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Research Model Canvas: A Strategic Response to Graduate Dropout in South Africa

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ABSTRACT

South African universities, much like their counterparts globally, are confronted with the pressing need to diminish postgraduate student dropout figures, foster graduateness, and bolster cutting-edge research which would result in substantial socioeconomic advantages. This participatory qualitative action research delved deep into the multifaceted challenges confronting graduate students in their research pursuits, exploring their profound repercussions and advocating for the adoption of an entrepreneurial-oriented research model. Grounded in the lived experiences of postdoctoral fellows, this study presented the Graduate Research Model Canvas as a strategic response. This model canvas, meticulously designed, will serve as a potent mechanism empowering graduate students to adeptly chart their research trajectories, offering a robust solution to the intricate challenges posed by graduate research endeavours. Its implementation will potentially optimize graduate student throughput, enhance postgraduate effectiveness, and scale up research output towards a sustainable entrepreneurial university direction that South Africa is striving to attain.

Keywords: *Postgraduate Enterprise, Research Efficacy, Entrepreneurial University, Model Canvas.*

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INTRODUCTION

According to Mphekgwana et.al., " Higher education institutions in South Africa struggle with developing strategies to increase student throughput and minimise dropout rates of postgraduate students resulting in failure to reach 80% success rate, targeted by the Department of Higher Education and Training (DHET)."[1] On average, only 24% of students enroll in master's programs within 3 years of completing their honors degrees, with a staggering 53% of these failing to complete their master's studies within 5 years.[2] This significant proportion of students dropping out, results in an alarmingly low progression rate from master's to doctoral enrollment.[3] What is also disconcerting is that a mere 16% of those who successfully complete a master's degree continue to enroll in doctoral programs within 5 years of their master's degree completion, while a meager 61% of this cohort manages to complete the program within seven years of their initial enrollment. These trends suggest that the country's current higher education landscape underscores the urgent need for the development of academic strategies that can foster progress in graduate work, for instance in research to enable the country's overarching benefits from higher education.

Within the realm of higher education, research-based graduate work assumes a pivotal role. Post-graduate research not only contributes to the intellectual and economic development of the host institution and its surrounding communities by fostering innovation, knowledge dissemination, and addressing local socio-

[1] Peter M Mphekgwana et al., "Analysis Of Survival Rates Among Postgraduate Students At A Historically Disadvantaged University In South Africa.," *Gender & Behaviour* 18, no. 3 (2020).
[2] J. Mouton, *The Doctorate in South Africa: Trends, Challenges and Constraints* (Stellenbosch : Sun Press, 2016).
[3] I. Bunting, N. Cloete, and F. van Schalkwyk, *An Empirical Overview of Eight Flagship Universities in Africa. A Report of the Higher Education Research and Advocacy Network in Africa (HERANA)* (Cape Town.: Centre for Higher Education Transformation (CHET), 2014).

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economic challenges but also to a country's comprehensive upliftment. The odyssey of graduate research, however, is frequently besieged by intricate and multifaceted challenges, which substantially impede progress, prolong completion timelines, and, in some unfortunate instances, lead to premature withdrawals or discontinuations.[4] Graduate studies pull-push factors are a global phenomenon. For instance, the United States and European nations, like many other countries in the world have consistently experienced high dropout rates,[5] although, it has been contested that the dropout levels are higher in Africa,[6] with it peaking in South Africa, where rates soar up to 50%.[7] This picture consistently sparks discussions on the unique challenges faced by graduate students in South Africa and the need for targeted interventions.

Most of the post-graduate students' pull-push factors have been narrowed to the research components of the tertiary curriculum. Debates around graduate research challenges have centred around a spectrum of issues, ranging from financial constraints[8] to the complexities of navigating supervision dynamics,[9] the inability to distil formidable and viable research direction,[10] as well as the intricacies of formulating a well-defined research process chain, spanning from proposal structuring to output presentation and dissemination.[11] Simultaneously, the exigencies of balancing academic commitments with personal and professional responsibilities, among other issues, compound these challenges, resulting, for instance, in sensations of burnout and disillusionment.[12] This situation frequently leads to complications regarding project scope, research design, and execution; these cause delays, misalignment, and inefficiencies in research pursuits; all these which hinder graduate research progress.

Any lack in graduate students' advancement extends beyond the individual students and casts a shadow over the reputation of educational institutions as prolonged graduate research timelines impact a university's research output and collaborations, potentially hampering its global visibility, ranking, and scholarly contributions.[13] Universities also stand to lose valuable human capital when students disengage due to insurmountable obstacles;[14] in addition, student attrition poses financial challenges, as dropout rates affect enrolment numbers and tuition revenue. In South Africa where institutions of higher learning are striving to maximize cutting-edge research output in tandem with their global counterparts, these odds leave stakeholders with the task of leveraging possible solutions to the high attrition of postgraduates, especially, research-based graduate cohorts.

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[4] Stephen M Mutula, "Challenges of Postgraduate Research: Case of Developing Countries," *South African Journal of Libraries and Information Science* 77, no. 2 (2011): 184–90; Melissa Laufer and Meta Gorup, "The Invisible Others: Stories of International Doctoral Student Dropout," *Higher Education* 78 (2019): 165–81; Muhammad Nadeem, Sellapan Palaniappan, and Waleej Haider, "Impact of Postgraduate Students Dropout and Delay in University: Analysis Using Machine Learning Algorithms," *International Journal* 10, no. 3 (2021).

[5] L. Thomas and H. May, "A Research Informed Approach to Improving Institutional Retention," *European University Association* 90 (2014): 33–40; Thomas F Torrance, *Incarnation: The Person and Life of Christ* (InterVarsity Press, 2015).

[6] M. Sondlo, "A Comparative Study of Student Retention and Throughput in a Postgraduate Distance Education Programme" (University of Pretoria, South Africa, 2016); P. L. Barasa and C. Omulando, " Research and Ph.D. Capacities in Sub-Saharan Africa; Kenya Report," *Https://Www2.Daad.de/Medien/Derdaad/Analysenstudien/Research_and_phd_cap Acities_in_sub-Saharan_africa_-_kenya_report.Pdf* (African Network for Internationalisation of Education (ANIE)., 2018); R J Botha, "Student Throughput Trends on Postgraduate Level: An African Case Study," *The Independent Journal of Teaching and Learning* 13, no. 2 (2018): 53–66; Sophia Mwende Mugendi and Eunice Njango Githae, "Prevalence of Non-Completion among Postgraduate Students in Selected Public Universities in Kenya," *European Journal of Education Studies* 8, no. 12 (2021).

[7] Department of Higher Education and Training, South Africa, 2019.

[8] Chinelo O Duze, "An Analysis of Problems Encountered by Post-Graduate Students in Nigerian Universities," *Journal of Social Sciences* 22, no. 2 (2010): 129–37; M. M. Kibalirwandi, A. R. Mwesigye, and C. Maate, " Relieving Financial Constraints of Doing Postgraduate Research in Africa ," in *Postgraduate Research Engagement in Low Resource Settings*, ed. D. Atibuni (IGI Global., 2020), 187–218.

[9] Claudine Mararaneza, Ntombifikile Mtshali, and Thokozani Bvumbwe, "Challenges in Postgraduate Research Supervision in Nursing Education: Integrative Review," *Nurse Education Today* 89 (2020): 104376.

[10] M Mwale, I O Iwara, and O S Obadire, "Inherent Success Characteristics of Postgraduate Students at Rural-Based Higher Learning Institutions," *Gender and Behaviour* 16, no. 2 (2018): 11762–72.

[11] Mwale, Iwara, and Obadire, "Inherent Success Characteristics of Postgraduate Students at Rural-Based Higher Learning Institutions"; Joanna Joseph Jeyaraj, "It's A Jungle Out There: Challenges In Postgraduate Research Writing.," *GEMA Online Journal of Language Studies* 18, no. 1 (2018); Félix O Socorro Márquez and Giovanni E Reyes Ortiz, "Canvas Model as a Tool for Research Projects: A Theoretical Approach," *Education Research International* 2022 (2022).

[12] Rebecca G Mirick and Stephanie P Wladkowski, "Pregnancy, Motherhood, and Academic Career Goals: Doctoral Students' Perspectives," *Affilia* 33, no. 2 (2018): 253–69.

[13] E. Hazelkorn, "Impact of Global Rankings on Higher Education Research and the Production of Knowledge," *Unesco Forum on Higher Education, Research and Knowledge*, , 2009; Ifeanyi J Ezema and Omwoyo Bosire Onyancha, "Open Access Publishing in Africa: Advancing Research Outputs to Global Visibility," *African Journal of Library, Archives & Information Science* 27, no. 2 (2017): 97–115; S. Sadeh et al., "The Scientific Output of Iran: Quantity, Quality and Corruption," Stanford Iran 2040 Project , 2019.

[14] Asal Aghaz, Amin Hashemi, and Maryam S Sharifi Atashgah, "Factors Contributing to University Image: The Postgraduate Students' Points of View," *Journal of Marketing for Higher Education* 25, no. 1 (2015): 104–26.

To Khupe and Keane and Callaghan, there is a compelling need to redesign and reshape the existing academic scene, one of which is to map out mechanisms that will enable students to explore both conventional and unconventional avenues for research progress.[15] A similar standpoint underlines the critical need for a comprehensive model to address the risks linked to early withdrawal or delayed graduation in higher education institutions, in accordance with the dual objective of risk mitigation and revenue enhancement.[16] This perspective recognizes the multifaceted challenges faced by universities, where student attrition or prolonged academic engagement can impact institutional outcomes. A robust model would include mechanisms to identify early signs of student disengagement or obstacles to timely graduation, allowing for appropriate interventions. Simultaneously, the model is designed to optimize revenue streams for universities, aligning with the imperative for financial sustainability. By effectively managing these identified risks, institutions can, not only enhance the academic journey for students but also fortify their financial health through improved student retention and progression. This holistic approach, therefore, aligns with contemporary higher education priorities, addressing both student success and institutional viability.

The current study draws inspiration from scholarly discourses and a select few academic inquiries that harness the power of scientific models to facilitate academic research. This study, using a participatory qualitative action research method, delves into the intricate web of challenges that postgraduate students encounter in their research endeavors, probing their far-reaching implications and advocating for the implementation of an entrepreneurial-oriented model, and innovative frameworks as a strategic initiative to empower graduate students in effectively navigating their research trajectories. The subsequent sections of this paper are dedicated to the literature review, offering a comprehensive examination of existing scholarly works on scientific models crafted to elevate graduate research, while also highlighting the specific knowledge gaps addressed by the current study. The literature review extensively explores the traditional business model canvas, a tool employed for conceptualizing and navigating the envisioned graduate research model canvas. Following this, the paper outlines the research methods employed, followed by a discussion of the findings derived from the results. The section culminates in conclusions drawn from this empirical study, providing a robust framework for understanding the research's implications and contributions.

LITERATURE REVIEW

Scientific models for graduate research are well-discussed in academia; these serve to enhance postgraduate success and research output. This proliferation reflects an increasing awareness of the intricate challenges within the graduate student community in higher education. The Doctoral Student Experience Model addresses unique issues by focusing on academic and social integration, advocating for a supportive academic community, and robust mentorship bonds.[17] This approach is crucial for meaningful interactions between the supervision team and students, so as to mitigate research-related anxiety and stimulate professional and personal development of the parties. The Graduate Research Success Model by Yousefi underscores the pivotal role of research self-efficacy, skills, and motivation for graduate student progress.[18] Kiley's initiative - Three-Pillar Model of Doctoral Research Progress – is based on the dynamic interplay between students, supervisors, and the institutional context, highlighting the need for transparent expectations, effective supervision, and conducive research environments.[19] Together, these models provide invaluable insights into the multifaceted dimensions of graduate research, covering academic, social, and personal aspects of the postgraduate experience. Discussions on graduate research planning and strategic conceptualization, providing a roadmap from ideation to execution, however, remain limited. Inadequate project planning and conceptualization may, arguably, diminish the effectiveness of graduate students' research competencies.

Efforts to devise an effective research planning tool are well-acknowledged, paralleling advancements in scientific research models. Silva and Cardoso introduced the Research Project Model Canvas, a meticulously crafted strategy empowering both graduate students and seasoned researchers to navigate innovative pathways

[15] Constance Khupe and Moyra Keane, "Towards an African Education Research Methodology: Decolonising New Knowledge," *Educational Research for Social Change* 6, no. 1 (2017): 25–37; Chris Willian Callaghan, "Do Benevolent and Altruistic Supervisors Have Higher Postgraduate Supervision Throughput? The Contributions of Individual Motivational Values to South African Postgraduate Supervision Throughput," *South African Journal of Higher Education* 34, no. 6 (2020): 27–51.

[16] Nadeem, Palaniappan, and Haider, "Impact of Postgraduate Students Dropout and Delay in University: Analysis Using Machine Learning Algorithms."

[17] Susan K Gardner, "Contrasting the Socialization Experiences of Doctoral Students in High-and Low-Completing Departments: A Qualitative Analysis of Disciplinary Contexts at One Institution," *The Journal of Higher Education* 81, no. 1 (2010): 61–81.

[18] N. Yousefi, " The Graduate Research Success Model: A Proposed Model to Promote Graduate Research Student Success," *Higher Education Research & Development* 35, no. 3 (2016): 590–603.

[19] M. Kiley, "Supervision of Doctoral Students: A Problematic Pedagogy ," *Teaching in Higher Education*, 14, no. 4 (2009): 489-500.

for research progress.[20] Inspired by the conventional Business Model Canvas (BMC), this model serves as a dynamic tool, allowing project initiators and teams to grasp the fundamental essence of a project from its inception. The canvas involves a comprehensive envisioning of the project, anticipating requisites, potential challenges, objectives, and the need for potential realignments to adapt to evolving research dynamics. This strategic methodology materializes in the form of the Research Project Model Canvas, featuring 13 distinct fields covering - scientific and social contributions, assessments of impact, considerations of issues and consolidation, establishment of a conceptual basis, intentionality, identification of technological and academic resources, external and social resources, evaluation of costs, financing/development plans, and team organization. Structured to align with the demands of research projects, this canvas framework facilitates seamless comprehension through its systematically organized fields, ensuring coherent reading, effective presentation, and interconnectedness among each component of a research project.

An alternative to the Research Projects Model Canvas was proposed by Socorro Márquez and Reyes Ortiz, who offered practicality and swiftness in visualizing, summarizing, and presenting research projects, particularly within the educational sphere.[21] These authors' model elaborates upon a distinct framework tailored for presenting research projects at diverse stages—initially for conceptualization, then for progress assessment and oversight, and ultimately for presenting findings and discussions. Structured around ten components mirroring a traditional research proposal, their model includes segments such as - the research title, problem statement, research question, hypothesis, general purpose, specific objectives, rationale, scope, theoretical framework, methodological approach, and anticipated outcomes and conclusions. Essentially, the proposed models by Silva and Cardoso and Márquez and Ortiz provide an organizational and unconventional pathway through which researchers can undertake an academic inquiry.[22] Both models possess unique traits that facilitate interdisciplinary collaboration and enhance communication among researchers from varying backgrounds, leading to a shared comprehension and achievement of research goals. Evaluation studies have frequently approached research model canvas topics from a theoretical standpoint, lacking valuable firsthand insights from individuals possessing practical experience. For instance, Marquez and Ortiz in their evaluation predominantly relied on existing literature and a limited undergraduate student cohort to validate the configuration and utility of the ten elements constituting the proposed Research Projects Model Canvas.[23] While this approach facilitated observation and initial utility assessment of the instrument for research project preparation and evaluation, concerns arise regarding rigour and quality assurance potentially falling short of desired research standards. Given that research projects predominantly inhabit the realms of graduates and academics, the development of models to nurture such initiatives should ideally involve these key stakeholders.

In addition to the above conspicuous shortcomings, although the traditional BMC framework provides a comprehensive structure for understanding typical graduate research and academic projects, however, current studies on research projects model canvas have shifted away from these components. Instead, current models have streamlined these elements into conventional research proposal outlines. The concern lies in the fact that the research proposal outline may not comprehensively represent the entire spectrum of graduate thesis/dissertation or other academic research-related projects. The argument posits that components such as key activities, key resources, key partners, and value propositions, among other elements common in traditional BMC, should also be integrated into the research model canvas, however, these should be adapted to align with the unique demands of research endeavours. Against this premise, the Graduate Research Model Canvas (GRMC) proposed in this current study, draws insights from the traditional BMC and its nine elements, while also actively involving knowledgeable postdoctoral fellows in its development process.

The motivation for this model is rooted in graduate research at the University of Venda, although, its potential extends holistically and flexibly to other forms of academic research projects within and beyond the study area. The University of Venda, however, can serve as a meaningful case study. This is due to the fact that, first, it is actively pursuing a trajectory toward becoming an entrepreneurial student-centred institution of higher learning; one that takes pride in engaged scholarship and is advancing its curriculum to promote academic accomplishment, graduateness, enterprise development and research commercialisation.[24] To fulfil this vision, one viable approach is to offer learning support through tools like the research model canvas, which can enable students to vividly conceptualize and navigate their academic endeavours. Secondly, the decline in graduate

[20] Hiago Silva and Alexandre Cardoso, "Research Project Model Canvas," *Computer Science and Information Technology* 7, no. 3 (2019): 55–64.
[21] Socorro Márquez and Reyes Ortiz, "Canvas Model as a Tool for Research Projects: A Theoretical Approach."
[22] Silva and Cardoso, "Research Project Model Canvas"; Socorro Márquez and Reyes Ortiz, "Canvas Model as a Tool for Research Projects: A Theoretical Approach."
[23] Socorro Márquez and Reyes Ortiz, "Canvas Model as a Tool for Research Projects: A Theoretical Approach."
[24] University of Venda Strategic Plan. (2021-2025), "Positioning the University of Venda for Impact and Relevance," https://www.univen.ac.za/wp-content/uploads/2022/02/UNIVEN-Strategic-Plan-2021-2025.pdf , n.d.

performance and enrolment over the years in the University has significantly impacted its research output. Plausibly, the proposed framework could serve as a valuable resource tool for enhancing graduate effectiveness, research output and valorization.

CONCEPTUAL FRAMEWORK

The concept of the 'GRMC' introduced in this study finds its roots in the established BMC, a valuable entrepreneurial development and management tool outlined by Osterwalder and Pigneur in their seminal work "Business Model Generation."[25] BMC serves as a concise blueprint, providing an executive summary of a business strategy, and is instrumental for entrepreneurs to conceptualize and develop ventures. This model acts as a strategic planning framework, applicable to both emerging startups and established enterprises, offering a visual chart equipped with a comprehensive template detailing essential aspects of a business. As noted earlier, the model's template encompasses the entire business lifecycle, embracing diverse segments that can vary across different enterprises. Commonly, entrepreneurs adhere to the nine foundational BMC elements, such as - key activities, key resources, key partners, value proposition, customer segments, channels, customer relationships, cost structure, and revenue streams (Table 1).

Table 1: Business Model Canvas Template

<table>
<tr><td rowspan="2">Key Partners
Collaborative entities and stakeholders vital for mutual success</td><td>Key Activities
Core operational tasks and processes required for business functionality</td><td rowspan="2">Value Proposition

Unique value and benefits offered to customers</td><td>Customer Relationships
Nature of interactions and relationships maintained with customers</td><td rowspan="2">Customer Segments

Specific target audience or customer groups</td></tr>
<tr><td>Key Resources
Critical assets and resources integral to business operations</td><td>Channels
Distribution and communication channels utilized</td></tr>
<tr><td colspan="2">Cost Structure
Breakdown of costs and financial considerations</td><td colspan="3">Revenue Streams
Sources of revenue generation and financial inflows</td></tr>
</table>

Author design and definition based on Osterwalder and Pigneur (2010).

The BMC, a strategic framework that offers a comprehensive perspective on a business's vital components and their interconnectedness, has emerged as a transformative instrument that significantly enhances the successful execution of business concepts, ultimately resulting in heightened business effectiveness. Through its visual representation of elements, BMC equips entrepreneurs with a structured method to articulate and refine their business ideas.[26] This lucidity in its presentation mitigates uncertainties and fosters alignment among stakeholders, facilitating optimal resource allocation.[27] For instance, startups that incorporate BMC often benefit from improved decision-making, as users can swiftly identify potential pitfalls or gaps within their business models and promptly amend them accordingly.[28] The inherent iterative nature of BMC, as highlighted by Teece, not only reduces the failure rate of nascent ventures but also nurtures adaptability, a crucial attribute in a dynamic business landscape.[29] This attribute can lead to elevated value generation, heightened business efficacy, and successful innovation commercialization.

Empirical evidence further supports the contribution of BMC's application to business efficacy. According to Moustaghfir *et al.*, businesses utilizing BMC exhibit improved communication and collaboration

[25] Alexander Osterwalder and Yves Pigneur, *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*, vol. 1 (John Wiley & Sons, 2010).
[26] P. Lindgren, Y. Taran, and O. V. Shelia, " Business Model Generation for Technology Entrepreneurs: Evidence from the Emerging Markets of Russia," *Journal of Business Models* 2, no. 2 (2014): 1–21.
[27] C. Nakata and K. Weidner, " Exploring Uncertainty in Business Model Design: An Empirical Study of Search Firms," *European Management Journal* 30, no. 6 (2012): 478–90.
[28] Christoph Zott, Raphael Amit, and Lorenzo Massa, "The Business Model: Recent Developments and Future Research," *Journal of Management* 37, no. 4 (2011): 1019–42.
[29] David J Teece, "Business Models, Business Strategy and Innovation," *Long Range Planning* 43, no. 2–3 (2010): 172–94.

among team members, attributed to the visual nature of the framework.[30] This aspect cultivates a shared sense of purpose and aligns efforts toward collective objectives, streamlining the implementation process. BMC also facilitates a deeper comprehension of customer needs and preferences, enabling businesses to tailor their value propositions effectively.[31] This targeted strategy minimizes resource wastage and increases the likelihood of the model resonating with the market. BMC encourages a systematic evaluation of revenue-generation mechanisms, resulting in the development of sustainable financial models.[32] The positive influence of BMC on business efficacy is evident across diverse industries, including finance education,[33] as well as the healthcare sector, where its incorporation has led to enhanced service delivery models and heightened patient satisfaction.[34] Collectively, the BMC, through its structured and visual approach, assumes a pivotal role in translating business concepts into successful implementations. By promoting clear communication, adaptability, and customer-centricity, BMC significantly fosters business practices which ultimately decrease failure rates among users and augment the overall success of entrepreneurial endeavours.[35] Considering this perspective, its adoption holds the potential to empower graduate students, alongside their mentors and other relevant research stakeholders, to adeptly articulate, visualize, and navigate their theses and dissertations.

In alignment with the unique BMC nine elements, the proposed model is conceptualized, and tailored to assist graduate students in effectively navigating their research endeavors. This paper strives to illuminate how the BMC constructs harmonize with the distinct demands and hurdles faced by graduate students throughout their research odyssey, providing lenses to clearly envision, organize, and ultimately the successful execution of their research initiatives. This potential becomes particularly significant in addressing the previously noted lack of well-defined research methodology, hence, this research model canvas seeks to offer a methodical approach applicable to various research pursuits, ensuring transparency, accountability, and accuracy in the research process.

METHODOLOGY

In this participatory, qualitative action research, purposive sampling was strategically employed to identify participants - a choice that harmonizes with the specific objectives of this study. The objectives revolve around gathering insights from individuals who possess not only advanced academic knowledge but also practical experience in the realm of research. A sample of 14 postdoctoral fellows were purposefully chosen from the University of Venda community as participants due to their adeptness and familiarity with the intricate challenges of postgraduate research. This comprised eight postdoctorate emeriti of the University, while the remaining six were drawn from the current 2021/2023 cohorts. Given their comprehensive understanding of research, the participants served as apt collaborators in co-defining the nuances of each element within the graduate research model canvas context.

To comprehensively capture insights, a two-fold data collection approach was implemented - semi-structured interviews and collaborative workshops. Individual semi-structured interviews were conducted with the carefully selected postdoctoral fellows. Through these interviews, an avenue was created to delve into their experiences, perspectives, and comprehension of the fundamental elements that comprise the graduate research journey. A series of open-ended questions guided these interviews, enabling participants to openly share their insights,confront challenges, and provide suggestions. Concurrently, collaborative workshops were orchestrated to facilitate collective ideation and co-creation of the graduate research model canvas. During these workshops, postdoctoral fellows engaged in group discussions and interactive activities, working together to jointly define and refine each element, through drawing upon their amalgamated expertise. These workshops fostered dynamic debriefings and encouraged the exchange of diverse viewpoints, thereby enriching the process of forming a comprehensive research canvas.

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[30] K. Moustaghfir et al., " Business Model Canvas: A Comprehensive Literature Review and Research Agenda," *Administrative Sciences*, 10, no. 2 (2020): 25.

[31] O. Gassmann, K. Frankenberger, and M. Csik, *The Business Model Navigator: 55 Models That Will Revolutionize Your Business.* (Pearson UK., 2014).

[32] Lindgren, Taran, and Shelia, " Business Model Generation for Technology Entrepreneurs: Evidence from the Emerging Markets of Russia."

[33] William T Jackson, Daniel James Scott, and Nathan Schwagler, "Using the Business Model Canvas as a Methods Approach to Teaching Entrepreneurial Finance," *Journal of Entrepreneurship Education* 18, no. 2 (2015): 99–112; Vasu Keerativutisest and Triyuth Promsiri, "Financial Feasibility Canvas (FFC): Extending the Business Model Canvas as a Method to Teach Financial Feasibility Study in Entrepreneurial Finance," *Academy of Entrepreneurship Journal* 27 (2021): 1–14.

[34] A. H. Lee, W. J. Chen, and W. Y. Lin, "An Innovative Business Model for Promoting Patient-Centered Care and Reducing Financial Risk in Hospitals.," *BMC Health Services Research* 18, no. 1 (2018): 1–14.

[35] Ted Ladd, "Does the Business Model Canvas Drive Venture Success?," *Journal of Research in Marketing and Entrepreneurship* 20, no. 1 (2018): 57–69; Abdullah Umar, Agung Hari Sasongko, and Glory Aguzman, "Business Model Canvas as a Solution for Competing Strategy of Small Business in Indonesia," *International Journal of Entrepreneurship* 22, no. 1 (2018): 1–9.

The collected qualitative data, including interview transcripts and workshop outputs, underwent qualitative analysis. Primarily, a thematic analysis approach modelled on Atlas-ti v8 was employed to discern recurring themes, patterns, and key concepts within the interview transcripts. This multifaceted process involved stages such as - data familiarization, generation of initial codes, theme exploration, theme review, definition, and labelling of themes, culminating in the production of the analysis report. Through this methodology, nuanced insights and themes pertaining to the definition of each element were uncovered. Subsequently, a content analysis was applied to the workshop outputs, specifically focusing on the collaborative definitions of each element. This method entails the systematic encoding and categorization of content to extract significant patterns and relationships. The primary objective was to ascertain consensus and discrepancies in the co-created definitions, thereby highlighting areas of alignment and divergence.

RESULTS AND DISCUSSIONS OF FINDINGS

As illustrated in Table 2, a diverse array of initiatives surfaced within the nine elements of the proposed model. Each initiative is meticulously delineated, defined, and discussed, elucidating its strategic significance.

<table>
<tr>
<td rowspan="2">Key Partners
Supervisor/advisor
Research institutions and laboratories
Colleagues and peers
Library and information services
Funding agencies and sponsors
Industry partners
Community and stakeholders
Government agencies
International collaborators
Ethics committees</td>
<td>Key Activities
Literature review
Research design
Data collection
Data analysis
Hypothesis testing
Writing and documentation
Collaboration & communication
Peer review
Presentations and conferences
Revision and publication</td>
<td rowspan="2">Value Proposition

Knowledge generation
Skill development
Career opportunities
Personal growth
Networking
Publication and recognition
Problem-solving
Intellectual fulfilment
Transdisciplinary collaboration
Personal satisfaction
Contribution to literature
Potential for impact</td>
<td>Customer Relationships
Mentorship
Collaborative partnerships
Funding organizations
Research participants/samples
Industry professionals
Government and policymakers
Academic publishers & journals
Public audience
Future employers or institutions
Peers and colleagues</td>
<td rowspan="2">Customer Segments
Targeted research unit/scope
Public and general audience
Funding organizations
Research participants/subjects
Industry professionals
Government and policymakers
Peers and collaborators
Future employers or institutions
Academic publishers & journals</td>
</tr>
<tr>
<td>Key Resources
Library resources
Laboratory facilities
Research materials/ facilities
Computing resources
Research funding
Research participants
Research advisors
Collaborative networks</td>
<td>Channels
University platforms
Conferences, workshops, and seminars
Professional organizations
Library services
Online repositories
Academic journals
Media
Local authorities</td>
</tr>
</table>

Cost Structure	**Revenue Streams**
Tuition and fees	Scholarships and grants
Technology/research materials	Research assistantships
Laboratory costs	Teaching assistantships
Travel expenses	Part-time jobs
Incentives	Publication royalties
Publication fees	Conference presentation
Supervisory costs	Consulting services
Ethics approvals	Intellectual property
Subsistence & sustainability	Research collaborations
	Crowdfunding and donations

Author's consolidation based on primary data

Drawing on firsthand graduate research experiences of the participants and crafting a comprehensive research model canvas necessitate meticulous planning and strategic thinking. Initially, students must engage in a thorough literature review, grounding their understanding in foundational theories and identifying research gaps to inform value propositions. Analyzing trends and discourse is vital for engaging key stakeholders and potential collaborators. This approach is also crucial for building meaningful partnerships and funding channels. Co-interaction with the supervisory team with some research wealth of knowledge and experience is essential, as it helps refine the canvas to a feasible standard that ensures real-world applicability. The ability to clearly define key research elements of the canvas and aligning them with research goals, and continuous updates of the model canvas as new issues evolve enhance the canvas's robustness. For quality assurance and credibility, the components of the canvas can be validated through pilot studies or consultations with knowledgeable stakeholders such as faculties, rated researchers, postdoctoral fellows, as well as active postgraduate - Masters and PhD supervisors with excellent graduate output trajectories. These steps empower graduate students to craft a dynamic research model canvas, which can effectively guide their pursuits.

Key Activities

As the term implies, key activities constitute the fundamental tasks that graduate students undertake throughout their research endeavours. These activities involve a wide range of tasks, including literature review, research design structuring, stakeholder engagement, data collection, analysis, conference participation, and publication, among others (Table 3). Ideally, key activities can be organized in a canvas and presented as an action plan, providing a concise and structured roadmap for the research process. The action plan typically includes specific, measurable, achievable, relevant, and time-bound (SMART) activities, outlining the steps, resources, and timelines necessary to achieve each of the listed goals.

Table 3: Graduate Research Key Activities

Initiative	**Remarks**
Literature review	Conducting an extensive review of existing literature to understand the trends and current state of knowledge in the research area, and identify gaps.
Research design	Developing a comprehensive research plan, including defining research questions, hypotheses, methodology, and data collection methods.
Stakeholder engagements	Consultations with key partners, sorting resources, customer segments, etc.
Data collection/analysis	Gathering relevant data through experiments, surveys, interviews, observations, or other appropriate methods. Analysing collected data using appropriate statistical or qualitative techniques to draw meaningful conclusions.
Writing and documentation	Documenting research findings, methods, and results in academic papers, reports, theses, and dissertations.
Presentations and conferences	Preparing and delivering presentations to showcase research findings at academic conferences or seminars.
Revision and publication	Revising research documents based on feedback and submitting them for publication in academic journals or other platforms.

A former postdoctoral (P11, Male) of the University noted that "*frequently, graduate students find themselves ensnared in a state of perplexity, grappling with the dilemma of selecting, organizing, and timing their research activities which can significantly impact their overall progress. The formulation of an action plan, delineating key research activities, stands as an indispensable guide for researchers embarking on the intricate journey of scientific inquiry. To me, the first step for every graduate research student is mapping out a feasible action plan, showing all the deliverables and timelines. This can be highlighted on the key activity segment of the research model canvas for visualisation."*

Serving as a foundational instrument, this plan facilitates the systematic organization of the research process.[36] It plays a pivotal role in defining research objectives, specifying the research design and methodology, and outlining precise timelines for each research activity. This structured roadmap offers not only clarity but also heightens the efficacy and efficiency of research engagements. By aiding researchers in maintaining focus, judiciously allocating resources, and preventing scope creep, the action plan substantially enhances the overall quality and rigor of the research.[37] In essence, the action plan operates as a fundamental tool in accomplishing research objectives.

Key Resources

Graduate research heavily relies on a range of key resources that significantly impact the process. These include - library resources, laboratory facilities, academic research materials, computing resources, research funding, research participants, research advisors and collaborative networks, among others (Table 5) - which collectively empower researchers to conduct comprehensive investigations, effectively analyze data, and provide valuable contributions to their respective fields of study.

Table 5: Graduate research key resources

Initiative	Remark
Library/laboratory facilities	Access to a well-stocked library with books, journals, and online databases for comprehensive literature review. Availability of well-equipped laboratories for conducting experiments and collecting data.
Research funding	Financial resources and grants to support research expenses, travel, and conference attendance.
Research participants	Access to individuals, groups, or organizations relevant to the research for data collection and interviews.
Research advisors	Expert mentors and advisors who provide guidance, feedback, and support throughout the research journey.
Collaborative networks	Connections with fellow researchers, peers, and professionals, and grassroots community members for collaboration and knowledge exchange.

"The strategic management of essential resources, including vital assets and capabilities crucial for gaining a competitive advantage, significantly shapes the outcomes of research endeavours" (P7; Current Postdoc, Male). Accurately delineating these resources and deploying them judiciously is indispensable for optimizing the efficiency, timeliness, and value of research endeavours. For example, access to state-of-the-art laboratory facilities and technology can lead to groundbreaking discoveries with practical applications, highlighting the critical role, precisely, of the resource (Hitt *et al.*, 2011). Similarly, the comment - *"the quality and depth of information researchers can obtain from grassroots community members are highly contingent on factors such as the selection of participants, the establishment of rapport, and the typology of instruments used" was made by* P2; Current Postdoc, Male. In essence, an understanding of specific key resources and their precise application not only enhances the timeliness of research but also amplifies its valorization potential, ultimately elevating research efficacy and impact.

Key Partners

Collaborative interactions with key partners are fundamental to the success and impact of graduate research, as they contribute invaluable expertise, resources, support, and diverse perspectives throughout the entire research journey. Key partners in this sense refer to a diverse array of entities, including - supervisor/advisory teams, research institutions, colleagues and peers, potential funders, industries, government and community members (Table 6) - directly or indirectly involved in graduate students' research activities.

[36] E. R. Babbie, *The Practice of Social Research* (Cengage Learning, 2016); John W Creswell and J David Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (Sage publications, 2017).
[37] Uma Sekaran and Roger Bougie, *Research Methods for Business: A Skill Building Approach* (john wiley & sons, 2016).

Table 6: Graduate Research Key Partners

Initiative	Remark
Supervisor/advisor	Provides guidance, mentorship, and expertise in shaping the research project, ensuring its quality and direction.
Host institutions	Offers access to facilities, equipment, and resources necessary for conducting experiments and research activities.
Colleagues and peers	Engaging with fellow students and researchers enables knowledge sharing, feedback, and collaborative opportunities.
Sponsors	Offers financial support through grants, scholarships, and sponsorships to cover research-related expenses.
Industry partners	Collaboration with industry partners can provide real-world applications, resources, and opportunities for practical research.
Community stakeholders	The involvement of relevant communities and stakeholders ensures research relevance, engagement, conformity, and potential impact.
Government agencies	Collaboration with government bodies can provide funding, data, regulations, and insights relevant to the research field.
External collaborators	Partnering with institutions/researchers to facilitate cross-cultural perspectives, data sharing, experiments and broader insights.

Successful graduate research studies do not rest solely on the candidate's intrinsic qualities but are intricately woven with various factors, with external stakeholders also being prominent among them. As highlighted by one of the participants (Postdoc Emeritus, Male), *"Beyond funding opportunities that can be harnessed from external stakeholders such as the NRF, and SA Reserve Bank, among a myriad of other bodies, collaborative partnerships with critical stakeholders enrich the research process by fostering a dynamic environment of knowledge exchange and multidisciplinary insights, thereby enhancing the quality and depth of the research conducted. Astonishingly, graduate students often overlook the significant contributions these stakeholders can make, relegating them to the shadows of their research endeavours. Clearly defining stakeholders and understanding their roles facilitate targeted research engagement, ensuring that the research is focused and relevant to the intended audience."*

This sentiment from a participant corroborates Patton's viewpoint that each research stakeholder requires a distinct level of engagement and contribution; building a defined web of meaningful stakeholders facilitates the amalgamation of expertise, knowledge, and resources, that enrich the quality and depth of research.[38] This also nurtures a culture of diverse knowledge sharing and exchange, which forms a cornerstone for robust research progress and the cultivation of a vibrant academic community;[39] this is in addition to fostering interdisciplinary insights and the exploration of innovative methodologies, both of which pave the way for groundbreaking discoveries. This aspect is also evident in Perkmann and Walsh, who maintain that the strategic involvement of key research partners is not merely advantageous but imperative for achieving exceptional research outcomes and fostering potent research progress.[40] Critical to this perspective is access to vital information and resources, including funding, and research facilities required to accelerate the research process.

Value Proposition

Delving into this discourse of graduate research model canvas, the foundational concept of a value proposition emerges as a linchpin. The value proposition component delves deep into the distinctive value and diverse benefits that research offers. Positioned as a fundamental element of the canvas model, it intricately defines the essence and viability of research, playing a pivotal role in categorizing its nature and establishing its relevance. As argued by a postdoctorate (P3 Male) emeritus of the University, *"value proposition knowledge gap in most of our research institutions such as Univen leaves students grappling to articulate the uniqueness of their research, particularly during pivotal moments like an institutional defence of their research output, as well as conference presentation".*

At its core, every graduate student is challenged by a fundamental question: *How does his/her research distinguish itself from existing work, and what intangible and/or tangible practical advantages does it provide?*

[38] Michael Quinn Patton, *Qualitative Research & Evaluation Methods: Integrating Theory and Practice* (Sage publications, 2014).
[39] Kathleen M Eisenhardt and Melissa E Graebner, "Theory Building from Cases: Opportunities and Challenges," *Academy of Management Journal* 50, no. 1 (2007): 25–32.
[40] Markus Perkmann and Kathryn Walsh, "University–Industry Relationships and Open Innovation: Towards a Research Agenda," *International Journal of Management Reviews* 9, no. 4 (2007): 259–80.

Responding to these questions requires graduate students to discover motivation through an array of propositions. These span from the creation of new knowledge and adept problem-solving to the fulfilment of intellectual curiosity, engagement in transdisciplinary collaborations, meaningful contributions to the existing body of literature, and the potential for substantial societal impacts (Table 7). These compelling motivations act as potent driving forces that should compel graduate students and their host institutions to invest resources, time, energy, and unwavering dedication into their research pursuits.

Table 7: Graduate Research Value Proposition

Initiative	Remark
Knowledge contribution	The opportunity to contribute new knowledge, insights, and advancements in their field of study that influence debates, policies, and practices, and contribute to societal progress.
Skill development	Enhancing research, analytical, critical thinking, and communication skills that are valuable for future career prospects.
Career opportunities	Building a strong foundation through research projects for a successful career in academia, industry, or other professional domains.
Personal growth	Gaining a sense of accomplishment, confidence, and personal growth through the completion of a significant research project.
Networking	Connecting with peers, mentors, experts, and professionals in the field, thereby expanding professional webs.
Publication and recognition	Patenting innovative discoveries and publishing cutting-edge research output in reputable journals, proceedings, and online channels for wider consumption, gaining recognition in the academic community.
Problem-solving	Producing solution-driven findings that have practical applications towards addressing real-world challenges.
Intellectual fulfilment	Fulfilling intellectual curiosity by delving deeply into a specific relevant area of interest more precisely and exhaustively.
Transdisciplinary collaboration	Collaborating with experts from diverse fields, fostering interdisciplinary learning, creativity, and innovation.

The need for value proposition finds legitimacy in the fact that a significant portion of research published globally is regurgitated, lacks real-world applicability and is redundant; this is a valid concern in the academic sphere. A current postdoc. (P1 Male) of the University attributed these criticisms to the following factors - 1) lack of originality, leading to the reproduction of existing concepts or theories without introducing novel perspectives or insights; 2) a deficiency in understanding the broader academic landscape or a specific field, leading researchers to unknowingly repeat concepts already explored by others; and 3) insufficient or narrow literature reviews, resulting in researchers unintentionally rehashing ideas, particularly if they fail to identify and integrate existing scholarship comprehensively. These concerns stress the urgency of graduate students standing up and engaging in cutting-edge research that aims for relevance in the broader context.

Customer Segment

In every business, the role of customers is pivotal, as they are the primary driving force influencing demand, shaping product preferences, and ultimately determining the success and sustainability of an enterprise. Similarly, in the realm of research, customers play a crucial role in propelling the outcome. A customer segment in this context refers to a distinct group of individuals or organizations with similar needs, preferences, and characteristics, targeted by researchers as consumers of their studies or findings. In research, this segment constitutes a diverse array, including - the targeted units for which the research is being conducted, public and general audiences, funders, research participants/subjects, industry professionals, government officials and policymakers, peers and collaborators, future employers or institutions, as well as academic publishers and journals (Table 8). In other words, graduate students should bear in mind that research undertakings are not merely limited to their academic qualifications but serve the needs of numerous stakeholders.

Table 8: Graduate Research Customer Segment

Initiative	Remark
Targeted unit	The specific entity for which the research was initiated
Public and general audience	Communicating research findings to the public or a wider audience for awareness and engagement.

Funding organizations	Organizations providing financial support, scholarships, grants, and fellowships to facilitate research projects.
Research participants/subjects	Individuals or groups who participate in studies, experiments, surveys, or data collection.
Industry professionals	Experts in relevant industries who can provide insights, data, or industry-specific perspectives.
Government and policymakers	Individuals who shape policies, regulations, and guidelines relevant to the research area.
Peers and collaborators	Fellow students and researchers who offer feedback, ideas, and collaboration opportunities.
Future employers or institutions	Potential employers, academic institutions, or organizations that value the skills and knowledge gained through the research.
Academic publishers and journals	Entities that publish and disseminate research findings to the broader academic community.

In alignment with the definitions outlined in Table 8, a postdoctorate emeritus of the University (P8; Female) asserts that *"Delineating specific customer segments in graduate research is of paramount importance for several reasons. For instance, researchers with impactful work are often sought after by employers who value expertise demonstrated through publications and innovative projects, therefore, graduate research students must conduct context-specific, relevant research that aligns with stakeholders' interests and contemporary discourse. To share my testimony, one of the external examiners, Professor…, who vetted my PhD thesis was impressed by my research discoveries, area of expertise, and analytical acumen, hence, requested to work with me at the postdoctoral level, although I had already joined another university. To enlighten you further, my current employment resulted from an aspect of the PhD I published years back."*

Beyond recognition and employment potentials, working in tandem with customer segments enables the comprehension of the unique needs of target audiences, enhancing the research's relevance and applicability.[41] Similarly, tailoring research processes to a specific customer segment allows students to be more contextual and rigorous in their inquiry, towards addressing problems. This, in a nutshell, increases the effectiveness and societal impact of the research.[42]

Channels

In the traditional entrepreneurship landscape, "Channels" refer to the various ways an enterprise delivers its value proposition to its customers. It involves the different touchpoints or distribution methods through which a business reaches and interacts with its customers to deliver its products or services. In relation to research, the segment serves as an efficient platform for disseminating and sharing research output with potential users. As outlined in Table 9, these channels include - university platforms, conferences, workshops, seminars, professional organizations, library services, online repositories, academic journals, media outlets, and local authorities. These platforms facilitate the dissemination of information and interaction vital not only for graduate research students but also for researchers in general. They enable scholars to share their work, receive valuable feedback, and actively contribute to the broader academic community, fostering a culture of knowledge exchange and scholarly engagement.

Table 9: Research Canvas Channels

Initiative	Remark
University platforms	Utilizing university websites, research portals, and intranets for sharing research progress and findings.
Conferences, workshops, and seminars	Presenting research findings and networking with peers, experts, and potential collaborators at conferences and symposiums.
Professional organizations	Engaging with professional organizations related to their field for networking, resources, and information exchange.

[41] Stephen A Small and Lynet Uttal, "Action-oriented Research: Strategies for Engaged Scholarship," *Journal of Marriage and Family* 67, no. 4 (2005): 936–48; Barbra Teater, "Social Work Research and Its Relevance to Practice:'The Gap between Research and Practice Continues to Be Wide,'" *Journal of Social Service Research* 43, no. 5 (2017): 547–65.
[42] Creswell and Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.*

Library services	Leveraging library resources and services for literature searches, access to journals, and inter-library loans.
Online repositories	Depositing research data, preprints, and publications in online repositories to increase visibility and accessibility.
Academic journals	Publishing and sharing research findings through peer-reviewed academic journals specific to their field.
Media	Engaging in online platforms like TV/Radio broadcasts to debrief, as well as ResearchGate, LinkedIn, and Twitter to connect with researchers and share research updates.
Local authorities	Reporting findings to local stakeholders where research was conducted

A current postdoctoral fellow of the University (P6; Male) argued *that "some research work, as novel as it may be, lacks visibility due to limited promotion, inadequate dissemination strategies, or the absence of engagement with relevant academic and public communities, hindering its recognition and impact."* This assertion reechoes a sentiment that, for research outcomes to reach societies, function adequately and serve their purpose, a certain level of visualization and accessibility is required.[43] Consequently, identifying specific platforms for efficient research dissemination and sharing becomes a critical area of discussion.

Shedding more light during the collaborative workshop, a current postdoc. (P2; Male) explained that *"academic journals, for instance, are essential for scholarly discourse within the academic community, while social media platforms such as ResearchGate and LinkedIn facilitate networking and outreach to professionals and fellow researchers. University repositories and online databases also enhance the accessibility and visibility of research outcomes. By strategically selecting dissemination platforms, graduate research students can tailor their communication strategies, ensuring a wide reach for their findings, which not only fosters a societal impact of their research but also potential collaborative opportunities. In all honesty, I had my first research exposure and international collaboration through a conference; it has made me travel near and far, involved in numerous top-tier research initiatives that contributed significantly to my professional and economic development. I would encourage graduate students to explore such channels. It comes with a lot of benefits".*

Customer Relationships

Nurturing and effectively managing customer relationships is imperative for the holistic advancement of graduate research initiatives. Customer relationships are the interactions, engagements, and connections established and maintained between a researcher and parties directly involved in the research; they involve incorporating various communication channels and strategies designed to build trust, satisfaction, and loyalty. In the context of graduate studies, customer relationships cut across a diverse range of stakeholders, including supervision teams, peers, funders, government bodies, and the broader public audience for whom research is conducted, as depicted in Table 10. These customer relationships hold paramount importance as they exert significant influence on the success and impact of graduate research endeavours, thereby, fostering learning, facilitating collaboration, supporting the dissemination of research findings, and enabling the practical application of research outcomes.

Table 10: Graduate Research Customer Relationships

Initiative	Motivation
Supervisory team	Building a strong mentor-mentee relationship with academic promoters, supervisors, advisors or experienced researchers for guidance and support.
Collaborative partnerships	Establishing collaborative relationships with fellow students, researchers, or institutions for joint projects and knowledge sharing.
Funding organizations	Maintaining positive communication and reporting with funding agencies that support the research financially.
Research participants/ subjects	Establishing ethical and respectful relationships with research participants/subjects, ensuring their consent and well-being.

[43] Mikael Laakso et al., "Research Output Availability on Academic Social Networks: Implications for Stakeholders in Academic Publishing," *Electronic Markets* 27 (2017): 125–33; Andriana Magdalinou et al., "Disseminating Research Outputs: The CrowdHEALTH Project," *Acta Informatica Medica* 27, no. 5 (2019): 348; Laura Ellen Ashcraft, Deirdre A Quinn, and Ross C Brownson, "Strategies for Effective Dissemination of Research to United States Policymakers: A Systematic Review," *Implementation Science* 15, no. 1 (2020): 1–17.

Industry professionals	Developing connections with experts in relevant industries to gain insights, data, and industry perspectives.
Government and policy makers	Engaging in dialogues with policymakers to understand regulations and contribute research-driven insights.
Academic publishers and journals	Nurturing relationships with publishers and journal editors for submitting and disseminating research findings.
Public audience	Building a relationship with the public through effective communication and engagement with research findings.
Future employers or institutions	Cultivating connections with potential employers or academic institutions through networking and showcasing research skills.
Peers and colleagues	Fostering supportive relationships with peers for idea exchange, feedback, and mutual encouragement.

Participants' excerpts showed that the essential nature of customer relationship management cannot be overstated, being perceived as a multifaceted, cross-functional, and value-generating process, integral to achieving superior performance in various professional spheres. For various reasons, some graduate students, however, still lag behind in this,[44] and it is a concern that should be carefully managed. *"Postgraduate students often grapple with maintaining robust relationships with their supervisors and other stakeholders throughout their research journey. The challenges stem from various factors, including the demanding nature of academic work, time constraints, and sometimes, a lack of effective communication channels* (Current postdoc. P9; Male). *"The intricate dynamics of a supervisory relationship require consistent collaboration, feedback exchange, and a shared understanding of research objectives. Students may struggle to balance their academic commitments with personal and professional responsibilities, leading to potential lapses in communication. Moreover, the evolving nature of research projects demands adaptive communication styles, which, if not navigated carefully, can strain relationships. Clear expectations, regular check-ins, and fostering an open, supportive environment are essential to overcoming these challenges and ensuring that the postgraduate journey remains a mutually enriching experience for both students and their academic stakeholders"* (Postdoc. emeritus; P14; Female).

The assertions above corroborate Callaghan and Ma, Huang, Fan, Cheng and Zhu who maintained that a meaningful, collaborative and respectful relationship with the supervision team creates an atmosphere of trust and open communication, vital for enhancing research throughput.[45] A strong rapport with supervisors leads to effective guidance, timely feedback, and valuable mentorship, thereby elevating the quality of research output and overall academic development.[46] Such relationship-building efforts should extend meaningfully to diverse stakeholders, including university management and funders, as well as community members, in recognition of the wealth of knowledge they hold and the significance of nurturing these connections for sustained academic success.

Cost Structure

Efficient management of cost structures in graduate research is indispensable, as it ensures the seamless progression of research activities. Cost structure stands as a vital financial component that demands consideration from researchers throughout their research journey. The structure assumes a pivotal role in the financial planning of a research project, dictating the boundaries within which researchers can explore revenue channels. Cost structure involves various financial requirements, ranging from tuition and fees to technology and research materials, as well as expenses associated with research-related travel and subsistence (Table 11).

[44] Fay Hodza, "Managing the Student-Supervisor Relationship for Successful Postgraduate Supervision: A Sociological Perspective," *South African Journal of Higher Education* 21, no. 8 (2007): 1155–65; B. Jones, "Factors in Postgraduate Supervision That Impact on the Quality of Research at a Selected Department at a University of Technology " (2014); Doraval Govender, "Postgraduate Supervisory Relationship: Experiences at an Open Distance Learning Institution," *International Journal of Education and Science* 20, no. 1–3 (2018): 9–17.

[45] Callaghan, "Do Benevolent and Altruistic Supervisors Have Higher Postgraduate Supervision Throughput? The Contributions of Individual Motivational Values to South African Postgraduate Supervision Throughput"; Huanling Ma et al., "Case Studies Investigating Distorted Supervisor-Postgraduate Relationship and Solutions in Chinese Universities," *Asia Europe Journal* 21, no. 2 (2023): 251–72.

[46] Mwale, Iwara, and Obadire, "Inherent Success Characteristics of Postgraduate Students at Rural-Based Higher Learning Institutions"; Anna-Clara Spetz Holm, Per-Anders Forstorp, and Mats Hammar, "Overcoming Challenges of PhD Supervision in a Clinical Setting," *MedEdPublish* 10 (2021): 42.

Table 11: Graduate Research Cost Structure

Initiative	Remark
Fees	Costs associated with tuition fees, enrollment fees, and other academic expenses.
Research materials	Expenses for using laboratory facilities, purchasing computers, software licenses, internet connectivity, books, journals, and other research-related materials.
Travel expenses	Costs related to attending conferences, workshops, and fieldwork, including travel, accommodation, and registration fees.
Incentives	Costs for compensating research assistants, participants or volunteers involved in research studies or surveys.
Publication fees	Where applicable, costs associated with publishing research findings in academic journals, including article processing charges (APCs).
Supervisory costs	Expenses for consultation fees or honorariums for advisors, mentors, or consultants.
Sustainability	Living expenses for the duration of the study

It is through cost structure that researchers understand the financial implications of their project, strategically plan to outsource funds and ensure efficient resource allocation that will maximize output.[47] In other words, cost aspects exert a significant impact on the research process and should be carefully handled. The careful management of cost structure, for instance, is crucial in averting budget overruns that might potentially impede research progress;[48] this process ensures the maintenance of fiscal responsibility.[49] To avert potential financial constraints that might impede research endeavors, graduate research students must possess this fundamental knowledge of cost structure and use it judiciously. Comprehension of the financial aspects equips researchers to adeptly navigate the intricacies of research financing and guarantee timely project completion.

Revenue Stream

Revenue streams are avenues through which graduate research students can generate income to sustain their academic and research pursuits effectively. These streams include - scholarships and grants, research assistantships, teaching assistantships, part-time jobs, publication royalties, conference presentations, consulting services, intellectual property, research collaborations, crowdfunding, and donations (Table 12). These diverse sources of income provide critical financial support for graduate students as they engage in their academic and research endeavors.

Table 12: Graduate Research Revenue Stream

Initiative	Remark
Scholarships and grants	Financial support in the form of scholarships, grants, or fellowships awarded based on academic merit or research proposals
Research assistantships	Income earned through working as a research assistant for faculty members or research projects
Teaching assistantships	Compensation received for assisting professors in teaching courses or grading assignments
Part-time jobs	Income from part-time jobs or employment outside of academia to supplement financial needs
Publication royalties	Earnings from royalties or compensation for publishing articles, books, or research findings
Conference presentation	Honorariums or travel reimbursements for presenting research findings at conferences or workshops.

[47] Ilker Etikan, Sulaiman Abubakar Musa, and Rukayya Sunusi Alkassim, "Comparison of Convenience Sampling and Purposive Sampling," *American Journal of Theoretical and Applied Statistics* 5, no. 1 (2016): 1–4; A. Bryman, *Social Research Methods.* (Oxford: Oxford University Press, 2016).

[48] C. Nygaard and D. W. Aksnes, "The Financial Burden of Doctoral Education in the Natural Sciences and Engineering: Results from a Cross-Institutional Study in Norway," *Studies in Higher Education* 45, no. 1 (2020): 148–63.

[49] Creswell and Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*; John W Creswell and Cheryl N Poth, *Qualitative Inquiry and Research Design: Choosing among Five Approaches* (Sage publications, 2016).

consulting services	Providing consulting services or expertise in your research field to external organizations or individuals.
Intellectual property	Revenue generated from licensing or commercializing intellectual property such as patents, inventions, or software.
Research collaborations	Funding from collaborating with industry partners, organizations, or other researchers on joint projects.
Crowdfunding and donations	Raising funds through crowdfunding platforms or receiving donations from supporters interested in your research.

In academic research, financial resources emerge as the lifeblood that propels projects beyond mere aspirations into tangible, impactful endeavours. While the essence of excellent research and its trajectory are not solely tethered to financial investments, the contemporary discourse paints an alternative compelling picture: a significant portion of graduate dropout rates and compromised research quality are intrinsically linked to funding constraints.[50] This resonates strongly with the perspective presented by Ijaz, that sustainable revenue channels are not just a luxury but a fundamental necessity for viable PhD pursuits.[51]

According to one postdoctorate emeritus (P3; Male), *"postgraduate students, especially PhD candidates, should not bear the brunt of tuition fees and research expenses. Instead, a more equitable approach would involve the provision of assistantships or fellowships, ensuring that financial barriers don't stifle the potential of brilliant minds. Pursuing a PhD is not worth it without a meaningful funding opportunity because it is both time-consuming and capital-intensive; students should strive to explore funding opportunities prior to their enrolment. Project all potential funders on the model canvas and strategize to compel them for funding."* In a nutshell, this discourse entrusts graduate students with the responsibility of mapping out potential capital and revenue streams even before embarking on their postgraduate journeys.

Diversified revenue channels, ranging from scholarships and research assistantships to grants, are not merely financial imperatives but strategic necessities that not only ensure financial stability but also serve as catalysts for focused research efforts.[52] Beyond the scope, scale, quality, and impact of the research that is mostly contingent on financial implications,[53] the structured inflow of funds also bolsters the resilience of projects, allowing researchers to adapt and persevere in the face of unforeseen challenges.[54] In other words, a well-articulated revenue strategy is not just a financial prerequisite but a strategic cornerstone, underpinning the success and influence of graduate research undertakings.

CONCLUSION AND RECOMMENDATIONS

This study responds to the crucial need for entrepreneurial-oriented approach in South African graduate research, aiming to propel innovative pathways for research advancement. Drawing inspiration from the traditional Business Model Canvas, the proposed Graduate Research Model Canvas emerges as a potent tool, offering strategic guidance to students navigating intricate research landscapes. Utilizing this framework enables students to set achievable milestones, manage time effectively, and adopt structured research approaches. The study explored nine vital elements aligned with the Business Model Canvas, showing how each plays a pivotal role in shaping academic endeavors.

Key activities delineate the fundamental tasks which will ensure structured planning and execution. Key resources encompass essential intellectual, financial, and physical assets, forming the foundation for profound exploration. Key partners facilitate collaborations, connecting researchers with expertise and funding and enriching the research landscape. The value proposition defines unique contributions, enhancing relevance and appeal. Customer segments direct research toward specific audiences, ensuring applicability. Channels promote knowledge dissemination, nurturing academic discourse. Customer relationships foster collaboration and trust, vital for refining research directions. Cost structure enables effective budgeting, ensuring project sustainability, while revenue streams map funding avenues, ensuring research longevity. Interlinked intricately, these elements

[50] Margaux Van Der Haert et al., "Are Dropout and Degree Completion in Doctoral Study Significantly Dependent on Type of Financial Support and Field of Research?," *Studies in Higher Education* 39, no. 10 (2014): 1885–1909; Robin Wollast et al., "Who Are the Doctoral Students Who Drop out? Factors Associated with the Rate of Doctoral Degree Completion in Universities.," *International Journal of Higher Education* 7, no. 4 (2018): 143–56.

[51] M. Ijaz, "5 Reasons a PhD without Funding May Not Be Possible," https://isphdforme.com/reasons-phd-without-funding-may-not-be-possible/ , 2021.

[52] L. P. Nygaard and D. W. Aksnes, " Different Types of Research Collaboration and Citation Impact: A Case Study in Norwegian Social Sciences and Humanities," *Journal of Informetrics* 14, no. 1 (2020): 101006.

[53] Bryman, *Social Research Methods.*

[54] Creswell and Poth, *Qualitative Inquiry and Research Design: Choosing among Five Approaches*.

form a robust framework enhancing graduate research's rigor, efficacy, applicability, and societal impact. The model's adoption at the University of Venda is recommended, thereby, aligning graduate research with the imperative for entrepreneurial university sustainability that South Africa is striving to attain. A template of GRMC (Appendix 1) is provided for practical use by graduate students and researchers in the university and beyond.

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Appendix 1: Graduate Research Model Canvas for practical exercise

<table>
<tr><td colspan="5">Project Topic:</td></tr>
<tr><td rowspan="2">Key Partners
List of collaborative entities and stakeholders vital for your research initiative:</td><td>Key Activities
List of core operational tasks and processes required for your research functionality:</td><td rowspan="2">Value Proposition
List of the unique value and benefits resulting from your research:</td><td>Customer Relationships
List the nature of interactions and relationships to be maintained with stakeholders involved in your research:</td><td rowspan="2">Customer Segments
List of the specific target audience or groups that your research will benefit:</td></tr>
<tr><td>Key Resources
List of critical assets and resources integral to the research operations:</td><td>Channels
List of communication channels through which your research output will be disseminated:</td></tr>
<tr><td colspan="2">Cost Structure
List of the breakdown of costs and financial considerations of events pertaining to your research initiative:</td><td colspan="3">Revenue Streams
List of potential sources of financial inflows for the research:</td></tr>
</table>

Author's consolidation

ABOUT AUTHOR

Ishmael Iwara is a University of Venda-based researcher with an NRF South Africa Y-rating. He centres his emerging scholarship on entrepreneurship, economic development and sustainability. His academic journey includes post-doctoral fellowships from the University of KwaZulu-Natal, South Africa and Carleton University, Canada. Rooted in rural development, he holds a PhD and master's from the University of Venda, specializing in entrepreneurship and economics. His other qualifications include B.A. Honours in African Studies and B.Sc. Honours in Economics. Dr. Iwara's evolving research trajectory focuses on Afrocentric models for entrepreneurial development, business efficacy, finance, transformation in higher education and community livelihoods, showcasing his impactful scholarship in academia and sustainable economic growth.