean of 5 and standard deviation ranging from 1.28 to 1.37 which indicated that on average respondents "somewhat agree" or "agree" to the 4 statements that support that understanding the effects using Product Service Systems (PSS) allows for SBM advancements. As per Figure 13 above:

- The fourth statement *"Principles of life-cycle reasoning and developing governance models are necessary to hold businesses accountable"* had the highest number of respondents who agreed with statement and had 48 respondents (Figure12 above).
- The second statement *"The product life-cycle approach is crucial idea for constructing comprehensively sustained PSS. Distribution network planning*

is critical in PSS architecture from a system standpoint" and third statement *"PSS legal arrangements may indicate the integration of several functions in the service level agreement that covers how the product should be used and the end product life-cycle"* had the similar number of respondents at 44 each (Figure 12 above) who agreed to the statements.

- The first statement *"Climate change effects, such as the expenses in the entire product life-cycle, are important in order to maximize commercial elements as primary incentive for agile production and quality customer service"* had the lowest number of respondents who agreed to the statement being 37 respondents (Figure 12 above), when compared to the other four statements.

The 4 statements had a 7item-Likert scale was first evaluated for each set of variable items for consistency reliability using the Cronbach alpha (Chapter 1 Introduction to data, 2015). The internal consistency of the "Product-Service Systems (PSS)" dependent variable single set 4 item scale had a 90.1% Cronbach alpha (Figure 11 above) which indicated that the 4 items scale was reliable (Chapter 2 Basic data analysis in SPSS, 2015). As the intrinsic reliability and validity was acceptable, the 4 statements of each variable group had been combined into one-factor rating for each inference by adding the sub-items in the group and aggregating the results to **"BFI4Total"** (Chapter 1 Introduction to data, 2015). The inter item correlation (Figure 11 above) indicated that the 4 statements had a significant positive correlation ranging between 60% and 80% (Figure 11 above), which indicated that the variables were associated with each other (Chapter 2 Basic data analysis in SPSS, 2015).

4.2 Relationship between the dependent and independent variables

The process that aggregated the multi-item variables for each of the independent and independent variables had led to the following naming conversion:

- *BFI1Total: The aggregated independent variable 1 question for "Value and SBMs"*
- *BFI2Total: The aggregated independent variable 2 question 1 for "Value system and collaborative partnerships"*
- *BFI3Total: The aggregated independent variable 2 question 2 for "Value system and collaborative partnerships"*
- *BFI4Total: The aggregated dependent variable questions for "Product-Service Systems (PSS)"*

The relationship between the dependent variable PSS (BFI4Total) and the independent variables ["Value and SBMs" (BFI1Total), question 1 for "Value system and collaborative partnerships" (BFI2Total), and question 2 for "Value system and collaborative partnerships" (BFI3Total)] had been assessed using the regression approach on linearity (Chapter 5 Regression theory, 2015).

Descriptive Statistics

	Mean	Std. Deviation	N
BFI4Total	5.4150	1.22101	103
BFI1Total	76.4593	19.58761	103
BFI2Total	69.0641	19.48736	103
BFI3Total	5.6869	1.19523	103

Figure 13: Descriptive statistics from SPSS

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.735[a]	.540	.526	.84087	2.016

a. Predictors: (Constant), BFI3Total, BFI2Total, BFI1Total

b. Dependent Variable: BFI4Total

Figure 14: Model summary from SPSS

The Adjusted R square was used as there were multiple independent variables (predicators), if there was one predicator, R Square would have been interpreted (Chapter 5 Regression theory, 2015). The model summary on Figure 15 above, indicated an Adjusted R Square of 52.6% which explained that all independent

variables (predicators) explained 52.6% of the variability of the dependent variable PSS (BFI4Total) (Chapter 5 Regression theory, 2015). The relationship between R Square (54%) and Adjusted R Square (52.6%) varied by 1.4%, which indicated that the noise of the model stability and had a level of simplicity (Chapter 5 Regression theory, 2015).

Durbin-Watson an indicator of auto correlation should lie between 1.5 and 2.5, as an indicator that the independent variables do not have a potential relationship or influence with each other (Chapter 5 Regression theory, 2015). As per Figure 15 above, the Durbin Watson of 2.02 which indicated that the independent variables did not have a relationship or influence each other.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	82.070	3	27.357	38.691	<,001[b]
	Residual	69.999	99	.707		
	Total	152.069	102			

a. Dependent Variable: BFI4Total

b. Predictors: (Constant), BFI3Total, BFI2Total, BFI1Total

Figure 15: ANOVA from SPSS

The Figure 16 ANOVA tested the overall model's goodness and fit, with was indicated by Sig that is less than 0.05, which would mean the model had a 95% confidence level (Chapter 5 Regression theory, 2015). The model had a Significance of less than 0.001 which indicated that the model had a 99.9% confidence level which indicated that the linearity assumption had been satisfied and the model a good fit.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95,0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	.852	.460		1.855	.067	-.060	1.764		
	BFI1Total	.005	.008	.085	.700	.485	-.010	.020	.316	3.165
	BFI2Total	.002	.008	.031	.259	.796	-.013	.017	.320	3.127
	BFI3Total	.707	.073	.692	9.665	<,001	.562	.853	.906	1.104

a. Dependent Variable: BFI4Total

Figure 16: Coefficients from SPSS

Figure 17 coefficients analysed the overall effect of independent variables had on dependent variable PSS (BFI4Total). The unstandardized coefficients were analysed which indicated the average dependent variable PSS (BFI4 Total) would change by 0.82 if everything from the model was excluded (Chapter 5 Regression theory, 2015). If everything in the model was included, 1 unit change in the dependent variable PSS would increase by 0.5% for “Value and SBMs” (BFI1Total) variable, 0.2% question 1 for “Value system and collaborative partnerships” (BFI2Total) variable, and 70.7% for question 2 of “Value system and collaborative partnerships” (BFI3Total) variable. This indicated that question 2 of “Value system and collaborative partnerships” (BFI3Total) variable was the most significant or had the largest impact or accounting for most of the variance standard coefficient beta in PSS (BFI4Total) variable (Chapter 5 Regression theory, 2015). The question 2 of “Value system and collaborative partnerships” (BFI3Total) variable was significant at 99.9% (less than 0.1%) that explained the variance in the dependant variable PSS (BFI4Total).

The second regression approach was the “independent of error”, that the independent variables had no relationship with each other there is multi collinearity and endogeneity was analysed (Chapter 5 Regression theory, 2015).

- The VIF should not be greater than 10, if it was below 10 there was no evidence of collinearity, if it was greater than 10 or close to 9, then there was evidence of collinearity (Chapter 5 Regression theory, 2015). The VIF coefficient on Figure 17 ranged between 1 and 3, therefore there was no evidence of collinearity.

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions			
				(Constant)	BFI1Total	BFI2Total	BFI3Total
1	1	3.920	1.000	.00	.00	.00	.00
	2	.050	8.817	.15	.06	.15	.16
	3	.019	14.375	.84	.00	.00	.82
	4	.011	18.861	.01	.94	.85	.01

a. Dependent Variable: BFI4Total

Figure 17: Collinearity Diagnostics from SPSS

The condition index on Figure 18 above, was relatively high for “Value and SBMs” (BFI1Total) and question 1 for “Value system and collaborative partnerships” (BFI2Total) which indicated that these two independent variables had been predicting each other, more than the dependent variable (PSS) (Chapter 5 Regression theory, 2015). However, from the research it is known that these two variables had not predicted each other, they merely had the same rating scale of points 1 to 100, unlike the other dependent variables which had a 7 Likert-item scale. Furthermore, these two variables did not measure the same things, BFI1Total measured important components to achieve the triple bottom line while BFI2Total measured the important stakeholders for achieving collaborative partnerships. Therefore, it was concluded that the model did not have multi collinearity.

Moreover, analysed independent variables correlation that were greater than 0.9, which could have indicated a high multi collinearity, which could have meant that they are connect but do not cause each other (not causation) (Chapter 5 Regression theory, 2015). None of the independent variables had a correlation greater than 0.9, therefore the model did not have multi collinearity.

Correlations

		BFI4Total	BFI1Total	BFI2Total	BFI3Total
Pearson Correlation	BFI4Total	1.000	.319	.296	.727
	BFI1Total	.319	1.000	.824	.301
	BFI2Total	.296	.824	1.000	.282
	BFI3Total	.727	.301	.282	1.000
Sig. (1-tailed)	BFI4Total	.	<,001	.001	<,001
	BFI1Total	.001	.	.000	.001
	BFI2Total	.001	.000	.	.002
	BFI3Total	.000	.001	.002	.
N	BFI4Total	103	103	103	103
	BFI1Total	103	103	103	103
	BFI2Total	103	103	103	103
	BFI3Total	103	103	103	103

Figure 18: Correlations from SPSS

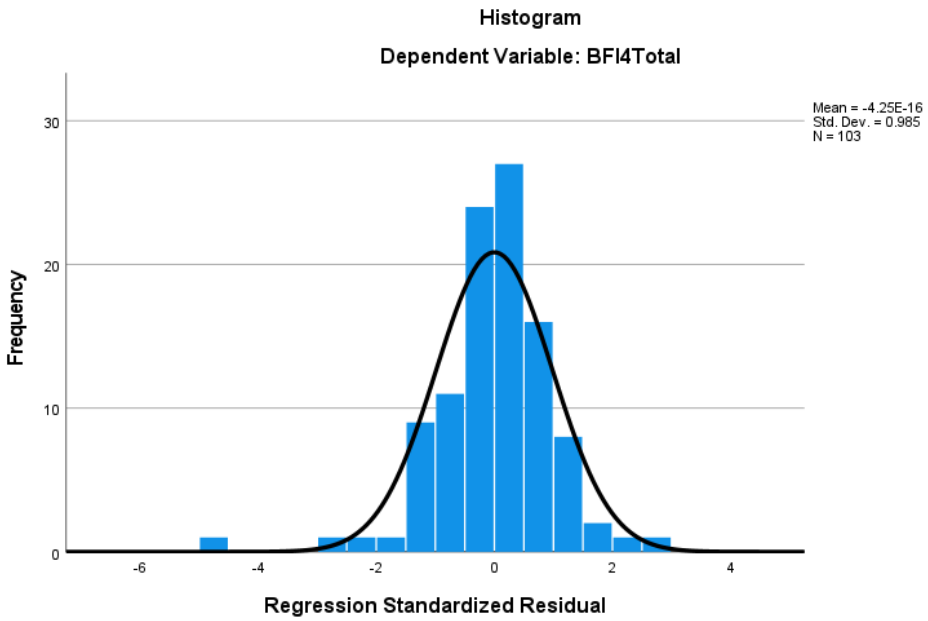


Figure 19: Histogram from SPSS

The histogram (Figure 20) was normal, as there were a lot of centralities and the residual values lied within the normal distributions, but the evaluated for less skewness (Chapter 5 Regression theory, 2015). The normality assumptions can be violated if the is a positive skewness if the residuals are not within the normal distribution or have the same pattern (Chapter 5 Regression theory, 2015).

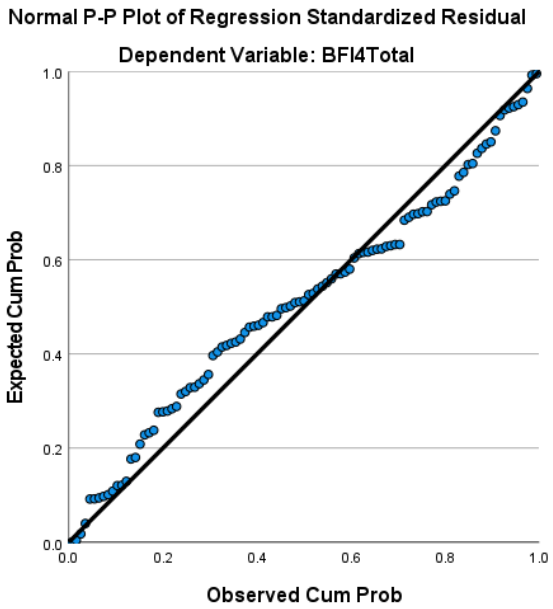


Figure 20: Normal P-P Plot of Regression Standardized Residual

The normal PP Plot's normality assumptions might have been violated because the residuals do not follow the diagnogal line completely(Chapter 5 Regression theory, 2015). When the normal PP Plot of regression (Figure 21) was analysed it was important to see if residuals follow the black line most the time.

In conclusion, the model analysed as statistically significant and fit. A strong positive relationship between the dependent variable PSS (BFI4Total) and the independent variables ["Value and SBMs" (BFI1Total), question 1 for "Value system and collaborative partnerships" (BFI2Total), and question 2 for "Value system and collaborative partnerships" (BFI3Total)] had been assessed using regression approach on linearity (Chapter 5 Regression theory, 2015). All independent variables (predicators) explained 52.6% of the variability of the dependent variable PSS (BFI4Total). Therefore, it can be concluded that understanding the effects of using PSS allows for SBM advancements.

4.3 Relationship between dependent variable and demographic variables

4.3.1 ANOVA

The relationship between one dependent variable and one demographic variable was analysed using a one-Way Analysis of Variance (ANOVA) statistical method (Hair et al, 2010). The one-way ANOVA was the dependent variable PSS (BFI4Total) and demographic variable age, this tested whether there were differences in the means in terms of PSS (BFI4Total) by age. The estimates effect size for overall tests was used, for the portion of variation in the dependent variable explained by the independent variable. The significant variances on the group meant that the Tukey Post Hoc test which assumed equal variances for the groups will be used; however, if there are no equal variances in the group the Tamhane's T2 Post Hoc test will be performed (Hair et al, 2010). One of the key assumptions for ANOVA was the quality of variances represented by the homogeneity of variance test also call the Levene's Test (Hair et al, 2010). If the quality of variance

assumption were to be violated this would impact the reliability of inferences of the ANOVA test (Hair et al, 2010). The Brown-Forsythe test and Welch test are robust ANOVA that can be used if the quality of variance assumption was to be violated, to adjust for the violations and provided a different perspective of group means (Hair et al, 2010).

Descriptives

BFI4Total

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
23	2	4.8750	1.59099	1.12500	-9.4195	19.1695	3.75	6.00
26	1	5.7500	.	.	.	.	5.75	5.75
28	2	5.2500	.00000	.00000	5.2500	5.2500	5.25	5.25
29	1	6.5000	.	.	.	.	6.50	6.50
31	6	5.6667	.34157	.13944	5.3082	6.0251	5.25	6.25
32	4	5.6875	.65749	.32874	4.6413	6.7337	4.75	6.25
33	1	6.0000	.	.	.	.	6.00	6.00
34	4	6.3125	.47324	.23662	5.5595	7.0655	6.00	7.00
35	10	5.4250	1.12454	.35561	4.6206	6.2294	3.00	7.00
36	9	5.2222	1.69763	.56588	3.9173	6.5271	1.00	6.50
37	7	5.1429	1.56696	.59225	3.6937	6.5921	2.00	7.00
38	5	5.5500	.32596	.14577	5.1453	5.9547	5.25	6.00
39	6	5.3333	1.25167	.51099	4.0198	6.6469	3.50	7.00
40	7	4.8214	1.51873	.57403	3.4168	6.2260	2.00	6.50
41	6	5.0000	1.68819	.68920	3.2283	6.7717	2.00	6.75
42	5	5.2000	1.29180	.57771	3.5960	6.8040	3.00	6.25
43	5	5.4500	1.24248	.55565	3.9073	6.9927	3.75	7.00
44	1	5.5000	.	.	.	.	5.50	5.50
45	6	5.9583	.73172	.29872	5.1904	6.7262	4.75	6.75
46	1	4.7500	.	.	.	.	4.75	4.75
47	5	6.0000	.63738	.28504	5.2086	6.7914	5.50	7.00
48	1	5.5000	.	.	.	.	5.50	5.50
49	3	3.5000	2.29129	1.32288	-2.1919	9.1919	1.00	5.50
50	1	7.0000	.	.	.	.	7.00	7.00
51	1	4.7500	.	.	.	.	4.75	4.75
53	1	7.0000	.	.	.	.	7.00	7.00
57	1	7.0000	.	.	.	.	7.00	7.00
59	1	5.5000	.	.	.	.	5.50	5.50
Total	103	5.4150	1.22101	.12031	5.1764	5.6537	1.00	7.00

Figure 21: Descriptive for Age and PSS (BFI4Total) from SPSS

Analysed Figure 22 above, the youth between the age group of 18 and 35 accounted for 30% of the respondents that had an average PSS (BFI4Total) mean of 5.7. The adults between the ages from of 35 to 64 accounted for 70% of the respondents with an average PSS (BFI4Total) mean of 5. This indicated that the

youth and adult respondents on average somewhat agree that the understanding the effects of PSS allows for SBM advancements.

ANOVA

BFI4Total

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	33.817	27	1.252	.794	.745
Within Groups	118.252	75	1.577		
Total	152.069	102			

S

Figure 22: ANOVA from SPSS

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
BFI4Total	Based on Mean	1.407	16	75	.162
	Based on Median	.728	16	75	.757
	Based on Median and with adjusted df	.728	16	43.344	.751
	Based on trimmed mean	1.270	16	75	.239

Figure 23: Test of Homogeneity of Variances from SPSS

ANOVA Effect Sizes[a,b]

			95% Confidence Interval	
		Point Estimate	Lower	Upper
BFI4Total	Eta-squared	.222	.000	.120
	Epsilon-squared	-.058	-.360	-.197
	Omega-squared Fixed-effect	-.057	-.355	-.195
	Omega-squared Random-effect	-.002	-.010	-.006

a. Eta-squared and Epsilon-squared are estimated based on the fixed-effect model.

b. Negative but less biased estimates are retained, not rounded to zero.

Figure 24: ANOVA Effect Sizes from SPSS

The ANOVA in Figure 23 above, indicated no significance as the significant value of 0.75 is greater than alpha 0.05, therefore, it was inferred that there were no differences in the population means. In the test of homogeneity of variance on

Figure 24 above, the significance value of 0.16 which was greater than the alpha of 0.05 therefore that confirmed one of the assumptions of ANOVA that ensured equal variance in the independent variable means had not been violated.

There were no significant variances on the group means and the assumption that equal variances in the group was met.

On ANOVA effect sizes on Figure 25, the Eta-squared, the proportion of variation accounted for in PSS (BFI4Total) by age, the estimated effect of age was 22.2% of PSS (BFI4Total). However, the confidence level used the lower bound at 0% indicates that there was no effect on PSS (BFI4Total) by age; and the upper bound indicated12% that there was medium effect on PSS (BFI4Total) by age.

4.3.2MANOVA

The relationship between the dependent variable and the demographic variables was analysed using Multivariate analysis of variance (MANOVA) statistical method (Hair et al, 2010). According to Hair et al (2010), the association between a number of categorical independent factors and at least two dependent variables should be simultaneously analysed by the MANOVA method. According to Hair et al (2010) the assumptions for MANOVA were as follows:

1. There should be at least two dependent variables that are measurable at interval or ratio level. The dependent variable for this analysis needs to be two or more scale variables, therefore age will be added as an independent variable for this analysis, with the existing dependent variable PSS (BFI4Total).
2. The independent variables should consist of at least two categorical independent groups. The categorical independent variables for this analysis will be gender, race, education, and location.
3. The observations are independent. All the observations selected are independent. The sample size of 103 was adequate.
4. There were no univariate or multivariate outliers. Multivariate normality

5. Linear relationship between each pair of dependent variables for each group of the independent variable. No multi collinearity

Box's Test of Equality of Covariance Matrices[a]

Box's M	37.752
F	1.686
df1	18
df2	808.855
Sig.	.037

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + Gender + Race + Education + Location + Gender * Race + Gender * Education + Gender * Location + Race * Education + Race * Location + Education * Location + Gender * Race * Education + Gender * Race * Location + Gender * Education * Location + Race * Education * Location + Gender * Race * Education * Location

Figure 25: Box's Test of Equality of Covariance Matrices from SPSS

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.923	424.449[b]	2.000	71.000	<,001	.923
	Wilks' Lambda	.077	424.449[b]	2.000	71.000	<,001	.923
	Hotelling's Trace	11.956	424.449[b]	2.000	71.000	<,001	.923
	Roy's Largest Root	11.956	424.449[b]	2.000	71.000	<,001	.923
Gender	Pillai's Trace	.118	1.507	6.000	144.000	.180	.059
	Wilks' Lambda	.885	1.497[b]	6.000	142.000	.183	.059
	Hotelling's Trace	.127	1.486	6.000	140.000	.187	.060
	Roy's Largest Root	.094	2.258[c]	3.000	72.000	.089	.086
Race	Pillai's Trace	.151	2.943	4.000	144.000	.022	.076
	Wilks' Lambda	.849	3.030[b]	4.000	142.000	.020	.079
	Hotelling's Trace	.178	3.114	4.000	140.000	.017	.082
	Roy's Largest Root	.178	6.395[c]	2.000	72.000	.003	.151
Education	Pillai's Trace	.191	1.519	10.000	144.000	.138	.095
	Wilks' Lambda	.811	1.570[b]	10.000	142.000	.121	.100
	Hotelling's Trace	.231	1.619	10.000	140.000	.107	.104
	Roy's Largest Root	.222	3.193[c]	5.000	72.000	.012	.181
Location	Pillai's Trace	.059	.437	10.000	144.000	.926	.029
	Wilks' Lambda	.942	.431[b]	10.000	142.000	.929	.029
	Hotelling's Trace	.061	.426	10.000	140.000	.932	.029
	Roy's Largest Root	.035	.508[c]	5.000	72.000	.769	.034
Gender * Race	Pillai's Trace	.169	3.331	4.000	144.000	.012	.085
	Wilks' Lambda	.831	3.441[b]	4.000	142.000	.010	.088
	Hotelling's Trace	.203	3.548	4.000	140.000	.009	.092
	Roy's Largest Root	.200	7.206[c]	2.000	72.000	.001	.167
Gender * Education	Pillai's Trace	.210	2.112	8.000	144.000	.038	.105
	Wilks' Lambda	.799	2.108[b]	8.000	142.000	.039	.106
	Hotelling's Trace	.240	2.103	8.000	140.000	.039	.107
	Roy's Largest Root	.177	3.184[c]	4.000	72.000	.018	.150
Gender * Location	Pillai's Trace	.000	.[b]	.000	.000	.	.
	Wilks' Lambda	1.000	.[b]	.000	71.500	.	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
	Roy's Largest Root	.000	.000[b]	2.000	70.000	1.000	.000
Race * Education	Pillai's Trace	.006	.227[b]	2.000	71.000	.798	.006
	Wilks' Lambda	.994	.227[b]	2.000	71.000	.798	.006
	Hotelling's Trace	.006	.227[b]	2.000	71.000	.798	.006
	Roy's Largest Root	.006	.227[b]	2.000	71.000	.798	.006
Race * Location	Pillai's Trace	.113	4.511[b]	2.000	71.000	.014	.113
	Wilks' Lambda	.887	4.511[b]	2.000	71.000	.014	.113
	Hotelling's Trace	.127	4.511[b]	2.000	71.000	.014	.113
	Roy's Largest Root	.127	4.511[b]	2.000	71.000	.014	.113
Education * Location	Pillai's Trace	.088	1.660	4.000	144.000	.162	.044
	Wilks' Lambda	.912	1.666[b]	4.000	142.000	.161	.045
	Hotelling's Trace	.095	1.671	4.000	140.000	.160	.046
	Roy's Largest Root	.089	3.205[c]	2.000	72.000	.046	.082
Gender * Race * Education	Pillai's Trace	.043	1.612[b]	2.000	71.000	.207	.043
	Wilks' Lambda	.957	1.612[b]	2.000	71.000	.207	.043
	Hotelling's Trace	.045	1.612[b]	2.000	71.000	.207	.043
	Roy's Largest Root	.045	1.612[b]	2.000	71.000	.207	.043
Gender * Race * Location	Pillai's Trace	.000	.[b]	.000	.000	.	.
	Wilks' Lambda	1.000	.[b]	.000	71.500	.	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
	Roy's Largest Root	.000	.000[b]	2.000	70.000	1.000	.000
Gender * Education * Location	Pillai's Trace	.000	.[b]	.000	.000	.	.
	Wilks' Lambda	1.000	.[b]	.000	71.500	.	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
	Roy's Largest Root	.000	.000[b]	2.000	70.000	1.000	.000
Race * Education * Location	Pillai's Trace	.000	.[b]	.000	.000	.	.
	Wilks' Lambda	1.000	.[b]	.000	71.500	.	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
	Roy's Largest Root	.000	.000[b]	2.000	70.000	1.000	.000
Gender * Race * Education * Location	Pillai's Trace	.000	.[b]	.000	.000	.	.
	Wilks' Lambda	1.000	.[b]	.000	71.500	.	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.	.
	Roy's Largest Root	.000	.000[b]	2.000	70.000	1.000	.000

a. Design: Intercept + Gender + Race + Education + Location + Gender * Race + Gender * Education + Gender * Location + Race * Education + Race * Location + Education * Location + Gender * Race * Education + Gender * Race * Location + Gender * Education * Location + Race * Education * Location + Gender * Race * Education * Location

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Figure 26: Multivariate Test

Levene's Test of Equality of Error Variances[a]

		Levene Statistic	df1	df2	Sig.
Age	Based on Mean	.686	13	72	.770
	Based on Median	.659	13	72	.796
	Based on Median and with adjusted df	.659	13	49.706	.792
	Based on trimmed mean	.683	13	72	.774
BFI4Total	Based on Mean	.818	13	72	.640
	Based on Median	.625	13	72	.825
	Based on Median and with adjusted df	.625	13	58.998	.823
	Based on trimmed mean	.781	13	72	.677

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Gender + Race + Education + Location + Gender * Race + Gender * Education + Gender * Location + Race * Education + Race * Location + Education * Location + Gender * Race * Education + Gender * Race * Location + Gender * Education * Location + Race * Education * Location + Gender * Race * Education * Location

Figure 27: Levene's Test of Equality of Error Variances from SPSS

Analysed whether model was significant (0.05 significance translating to a 95% confidence level) used the Box's Test, if it is not significant a further analysis of significance is done on the Multivariate Test using Wilkins' Lambda, if it is significant a further analysis of significance done using Pillai's Trace (Hair, 2010). The model had a significance of 0.037 (Figure 26 above), greater than 0.05 which indicated that the model not significant as the confidence level at 63% and not the required 95%. As the model had been determined not significant using the "Box's Test of Equality of Covariance Matrices" the next step to analyse whether Wilks' Lambda would be statistically significant. On Figure 27 above, on the Multivariate Test, the Wilks' Lambda for all the variables were higher than 0.05, therefore the test continued. However, if the Wilks' Lambda finding was significant, the assumptions would have been violated and would not be possible to continue with the test. The Lavene's Test was analysed to assess the significance of the dependent variables (Hair, 2010). The Lavene's Test (Figure 28 above) for age and PSS (BFI4Total), not significant, therefore the assumptions were not violated. Therefore, concluded that the 5 assumptions of the model had not been violated and relied on the model to continue with the analysis.

The estimates marginal means relationship between each of the independent variables against the two dependent variables were analysed below:

Between-Subjects Factors

		N	%
Gender	Female	51	50%
	Male	48	47%
	Non-binary / third gender	1	1%
	Prefer not to say	3	3%
	Total Gender	**103**	**100%**
Race	Black/African	91	88%
	Coloured	3	3%
	Indian	8	8%
	White	1	1%
	Total Race	**103**	**100%**
Education	Degree	45	44%
	Diploma	10	10%
	Doctoral Degree	2	2%
	High School	3	3%
	Masters Degree	38	37%
	Some University or College	5	5%
	Total Education	**103**	**100%**
Location	Eastern Cape	3	3%
	Gauteng	89	86%
	Kwa Zulu- Natal	3	3%
	Limpopo	2	2%
	Mpumalanga	4	4%
	Western Cape	2	2%
	Total Location	**103**	**100%**

Figure 28: Between-Subjects Factors adapted by researcher from SPSS

1. Gender

Dependent Variable	Gender	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Age	Female	37.723[a]	1.294	35.144	40.302
	Male	39.430[a]	1.455	36.529	42.330
	Non-binary / third gender	41.000[a]	6.222	28.598	53.402
	Prefer not to say	32.000[a]	3.592	24.839	39.161
BFI4Total	Female	5.555[a]	.217	5.122	5.987
	Male	4.792[a]	.244	4.306	5.278
	Non-binary / third gender	4.250[a]	1.043	2.172	6.328
	Prefer not to say	5.667[a]	.602	4.467	6.867

a. Based on modified population marginal mean.

Figure 29: Estimated Marginal Mean - Gender

1. Gender: The observations on Figure 29 above, comprised of 50% females, 47% males, 3% of respondents that preferred not to say their gender and 1% non-binary. The gender estimated marginal mean on Figure 30 above indicated that the average age of female respondent's s 37 years, 39 years for male respondents, 41 years for non-binary respondents, and 32 years for those that did not prefer to say their gender. On average the female respondents and those that did not prefer to say their gender, somewhat agreed, and agreed on the PSS (BFI4Total) variable indicated by the mean of 5.6 and 5.7 respectively. The male respondents and non-binary respondents on average were either neutral or somewhat agree on the on the PSS (BFI4Total) variable indicated by the mean of 4.8 and 4.3

respectively.

2. Race

Dependent Variable	Race	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Age	Black/African	37.273[a]	1.062	35.156	39.390
	Coloured	40.667[a]	3.592	33.506	47.827
	Indian	39.800[a]	2.328	35.159	44.441
	White	35.000[a]	6.222	22.598	47.402
BFI4Total	Black/African	5.469[a]	.178	5.114	5.824
	Coloured	4.250[a]	.602	3.050	5.450
	Indian	4.600[a]	.390	3.822	5.378
	White	6.000[a]	1.043	3.922	8.078

a. Based on modified population marginal mean.

Figure 30: Estimated Marginal Mean - Race

2. *Race: On Figure 29 above,* black respondents were the most significant observations at 88%, with 8% being from Indians, 3% from Coloured's and 1% from a White respondent. The race estimated marginal mean on Figure 31 above indicates that the average age of black respondents is 37 years, 40 years for coloured respondents, 35 years for non-binary respondents, and 32 years for those that did not prefer to say their gender. On average the black respondents and white respondent, somewhat agreed and agreed on the PSS (BFI4Total) variable indicated by the mean of 5.5 and 6 respectively. The Coloured respondents and Indian respondents on average were either neutral or somewhat agreed on the on the PSS (BFI4Total) variable indicated by the mean of 4.3 and 4.6 respectively.

3. Education

Dependent Variable	Education	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Age	Degree	37.230[a]	1.562	34.117	40.343
	Diploma	36.313[a]	2.459	31.410	41.215
	Doctoral Degree	39.000[a]	4.399	30.230	47.770
	High School	39.000[a]	3.810	31.405	46.595
	Masters Degree	38.489[a]	1.664	35.172	41.805
	Some University or College	40.167[a]	2.840	34.506	45.828
BFI4Total	Degree	5.683[a]	.262	5.161	6.204
	Diploma	6.031[a]	.412	5.210	6.853
	Doctoral Degree	3.500[a]	.737	2.030	4.970
	High School	6.313[a]	.638	5.040	7.585
	Masters Degree	4.440[a]	.279	3.884	4.996
	Some University or College	5.708[a]	.476	4.760	6.657

a. Based on modified population marginal mean.

Figure 31: Estimated Marginal Mean - Education

3. *Education:* Figure 29 above, indicated that the majority of the observations were collected from well-educated respondents with 44% having degrees, 37% with master's degree and 10% with diplomas and 2% with Doctoral degree. The remainder of the respondents had a high school level (3%) education or from some university of college (5%). The education estimated marginal mean on Figure 32 above indicated that the average age of respondents with a degree was 37 years, 36 years for respondents with a diploma, 39 years for respondents with a doctoral degree and high school level of education, 38 years for respondents with a master's degree, and 40 years for respondents that had some University or College level of education. On average respondents with a degree, diploma, high school level of education and some university or college level of education; somewhat agreed, and agreed on the PSS (BFI4Total) variable indicated by the mean of 5.7, 6, 6.3 and 5.7 respectively. The respondents with a master's degree on average were either neutral or somewhat agreed on the PSS (BFI4Total) variable indicated by the mean of 4.4. The respondents with a doctoral

degree on average are either neutral or somewhat disagree on the PSS (BFI4Total) variable indicated by the mean of 3.5.

4. Location

Dependent Variable	Location	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Age	Eastern Cape	36.500[a]	3.810	28.905	44.095
	Gauteng	39.369[a]	1.066	37.243	41.494
	Kwa Zulu- Natal	37.000[a]	3.592	29.839	44.161
	Limpopo	32.500[a]	4.399	23.730	41.270
	Mpumalanga	35.000[a]	3.279	28.463	41.537
	Western Cape	37.000[a]	4.399	28.230	45.770
BFI4Total	Eastern Cape	6.125[a]	.638	4.852	7.398
	Gauteng	5.070[a]	.179	4.713	5.426
	Kwa Zulu- Natal	4.417[a]	.602	3.217	5.617
	Limpopo	4.875[a]	.737	3.405	6.345
	Mpumalanga	6.333[a]	.549	5.238	7.429
	Western Cape	5.750[a]	.737	4.280	7.220

a. Based on modified population marginal mean.

Figure 32: Estimated Marginal Mean - Location

4. Location: Figure 29 above, indicated the majority being 86% of the observations were collected from Gauteng respondents, with the remainder of the residents being from Eastern Cape, Kwa Zulu-Natal, Limpopo, Mpumalanga, and Western Cape. The location estimated marginal mean on Figure 31 above indicates that the average age of Eastern Cape respondents was 36 years, 39 years for Gauteng respondents, 37 years for Kwa Zulu-Natal, 32 years for Limpopo, 35 years for Mpumalanga respondents, and 37 years for Western Cape. On average the Eastern Cape, Gauteng, Mpumalanga, and Western Cape respondents, somewhat agreed or agreed on the PSS (BFI4Total) variable indicated by the mean of 6.2, 5, 6.3 and 5.7 respectively. The Kwa Zulu-Natal and Limpopo respondents on average were either neutral or somewhat agreed on the on the PSS (BFI4Total) variable indicated by the mean of 4.4 and 4.8 respectively.

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Age	1557.231[a]	30	51.908	1.341	.156	.358
	BFI4Total	73.805[b]	30	2.460	2.263	.003	.485
Intercept	Age	21035.078	1	21035.078	543.428	<,001	.883
	BFI4Total	401.849	1	401.849	369.688	<,001	.837
Gender	Age	123.766	3	41.255	1.066	.369	.043
	BFI4Total	6.251	3	2.084	1.917	.134	.074
Race	Age	.846	2	.423	.011	.989	.000
	BFI4Total	13.832	2	6.916	6.363	.003	.150
Education	Age	46.547	5	9.309	.241	.943	.016
	BFI4Total	17.103	5	3.421	3.147	.013	.179
Location	Age	78.527	5	15.705	.406	.843	.027
	BFI4Total	2.593	5	.519	.477	.792	.032
Gender * Race	Age	103.723	2	51.861	1.340	.268	.036
	BFI4Total	12.189	2	6.095	5.607	.005	.135
Gender * Education	Age	484.162	4	121.040	3.127	.020	.148
	BFI4Total	5.428	4	1.357	1.248	.298	.065
Gender * Location	Age	.000	0	.	.	.	.000
	BFI4Total	.000	0	.	.	.	.000
Race * Education	Age	11.498	1	11.498	.297	.587	.004
	BFI4Total	.148	1	.148	.136	.713	.002
Race * Location	Age	2.057	1	2.057	.053	.818	.001
	BFI4Total	9.943	1	9.943	9.147	.003	.113
Education * Location	Age	202.922	2	101.461	2.621	.080	.068
	BFI4Total	2.108	2	1.054	.970	.384	.026
Gender * Race * Education	Age	125.579	1	125.579	3.244	.076	.043
	BFI4Total	.002	1	.002	.002	.964	.000
Gender * Race * Location	Age	.000	0	.	.	.	.000
	BFI4Total	.000	0	.	.	.	.000
Gender * Education * Location	Age	.000	0	.	.	.	.000
	BFI4Total	.000	0	.	.	.	.000
Race * Education * Location	Age	.000	0	.	.	.	.000
	BFI4Total	.000	0	.	.	.	.000
Gender * Race * Education * Location	Age	.000	0	.	.	.	.000
	BFI4Total	.000	0	.	.	.	.000
Error	Age	2786.982	72	38.708			
	BFI4Total	78.264	72	1.087			
Total	Age	160306.000	103				
	BFI4Total	3172.313	103				
Corrected Total	Age	4344.214	102				
	BFI4Total	152.069	102				

a. R Squared = .358 (Adjusted R Squared = .091)

b. R Squared = .485 (Adjusted R Squared = .271)

Figure 33: Test of Between-Subjects Effects from SPSS

The Adjusted R Squared was used as there were multiple independent variables (predicators), R Squared would be interpreted if there was one predicator (Chapter 5 Regression theory, 2015). Figure 34 above, indicated an Adjusted R Squared of 9.1% for age which explained that all independent variables (gender, race,

education, and location) explained 9.1% of the variability of the dependent variable age. Figure 26 above, indicated an Adjusted R Squared of 27.1% for PSS (BFI4Total) which explained that all independent variables (gender, race, education, and location) explained 27.1% of the variability of the dependent variable PSS (BFI4Total).

Tested between the subjects' effect to assess the significant relationship between the variables (Hair et al, 2010). On Figure 34 above:

- Race had a significance of 0.03 for dependent variable PSS (BFI4Total) less than 0.05, indicated a confidence level of 97%. This evidenced that the black race which are the majority of the respondents for race, have significant effect on the independent variable PSS.
- Race and location had a significance of 0.03 for dependent variable PSS (BFI4Total) less than 0.05, indicated a confidence level of 97%. This evidenced that the black race in the Gauteng province had a significant effect on the dependent variable PSS.

5. Discussion

5.1 PSS

The findings from the usage of the regression approach on linearity indicated a strong positive relationship between the dependent variable PSS and the independent variables which were question 1 for "Value system and collaborative partnerships", and question 2 for "Value system and collaborative partnerships". All independent variables (predicators) explained 52.6% of the variability of the dependent variable PSS (BFI4Total). Therefore, relations confirms that the research question, that there was connection between the SBM theory's enablers—such as value and SBMs, value systems and cooperative partnerships, and Product Services Systems (PSS).

The statement “Principles of life-cycle reasoning and developing governance models are necessary to hold businesses accountable” had the highest number of respondents who agreed with statement and had 48 respondents (Figure12 above). The response to this statement confirmed that essence of PSS is to offer clients capabilities and results rather than a goods, which then makes companies accountable for economic, ecological, and societal inequalities for the entire product life cycle (Evans et al., 2017).

The statement “The product life-cycle approach is crucial idea for constructing comprehensively sustained PSS. Distribution network planning is critical in PSS architecture from a system standpoint” had respondents at 44 respondents who agreed to the statements. This supports Lüdeke-Freund (2010) argument that stressed the significance of SMMEs that invests in advancement in sustainable production and consumption (SCP). The SBMs explored in Lüdeke-Freund (2010) support that distribution network in more environmentally friendly supply chains that can aid in the uptake of greener goods and operations. As SCP is a form of PSS, Lüdeke-Freund (2010) supports Evans et al (2017) theory 5 that understanding the effects of using PSS allows SBM growth.

The statement “PSS legal arrangements may indicate the integration of several functions in the service level agreement that covers how the product should be used and the end product life-cycle” had respondents at 44 respondents who agreed to the statements. This highlights that the legal terms in PSS agreements achieve the protection of SMMEs title and protection, help SMMEs drive employee and customer experience in the end-to-end life cycle processes (Lay et al., 2009, as cited in Evans et al., 2017).

The statement “Climate change effects, such as the expenses in the entire product life-cycle, are important in order to maximize commercial elements as primary incentive for agile production and quality customer service” had the lowest number of respondents who agreed to the statement being 37 respondents (Figure 12 above). The climate change effects can be viewed as unintended consequences of economic and environmental degradation that can be socialized via mainstream monetary and fiscal reforms such as tariffs and licenses (Bithas, 2011, as cited in

Evans et al., 2017). Therefore, PSS may help promote sustainable development by reducing climate change and encouraging SBMs to manufacture and use goods in a sustainable manner (Tukker, 2015; Vezzoli et al., 2015, as cited in Evans et al., 2017). The product life-cycle approach is considered crucial for constructing sustained PSS (Aurich et al., 2006; Linder and Williander, 2015, as cited in Evans et al., 2017).

The youth between the age group of 18 and 35 accounted for 30% of the respondents that had an average PSS mean of 5.7. This indicated that the youth respondents on average somewhat agree that the understanding of PSS impact allows for SBM advancements. YU. Mago (2019) proposes promoting youth entrepreneurship as the solution to the challenge of YU in South Africa (SA). According to Shastri, Kumar, and Ali (2009), youthful business ownership is significant to the person and societal and international scales as it allows the youth to make improvements to both their personal and overall standard of living by using their drive, abilities, and capacity for innovation. The youth have the ability to develop and sustain connections on an international basis, which helps them offer in innovative concepts and money invested in creative thinking and engage in the international community (Dzemyda and Raudelinien, 2014). This supports the enthusiasm of the youth with regards to worldwide challenges in addition to their decision-making (Dzemyda and Raudelinien, 2014). Young business ownership also has the advantage of creating employment opportunities (Dzemyda and Raudelinien, 2014).

The education findings indicated that the majority of the observations were collected from well-educated respondents with 44% having degrees, 37% with master's degree and 10% with diplomas and 2% with Doctoral degree. On average respondents with a degree, diploma, high school level of education and some university or college level of education; somewhat agreed and agreed on the PSS (BFI4Total) variable indicated by the mean of 5.7, 6, 6.3 and 5.7 respectively. The respondents with a master's degree on average were either neutral or somewhat agreed on the PSS (BFI4Total) variable indicated by the mean of 4.4. The respondents with a doctoral degree on average are either neutral or somewhat

disagree on the PSS (BFI4Total) variable indicated by the mean of 3.5. The schooling process, the availability of governmental, societal, and ecological legislation, as well as the general awareness and backing of ecologic and societal activities, serve an essential part in developing sustainable entrepreneurial SMMEs, though, amongst the external elements (Starchenko et al., 2021).

Race had a significance of 0.03 for dependent variable PSS (BFI4Total) less than 0.05, indicated a confidence level of 97%. This evidenced that the black race which are the majority of the respondents for race, have significant effect on the independent variable PSS. Race and location had a significance of 0.03 for dependent variable PSS (BFI4Total) less than 0.05, indicated a confidence level of 97%. This evidenced that the black race in the Gauteng province had a significant effect on the dependent variable PSS.

These findings indicate that SMMEs might use to maximize the advantages of SBMs and guide in achieving the objective to understanding whether the effect of using PSS allows for SBM advancements.

5.2 Value and SBMs

The findings indicated that the most important value components to the respondents had a mean above 80 points components such as treating customers fairly, providing good quality service to customers, treating employees fairly, and complying with laws and regulations. SMMEs that prioritize long-term viability have strong relationships with other parties that place a premium on treating customers fairly and providing good quality services to customers (Starchenko et al., 2021). The long-term viability of the idea of long-term business can be ensured by a number of elements, according to research on the growth of sustainability SMMEs conducted by Berard and Saleilles (2016). It consists of a variety of development tactics particularly treating employees fairly evaluated with employee capabilities and expertise with an emphasis on continuous improvement (Jahanshahi, Brem, and Bhattacharjee, 2017).

Providing a report on Corporate Social Responsibility was the least important value component for creating sustainable triple bottom line to the respondents as it had the lowest mean of 59.4 points. According to Starchenko et al. (2021), the formation of new types socially responsible SMMEs and SMMEs that care about the environment of entrepreneurship have their sights not only on generating profitability but also on attaining particular objectives that are significant to the SMME's outside stakeholders.

The objective is to understand triple bottom line advantages conceptualize value components in creating long-term value for SMMEs. Starchenko et al. (2021) articulates that the resolution to youth unemployment issues becomes more pertinent in view of the rising focus on equitable growth, which calls for balancing the triple bottom line at signs of any type of social engagement. According to Starchenko et al. (2021), sustainable entrepreneurial SMMEs are an endeavour targeted at integrating issues related to the triple bottom line. The literature review on youth unemployment and sustainable youth entrepreneurial SMMEs supports that sustainable entrepreneurial SMMEs led by the youth can achieve triple bottom line outcomes for SMMEs such as social outcomes to reduce youth unemployment, financial outcomes of being profitable and environmental outcomes by using sustainable business models. This will enable the analysis of whether SMMEs with the advantages of SBMs can achieve a reduction in youth unemployment and drive economic growth.

5.3 Value system and collaborative partnerships

The findings indicated that the most important stakeholders that had a mean above 80 points were customers and employees, followed by suppliers and shareholders that had a mean greater than 70 points. According to Whelan and Fink (2016), a large part of the strategic value of the SMMEs sustainability initiative is derived from the need to communicate with and learn from important stakeholders on a regular basis, such as employees, suppliers, and customers.

Academic institutions were the least important stakeholders to the respondents as they had the lowest mean of 57.3 points. According to Starchenko et al. (2021), schooling process holds an important role because it enables prospective business owners to develop a long-term strategy of the equilibrium between values related to the economy, society, and ecological, as well as the possibility of realizing this equilibrium within their own businesses.

The statement “Better stakeholder participation, as well as increased confidence and Business Model innovation, are some of the major adjustments that companies must make in order to achieve a lifelong goal of being sustainable” on average 49 respondents that agreed to the statement. The statement “Innovation systems and supply chain management should be common networks” on average 49 respondents that agreed to the statement. The statement “Collaborative value creation in SBMs necessitates systematic assessment of a diverse group of stakeholders with an interest and obligation focused on the future growth of the network” on average 49 respondents that agreed to the statement. The statement “It is necessary to engage in purposeful engagement, collaborating, connecting, and training from various and different stakeholders to achieve an organized and structured network” had 36 respondents who agreed to the statement. Starchenko et al. (2021) conclude that "external values," "stakeholder network," and "public acceptance" are frequently the essential variables in the setting of long-term business. Evans et al. (2017) identify many aspects that represent SBMs based on studies in “business model innovation” (Teece, 2010; Amit and Zott, 2012; Spieth et al., 2014) and “sustainability innovations” (Hellström, 2007; Adams et al., 2012; Boons et al., 2013). Evans et al. (2017) incorporate advancements from “networks” (Provan et al., 2007; Allee, 2008) and “stakeholder theories” (Haigh and Griffiths, 2009), which support the aspects of “sustainable value flows” between numerous different stakeholders invoking the intricacies of SBMs; and PSS (Evans et al., 2007; Tukker, 2015), which offers information into distinctive factors of a successful SBM. Evans et al. (2017) explain how enhancing SBMs necessitates transformation, creativity, or a repositioning of an SMME enabling ecosystem.

The findings indicated that for collaborative value, SBMs need a holistic examination of stakeholder relationships and roles. This indicated that the relationship between the SBM theory's enables explain the connection between South African SMMEs' investments in innovation and their adoption of sustainability.

Overall

The relevance for corporate planning is that SMMEs must comprehend the difficulties in adopting SBMs. The company's strategic plan ought to take into account the necessity of developing novel company models through testing as well as the breadth and depth of SBMs. Creativity in business models ought to be avoided and handled carelessly because doing so requires a complicated and context-specific effect evaluation. SBM research is developing quickly, but there hasn't been much investigation on how to make it work. This research makes an effort to close this hole, find ways to improve the results of SBM developments, and adds to the creation of fresh concept that will benefit the larger SBM field.

6. Conclusion

The objective of the research is understanding the effects of using PSS allows for SBM advancements. This will enable the analysis of whether South African SMMEs' investment in innovation and adoption of sustainability using the SBM theory can reduce youth unemployment and drive economic growth among South Africa’s black youth.

Young people's possibilities to create and carry out their business plans are crucial for the wider world as a whole when it comes to of long-term viability community unity, and economic growth. Additionally, this promotes the development of new employment opportunities, engages youth, and empowers the youth to exercise their action to achieve holistic grow.

The results of this research indicate a strong relationship between the independent and independent variables which are the enablers of SBM theory such as value and

value systems and collaborative partnership and PSS can be implemented by SMMEs to leverage the benefits of SBMs.

The research evidenced that the majority of the respondents that are black and from Gauteng have a significant effect on how understanding the effects of using PSS can allow SBM advancements. Further, the results indicate that a significant number of the respondents are the black youth and on average somewhat agree or agree that the understanding the effects of using PSS can allow SBM advancements. Overall, the age of respondents has a significant effect on understanding the effects of using PSS to enable SBM advancements.

This then demonstrates that the SBM theory, which focuses on developing a conceptual model, explain the relationship between the investment in innovation and the adoption of sustainability by South African SMMEs. Further, that SMMEs with SBMs can achieve a reduction in youth unemployment and drive economic growth.

In conclusion, the results of this research indicate that the SBM theory can be applied by SMMEs to invest in innovation and adopt sustainability to reduce youth unemployment and drive economic growth among South Africa’s black youth.

6.1 Recommendation and limitations

It is recognized that the outcomes for businesses of various sizes and operating phases, as well as based on the kind of ownership and industry activity, differed according to the actual study that has already been done. The analysis's findings offer a scientific foundation for further study on the critical factors influencing the success of sustainable entrepreneurial SMME initiatives, the identification of the most promising industries for societal and ecological initiatives, and the examination of connections with triple bottom line metrics.

The way businesses operate calls for SMMEs to be encouraged to gain insight into their present business model, accept the ideas of SBMs, and possibly come up with completely novel and more suitable prospective company models. SBM research

is developing quickly, but there hasn't been much investigation on how to make it work. This research makes an effort to close this hole, find ways to improve the results of SBM developments, and adds to the creation of fresh concept that will benefit the larger SBM field. A few areas for investigation according to what was discussed in this study is recommended. In order to better grasp the concepts presented in the SBM theories, more studies may look into the construction of an array of factors from each factor (SMMEs, youth unemployment, Value and SBMs, value systems and collaborative partnerships and PSS) and the interactions between them. The unpredictability associated with network participants' effects and behaviours with relation to each the SBM aspects is an important driver of difficulty in SBMs. In order to assist a SMME in identifying valuable transfers and markets, an experiment framework ought to be created. This may show potential for business model improvements and decrease the risk of testing. The experiment framework ought to illustrate how novel business approaches have an influence on the economy, society, and our planet.

However, entrepreneurs aiming to satisfy the urgent requirement for long-term growth and the shift to more sustainability manufacturing methods to address increasing ecological issues will be interested in these initiatives.

This is a relevant study in light of the challenges we face in South Africa, especially around energy crisis affecting the sustainability of most business. The SBM theory to understand how SMMEs can invest in innovation and adopt sustainability to reduce youth unemployment among South Africa’s black youth and achieve economic growth. SMMEs rarely do a holistic examination 'collaborative value' they either do not have the skills or are too busy running the business.

Approximately 222 responses were received on the survey, however only 103 respondents managed to complete the survey, it indicates that most SMME's do not seriously consider the 'triple bottom line' they usually focus on one component which is the profit aspect of the business.

Therefore, it is recommended that further research should be done on how SMMEs can be up skilled and educated on the SBM theory. To enable SMMEs to invest in

innovation and adopt sustainability to reduce youth unemployment among South Africa’s black youth and achieve economic growth.

It is recommended that further research on the discussion of the idea of long-term youth enterprise, the expanding scope of youth entrepreneurial activity, the necessity to support the youth's potential to start their own businesses, as well as young business ownership SBMs, illustrates the fundamental conceptual features of young business owners. It should be pointed out that youth entrepreneurial activity is growing more and more significant in modern times. It is thought that giving young people the chance to realize their entrepreneurial dreams is crucial not only on an individual basis but also for the benefit of the wider community and SBM growth.

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Appendix A – Online Quantitative Questionnaire Qualtrics Survey

1) The email correspondence:

Dear participants,

I hope this correspondence finds you well.

My name is Nokuthula Audrey Shiba. I am currently conducting a research study as part of my Masters in Business Administration (MBA). I am conducting research on the “The evaluation of sustainable business models (SBMs) theory of SMMEs for black youth within the South African context” under the supervision of Dr Rene Horne (Wits Business School Professor).

The purpose of the study is to use SBM theory to understand how SMMEs can invest in innovation and adopt sustainability to reduce youth unemployment among South Africa's black youth and achieve economic growth. The South African unemployment rate of 34.5% is the highest in history of SA with the youth being the majority. There are 2.4 million SMMEs contributing to the SA's economic growth by providing approximately 10 million jobs.

I kindly request your participation and distribution of the survey to other SMMEs, in completing the survey to contribute to the outcome of the study and completion of my MBA. Information about completing the survey:

1) *Completion of the survey is voluntary.*
2) *You may stop participating from the survey at any stage.*
3) *There are no personal identifiers or personal information collected therefore your identity will be completely anonymous.*
4) *The data collected will be kept confidential.*
5) *It should take approximately 5 to 10 minutes to complete the 10 questions on the survey.*

Please click on survey:

https://wits.eu.qualtrics.com/jfe/form/SV_bf4MZs3UjO3d57E

2) The actual survey accessed through the link

Dear participant,

The purpose of the study is to use SBM theory to understand how SMMEs can invest in innovation and adopt sustainability to reduce youth unemployment among South Africa's black youth and achieve economic growth.

Information about completing the survey:
1. Your participation in this survey will assist me in my MBA studies to evaluate the sustainable business models (SBMs) theory of SMMEs for black youth with in the South African context.
2. You may stop participating from the survey at any stage.
3. There are no personal identifiers or personal information collected therefore your identity will be completely anonymous. The data collected will be kept confidential.
4. Completion of the survey is voluntary
5. It should take approximately 5 to 10 minutes to complete the 10 questions on the survey.

- Yes | Consent
- No | I do not Consent

What is your gender?

- Male
- Female
- Non-binary / third gender

- Prefer not to say

In what year where you born?

What is your race?

- Black/African
- White
- Indian
- Asian
- Coloured
- Other

What is your level of education?

- Less than High School
- High School
- Some University or College
- Diploma
- Degree
- Masters Degree
- Doctoral Degree

In which province is your business located in South Africa?

- Gauteng

- Western Cape
- Eastern Cape
- Northern Cape
- Limpopo
- Kwa Zulu- Natal
- Mpumalanga
- Free State
- North West

Which are the most important elements of achieving triple bottom (economic/profit, environmental and social) line advantages as value components in creating long-term value for SMMEs? Allocate a score between 1 and 100 across these choices to represent those which you believe are more or less important. Which are the most important value components for creating a sustainable triple bottom line ?

- 0
- 10
- 20
- 30
- 40
- 50
- 60
- 70
- 80
- 90
- 100

Have easy to understand terms and conditions: _____ (1)

Treat customers fairly: _____ (2)

Provide good quality service to customers: _____ (3)

Treat its employees fairly: _____ (4)

Provide good opportunities to its employees: _____ (5)

Pay its employees well: _____ (6)

Comply with all laws and regulations: _____ (7)

Be responsible towards the environment and climate change in their product and service lifecycle: _____ (8)

Provide a report on Corporate Social Responsibility initiatives and role in United Nations 17 SDGs: (9)

Have SBMs that accomplished via technological, commercial, or consumer experience and continuous improvement: _____ (10)

Provide good returns to its shareholders: _____ (11)

Treat its shareholders fairly: _____ (12)

Be transparent in its dealings with shareholders: _____ (13)

For collaborative value, SBMs need a holistic examination of stakeholder relationships and roles. Allocate a score between 1 and 100 across these choices to represent those which you believe are more or less important. I believe that the most important stakeholders to achieve a SBMs collaborative value:

- 0
- 10
- 20
- 30
- 40
- 50
- 60
- 70
- 80
- 90
- 100

_____ Customers (1)

_____ Suppliers (2)

_____ Employees (3)

_____ Society and Non-Profit Organisations (4)

_____ Shareholders (5)

_____ Advertisers (6)

_____ Government institutions (7)

_____ Academic institutions (8)

_____ Global corporations and organisations (9)

_____ Professional Service Providers (Bankers, Lawyers, Accountants) (10)

For collaborative value, SBMs need a holistic examination of stakeholder relationships and roles. What is your personal view of the following statements?

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
It is necessary to engage in purposeful engagement, collaborating, connecting, and training from various and different stakeholders to achieve an organized and structured network (1)							
Better stakeholder participation, as well as increased confidence and Business Model innovation, are some of the major adjustments that companies must make in order to achieve a lifelong goal of being sustainable (2)							
Collaborative value creation in SBMs necessitates systematic assessment of a diverse group of stakeholders with an interest							

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
and obligation focused on the future growth of the network (3)							
Innovation systems and supply chain management should be common networks(4)							

Understanding the effects using Product Service Systems (PSS) allows for SBM advancements. PSS, which is defined the mixture of physical goods and rendering services that are customer centric. What is your personal view of the following statements?

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
Climate change effects, such as the expenses in the entire product life-cycle, are important in order to maximize commercial elements as primary incentive for agile							

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
production and quality customer service (1)							
The product life-cycle approach is crucial idea for constructing comprehensively sustained PSS. Distribution network planning is critical in PSS architecture from a system standpoint (2)							
PSS legal arrangements may indicate the integration of several functions in the service level agreement that covers how the product should be used and the end product life-cycle (3)							
Principles of life-cycle reasoning and developing governance models are							

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
necessary to hold businesses accountable (4)							