

Perspectives on Research-Industry Moral Synergy in Zimbabwe: Differential views- Academia relative to Industry

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Abstract:

This paper shares differential perspectives between research and industry on the subject of moral synergy between them. The views were drawn from key informants (KIs) in both academia and industry. The Stage Gate process, Triple Helix, 3i Framework, Systems as well as the Business Ecosystem theories guided the analysis. Thematic contexts also guided the analysis of findings. The paper shares that interests between the two sides must be effectively negotiated if synergy is to be realized.

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I. Introduction:

Definitions:

Synergy –the interaction of elements that when combined produce a total effect that is greater than the sum of the individual elements, contributions(<https://www.dictionary.com>)

Moral synergy – refers to synergy that observes principles of right conduct or good cause (<https://www.dictionary.com>)

The issue of synergy between research and development (R&D) on one side and industry and commerce (I&C) on the other has been worrisome to key informants (KI) over time. As part of doctoral studies by the first author, KIs from either side were interviewed in years 2021 and part of 2022 in an attempt to compare perspectives from either side. This study period coincided with the outbreak of COVID19 whose mitigation required minimal person to person interviews. The questions were virtually administered to key informants in both academia and in industry through telephone conversations/interviews. Thematic issues that guided analysis (Phulkerd et al, 2022) included: ideas, interest and institutions (3i). The parameters selected in the analysis also included: markets, funding, infrastructure, access to state-of-the art technology, exposure to international best practices, policy and culture. The business culture dimension pursued sub-dimensions such as teamwork (Cooper 1994, 2014), the extent of business approach to research, acceptance of research commercialization by both academia and industry and the quest for rising above petty differences by KIs. The extent to which speedy facilitation of agreements occurred was covered. The transition in engagement beyond mere contacts into connections of value within organisation and across R and I were covered.

II. Analytical Framework:

The analytical framework drew from the following theories:

- Stage Gate Process (Cooper, 2011) which emphasises the market first; teamwork; novelty and excellent communication among other factors
- Triple Helix (Marina Ranga, Henry Etzkowitz (2013) which calls for a balance among Government, Academia and Industry
- 3i Framework (Phulkerd *et al*, 2022) which considers the Ideas, Interests and Institutions
- Systems Theory (Majchrzak Joanna, Golinski Marek, Mantura Wladyslaw, 2019); Chen Herbert (2014) which calls for a Holistic view and feedback
- Business Ecosystem (Galateanu-Avram and Avasilcai, 2013) which stresses interconnectedness, productivity gains and sustainability issues

- Policy mix for commercializing university technologies(QingQui Gan, Jin Hong, BoJun Hou ; 2021) which calls for consideration on how researchers, technology transfer offices (TTOs) and private investors relate
- “Trinity” Analytical Framework (Zhang, 2017) which emphasizes the synergy among Institutes, Incubators and Industrial base
- National policies of the day, namely: National Development Strategy 1 (NDS1) 2021-2025; Industrial Development Strategy (2019-2023); University Innovation Hubs and several State Enterprise 5-Year Strategic plans (aligned to NDSI)

Analytical perspectives:

The main analytical thrust centred on identifying areas of positive convergence; areas of “negative” convergence as well as points of divergence between the two categories. This analysis helps in effective targeting of corrective interventions.

Coverage:

The KIs covered by the study were drawn from both industry and academia as shared by table 1 whilst table 2 shared some of the interviewees. Over 33 interviews were conducted for informants representing the R&D side and over 34 were from theI&C side. Only 50% from either side are highlighted in this paper.

Table 1: Organisations drawn from industry and academia

Industry	Research /Academia
Zimbabwe National Chamber of Commerce (ZNCC); Bankers Association of Zimbabwe (BAZ); Confederation of Zimbabwe Industries (CZI); Procurement Regulatory Authority of Zimbabwe (PRAZ); Senior Company Representatives for companies drawn from sub-sectors: foundry (metal casting), animal health products; fertilizer; pharmaceuticals; private laboratories; stock feeds; beverage manufacturers; information communication technologies (ICT); Seed Houses; Trade Measures Department and senior officers under the Ministry of Industry and Commerce (MinI&C)	Institute of Agricultural Engineering (IAE); Scientific and Industrial Research and Development Centre (SIRDC); Pig Industry Board (PIB); Tobacco Research Board (TRB); National Biotechnology Authority of Zimbabwe (NBAZ); Department of Research and Specialist Services (DR&SS) under the Ministry of Lands Agriculture Fisheries Water and Rural Development (MinLAFW&RD); University of Zimbabwe (UZ); Chinhoyi University of Technology (CUT); Harare Institute of Technology (HIT); Zimbabwe Council for Higher Education (ZIMCHE); Ministry of Higher and Tertiary Education, Innovation, Science and Technology Development (Min HTE,I,STD), Ministry of Finance and Economic Development (MinFED)

Source: Key Informant Interviews (2021)

Table 2: Actual interviewees drawn from industry and academia

R&D/Academia	Industry & Commerce
<ul style="list-style-type: none"> • Chief Director-DR&SS • Executive Dean-Faculty of Agriculture and Food Systems-UZ • Zimbabwe Ezekiel Guti University (ZEGU) Vice Chancellor (VC), past Acting VC, past PVC-UZ, past SIRDC DG, Renowned Biochemist • past Chairman: School of Pharmacy-UZ; renowned researcher in pharmacology, toxicology and drug synthesis • Registrar & Director General-NBA(Z); renowned biotechnologist • Acting General Manager: TRB/Assistant General Manager Business Development • HIT PVC (Innovations & Business Development) • Current; Past Head-IAE • CUT VC, former Dean-Faculty of Engineering-UZ; renowned metallurgist 	<ul style="list-style-type: none"> • MD of an industrial chemicals manufacturing company; CZI Chair of Standing Committee on R&D • Past and current CZI Chief Economist • Industry captains (3) and past CZI presidents • ZNCC Chief Executive Officer • BAZ Chief Economist • Trade Measures Department –Chief Superintendent • General Manager of an animal health remedies manufacturing company • Director of Finance-Ministry of Industry and Commerce • MD of a Seed manufacturing company • MD of a regional seed house • Past and present ZISCO MD • MD of an electronics & electrical manufacturing company • MD of IPC Industrial Employment Agency • CEO of a local Asset Management Company

<ul style="list-style-type: none"> • Director-ICT, ZIMCHE; formerly Director-Computer Centre-UZ • Head of Group on Pyro-Metallurgy (Mintek-RSA); formerly Director –Metallurgical Research Institute (MRI)-SIRDC • Chairman: Soil Science and Agricultural Engineering-UZ • Industrial Liaison Officer –Faculty of Engineering and Built Environment-UZ • CBI Head (DR&SS) • PIB Director 	<ul style="list-style-type: none"> • Executives (2) in Agricultural Finance Corporation (AFC) Bank • Renowned consultant metallurgist/Foundry expert
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Source: Key Informant Interviews (2021)

Views from R&D:

A lead executive under the DR&SS expressed frustration “the Zimbabwe seed industry has roots in research but is no longer ploughing back into DR&SS for more research”. This showed that business under this sector are placing emphasis in their own interests which are in the form of profits and business growth. A Faculty liaison officer under UZ pointed out that “teamwork was lacking” and that “authorities under universities take a long time before signing collaborative agreements”. This, in a way, reduced the appetite for synergy. He also felt that “industrial R&D has been external in line with colonial era links” and that “local industry is yet to set-up own R&D capacity to shake-off colonial bondage”.

A professor in agriculture implored “the R&D work of university research fellows must be revived” as the “R&D output would feed into the newly created Innovation Hubs and Technology Parks”. A professor in pharmacology expressed the following reservations “our R&D work has produced more than twenty (20) pharmacology related products but was not sure how the Innovation Hub was going to absorb them”. They had developed special competency which was not automatically transferrable to university Innovation Hubs.

An ICT director formerly with a local state university shared that “university research boards are grossly under-funded” and also that the “majority university research fellow posts were vacant”. This adversely affected R-I synergy. A Pro-Vice Chancellor shared that “direct incentives to the inventor were key” and that “researcher capacity in terms of numbers, skill and access to modern equipment were very low”. This compromised output that could be transferred to industry with a synergistic effect.

A professor in medicine called for “innovation hubs that must produce tangible results including training kits in the field of medicine to minimize 100% reliance on imports”. Two experts in metallurgy and foundry raised concerns regarding “limited access to latest analytical and testing equipment as well as limited access to latest R&D tools of trade”. This heavily compromised what gets released for uptake by industry.

A director of an Innovation Hub and a Vice Chancellor of a state university shared that “the funding and equipment challenges must be addressed” and that “revive university research fellow –URF -positions must be revived”. These strengthened teaching and the R&D output “effectively fed into industry”.

A senior plant breeder and prominent biotechnologist called for the “revival of R-I and/or R-R collaborative work that used to be in place”. Cited past collaborative engagements include: DR&SS and Delta in sorghum breeding; DR&SS and Irvines’, National Foods in stock feeds and commented initiatives involving DR&SS and NBAZ on tissue culture work. Other synergistic collaborations were AFC-Dairy Industry revival and CBI contracts with seed houses on varietal exploitation under 3-5% commission on sales. A senior breeder under CIMMYT invited seed houses, agricultural colleges, university faculties of agriculture to “exploit varieties released by CIMMYT through free commercialization and raise own income”. The response to this call was very low, throttling R-I synergistic gains.

Views from I&C:

A prominent electronics engineer with more three decades of experience shared that “we must develop new product development (NPD) capacity and that the strategy for their exploitation must be right”. These two were observed to be missing. He also urged that “legal and technological capacity to protect and defend IP rights was also key”. Another marketing executive advised that “R&D units are important for new growth opportunities in industry” and “these must be set-up and be utilized to attain competitiveness”. Two senior

engineers who served Managing Director of an iron and steel facility expressed that “I&C, like R&D face infrastructure challenges” as “laboratories were not adequately equipped and manned”. These conditions compromised the quest for R-I synergy.

Industrialists who served as past presidents of the CZI implored stakeholders, including academia to “aim for industrial excellence”. A renowned metallurgist and foundry expert shared that “gaps existed in NPD, mentorship capacity and access as well as utilization of modern R&D tools”. He also called for “culture change and shift away from bureaucracy and personality differences”. An industrial engineer serving as Managing Director of an oil expressing firm shared that “it was wrong to protect an inefficient industry”. Creativity and Innovations were to be pursued instead and implored Zimbabwe to “boost R&D in industry in order to attain competitiveness”.

A procurement executive under PRAZ shared that “there is special treatment by PRAZ when procuring R&D/scientific equipment” though procuring entities lacked awareness. A Managing Director of a seed company and two (2) AFC bank executives called for the “multiplier effect of technology” to be exploited with synergistic effect.

III. How far apart are R and I?

Convergence in the positive:

Research and Industry were positively converging on the following issues: Calling for technology upgrading; in urging the revive R&D units; the importance of protecting intellectual property (IP) and in calling for Culture change. They also agreed that Government had a role in mediation and mitigating the low synergy levels.

Convergence in the negative:

It was deduced that the two sides were unfortunately in the corner on undesirable dimensions such as: Lack of teamwork; Low mentorship capacity and Limited exposure to international best practices. Both had very low funding priority (R&D budgets under academia not funded; R&D Units shut down). There was low attention to prior art (literature; patent; industrial designs review) and there was limited direct incentives for creativity. Heavy “penalties or sanctions” for those that fail after trying meant very few would take the risk. In a way this also compromised the quest for R-I synergy!

Divergent:

Parties were divergent in ideas (and ideation modalities) and in interests. R&D Commercialisation through start-ups or Innovation Hubs or Technoparks were heavily resisted by industry. Industrialist “want to access technologies for free” and do not want universities to venture into their “industrial territory”. Universities expected funding from industry whilst captains of industry and banks considered “green field projects from research to be too risky”. Local industry was importing cheap goods, put a mark-up and resale locally. A prominent human resources expert expressed concern about “replacement of manufacturing factories with warehouses full of imports”.

IV. Conclusion and way forward:

The KIs acknowledged that both academics and industrialist, though educated and tenured, have some aspect that need capacity building if R-I synergy is to be enhanced. These include working as teams (within and across); effective communication and sound attainment of economic competitiveness through local resources. A bankable business plan per project/idea was key for R-I connection. Though researcher incentives are needed, the researcher improve in “hustling for resources from allocative authorities such as National Treasury; Research Boards and Finance Departments”. It was shared that every semester universities collect fees- a share must be set aside for NPD which will generate more when commercialized. It was shared that the call for R-I synergy deals with resistance by educated persons. We ought to refer to international best practices and a Technology/Synergy Ombudsman, like in the USA, may be needed.

References:

- [1]. **Chen Herbert (2014):**The Supporting Systems of Science Parks – Case Introduction of TusPark UNESCO World Technopolis Association (WTA) International Training Workshop, Conference Hall, INNOPOLIS Foundation, Republic of Korea.
- [2]. **Chetsanga C.J. (2021):** Africa: Industrialising for Economic Prosperity: My Life and Work in Science and Technology Themba Books ISBN: 9798433807693
- [3]. **Cooper Robert G. (2011):** Winning at New Products: Creating Value through Innovation 4th Edition, Illustrated. Published by Basic Books. ISBN 0465025846, 9780465025848

- [4]. **Confederation of Zimbabwe Industries (CZI) Manufacturing Sector Survey 2021:** Growing Manufacturing Competitiveness: Realities and Realignment published by CZI and Financial Gazette www.czi.co.zw
- [5]. **Cunningham J, Link A (2014):** Fostering University-Industry R&D Collaboration in European Union Countries Whitaker Institute Working Paper no 42 Galway. <http://hdl.handle.net/10379/4369>
- [6]. **DAMVAD Analytics (2017):**Economic Impact of Research Collaborations with the Norwegian University of Science and Technology-NTNU Copy right 2017, DAMVAD Analytics A/S Hvnegade 39 DK-1058 Copenhagen <https://www.damvad.com>
- [7]. **Francis Judith Ann (2015):**Research and Empowerment for Social Transformation Keynote Address at the Research Council of Zimbabwe (RCZ) 2015: The 10th Zimbabwe International Research Symposium Book of Papers Presented ISBN 978-0-7974-6567-1 ISSN: 2412-2386 edited by Nhachi CFB (2015) Harare, Zimbabwe
- [8]. **Galateanu (Avram) E, Avasilcai S (2013):**Business Ecosystems Architecture Annals of the Oradea University. Fascicle of Management and Technological Engineering Issue #1, May 2013, <http://www.imtuoradea.ro/auo.fmte>
- [9]. **Government of Zimbabwe (2021):** National Development Strategy (NDS) 1 – Towards a Prosperous and Empowered Upper Middle Income Society by the Year 2030 Government Printers, Harare, Zimbabwe.
- [10]. **Government of Zimbabwe (2021):** Centre for Education, Innovation, Research and Development Act Chapter 25:34 No.3/2021
- [11]. **Government of Zimbabwe (August 2020):** Agriculture and Food Systems Transformation Strategy- 5-Year Agriculture Gross Value Projections Ministry of Lands, Agriculture, Fisheries, Water and Rural Resettlement
- [12]. **Government of Zimbabwe-GoZ (2019):**Local Content Strategy: Towards Investment, Innovation and Export-led Industrialization Ministry of Industry and Commerce, Mukwati Building, Harare, Zimbabwe.
- [13]. **Government of Zimbabwe –GoZ (September 2019):** Performance Review of the SIRDC: Analysis, Assessment and Recommendations for a Turnaround Strategy conducted by Tetralink Taylor and Associates East Africa with funding from the African Development Bank (ADB) validated at an all-stakeholder workshop held on the 20th of September 2019, Crowne Plaza Monomotapa Hotel, Harare, Zimbabwe.
- [14]. **Government of Zimbabwe –GoZ (2018):** Transitional Stabilisation Programme: Reforms Agenda (October 2018 to December 2021): Towards a Prosperous and Empowered Upper Middle Income Society by the Year 2030 Government Printers, Harare, Zimbabwe.
- [15]. **Hobololo Vuyisile (2016):**A critical Analysis on the Right of University Technology Transfer Offices (TTOs) to develop intellectual property policies: Reflections on the IPR Act 51 of 2008 – Republic of South Africa (RSA) in *Speculum Juris* Volume 30 Part 2, 2016
- [16]. <https://www.vocabulary.com>
- [17]. **Imungi JK (2016):** Synergy between the Cooperative Sector and the Academia in Promoting Research and Innovation to Enhance Industrial and Socio-Economic Development in East Africa Paper for First East Africa Cooperative Conference 29 February -2nd March 2016, Nairobi, Kenya.
- [18]. **International Association of Science and Technology Parks (IASP 2008):** Annual World
- [19]. Conference on Science and Technology Parks and the 2008 Members' Annual General
- [20]. Meeting, Johannesburg, South Africa.
- [21]. **Lena Miranda (2021):**Strategic Benefits of Working as a Team in Knowledge sharing in virtual times, 37th IASP World Conference on Science Parks and Areas of Innovation, IASP Knowledge room September 2021 www.iasp.ws Malaga, Spain
- [22]. **Leydesdorff Loet, Etzkowitz Henry, Ivanova Inga, Meyer Martin (2017):**The Measurement of Synergy in Innovation Systems: Redundancy Generation in a Triple Helix of University-Industry-Government (UIG) Relations in Social Science Research Network (SSRN) Electronic Journal, January 2017. DOI:102139/ssrn.2937647
- [23]. **Kijkasiwat P, Cave J, Hewa Wellalage N, Locke S (2022):**Synergistic model to boost business performance: a New Zealand Case Study *Journal of Small Business Enterprise Development*, Vol 29 No 2 pp 241-260 © 2021 Emerald Publishing Limited <https://doi.org/10.1108/JSBED-03-2020-0063>
- [24]. **Kurtulus Kaymaz, Kadir Yasin Eryisit (2011):** Determining Factors hindering university-industry collaboration: A critical Analysis from the perspective of Entrepreneurial Science *Paradigm International Journal of Social Inquiry* Volume 4 Number 1, 2011 pp 185-213
- [25]. **Liu Weidong (2009):**Major Measures to Drive the Development of High Technology in Z-Park in The ninth (9th) International Workshop on Technological Innovations for Small and Medium Enterprises (SMEs) based on Science and Technology, 31st August – 13 September 2009, Beijing, China.

- [26]. **Mafoti R.M. (2019):** Innovation, Creativity and Development Presentation at the Inaugural Zimbabwe National Career Guidance Conference held on the 4th of July 2019, SIRDC Campus, Harare, Zimbabwe.
- [27]. **Mafoti R (2014):** Of Serendipity and Discovery Inaugural Professorial Lecture given to the academic audience at the Chinhoyi University of Technology (CUT), July 2014, Chinhoyi, Zimbabwe www.cut.ac.zw
- [28]. **Mamina MT and Maganga R (2019):** A review of engineering education at University of Zimbabwe in UZ 2019 Research Week Book of Abstracts, Directorate of Research and Innovation, Harare, Zimbabwe www.uz.ac.zw
- [29]. **Marina Ranga, Henry Etzkowitz (2013):** Triple Helix Systems: An Analytical Framework for Innovation Policy and Practice in the Knowledge Society DOI:10.5367/ihe.2013.0165
- [30]. **Leydesdorff Loet, Etzkowitz Henry, Ivanova Inga, Meyer Martin (2017):** The Measurement of Synergy in Innovation Systems: Redundancy Generation in a Triple Helix of University-Industry-Government (UIG) Relations in Social Science Research Network (SSRN) Electronic Journal, January 2017. DOI:102139/ssrn.2937647
- [31]. **Martin Jacques (2009):** When China Rules the World: The End of the Western World and the Rise of the New Global Order Penguin Publishers
- [32]. **Government of Zimbabwe (2001):** The Research Act Chapter 10:22 22/2001 Government Printers, Harare
- [33]. **Ministry of Energy and Power Development (2019a):** Biofuels Policy of Zimbabwe (BPZ 2019) Government of Zimbabwe, Harare www.energy.gov.zw
- [34]. **Ministry of Energy and Power Development (2019b):** National Renewable Energy Policy of Zimbabwe (NREP 2019) Government of Zimbabwe, Harare www.energy.gov.zw
- [35]. **Ministry of Finance and Economic Development (various years up to 2021):** Budgetary Statements up to years 2021. Government of Zimbabwe. Harare. Zimbabwe
- [36]. **Ministry of Finance and Economic Development (September 2019):** Performance Review: Analysis, Assessment and Recommendations for the Scientific and Industrial Research and Development Centre-SIRDC Final Report Tetralink Taylor and Associates East Africa in JV with Pazel Conroy Consulting Ltd with financial support from the African Development Bank, Nairobi, Kenya
- [37]. **Ministry of Finance and Economic Development (January 2020):** Turnaround Reform Strategy and Action Plan for the Scientific and Industrial Research and Development Centre-SIRDC- Final Report Tetralink Taylor and Associates East Africa in JV with Pazel Conroy Consulting Ltd with financial support from the African Development Bank, Nairobi, Kenya
- [38]. **Ministry of Higher and Tertiary Education, Science and Technology Development (2019a):** Strategic Plan 2019-2023-Education 5.0 Heritage-Innovation-Industrialisation The Modernisation and Industrialisation of Zimbabwe through Education, Science and Technology, Harare, Zimbabwe.
- [39]. **Ministry of Higher and Tertiary Education, Science and Technology Development (2019b):** Government of Zimbabwe's Priority Programmes 2019-2030 on Innovation, Science and Technology Development The Modernisation and Industrialisation of Zimbabwe through Education, Science and Technology, Harare, Zimbabwe.
- [40]. **Ministry of Higher and Tertiary Education, Innovation, Science and Technology Development – MinHTE,ISTD (2018a):** Zimbabwe's Innovation Hubs Phase I Government of Zimbabwe, Harare
- [41]. **Ministry of Higher and Tertiary Education, Innovation, Science and Technology Development (2018b):** Funding Models for Research and Development to operationalize Zimbabwe's Innovation Hubs Government of Zimbabwe, Harare
- [42]. **Ministry of Higher and Tertiary Education, Science and Technology Development (April-May, 2017):** University Industries Incubation Tour A report by the high-power delegation comprising the Minister, 10 Vice Chancellors, Zimbabwe Manpower Development Fund (ZIMDEF) Chief Executive Officer (CEO), Advocates in Government and Senior Government Officers, Government of Zimbabwe, Harare, Zimbabwe
- [43]. **Ministry of Higher and Tertiary Education, Science and Technology Development - MinHTE,STD (May 2017):** Transformation of Higher Education for Industrialisation and Modernisation a Report on the Proceedings of the workshop held on Friday, 19th of May 2017, Council Room, University of Zimbabwe, Harare
- [44]. **Muranda Z (2021):** Academia-Industry Interface: the Weak Link in Human Capital and New Industry Development Marketing Matters in the ZimMarketer December 2021 Edition published by the Marketers Association of Zimbabwe © MAZ
- [45]. **Mutsvangwa-Sammie E.P. (2018):** Key attributes of agricultural innovations in Semi-Arid Smallholder Farming Systems in South-East Zimbabwe Physics and Chemistry of the Earth 105 (2018) 125-135
- [46]. **Muzite S, Marango T (2019):** Research, Innovation and Entrepreneurship Ecosystem of Zimbabwe in Research Council of Zimbabwe (RCZ) 2017: The 12th Zimbabwe International Research Symposium

- Book of Papers Presented ISBN 978-0-7974-7845-6 ISSN: 2412-2386 edited by Nhachi CFB (2019) Harare, Zimbabwe
- [47]. **Muzite S, Chitereka J, Chiwuta L (2017):**An overview of the National Research Prioritisation and Resultant Benefits: The Case Study of Zimbabwe in Research Council of Zimbabwe (RCZ) 2017: The 11th Zimbabwe International Research Symposium Book of Papers Presented ISBN 978-0-7974-7845-6 ISSN: 2412-2386 edited by Nhachi CFB (2017) Harare, Zimbabwe
- [48]. **Muzite S, Chitereka J, Chikowore P (2017):**Research for Entrepreneurship: Bringing Innovation to the Marketplace in Research Council of Zimbabwe (RCZ) 2017: The 11th Zimbabwe International Research Symposium Book of Papers Presented ISBN 978-0-7974-7845-6 ISSN: 2412-2386 edited by Nhachi CFB (2017) Harare, Zimbabwe
- [49]. **Ministry of Industry and Commerce (2018):** Zimbabwe National Industrial Development Policy 2019-2023: Towards Investment, Innovation and Export-Led Industrialisation Government of Zimbabwe, Harare
- [50]. **Ncube Muthuli (2019):** The 2020 Zimbabwe National Budget: Gearing for Higher Productivity, Growth and Job Creation Presentation to the Parliament of Zimbabwe, 14th of November 2019 by the Minister of Finance and Economic Development, Government of Zimbabwe, Harare.
- [51]. **Rao Bharat and Mulloth Bala (2017):**The Role of Universities in Encouraging Growth of Technology-Based New Ventures International Journal of Innovation and Technology Management August 2017, Vol. 14, No. 04 <https://doi.org/10.1142/S0219877017500146>
- [52]. **Ravindra Nath (2017):**Creating Enabling Environment for MSMEs-Indian Ecosystem in Research Council of Zimbabwe (RCZ) 2017: The 11th Zimbabwe International Research Symposium Book of Papers Presented ISBN 978-0-7974-7845-6 ISSN: 2412-2386 edited by Nhachi CFB (2017) Harare, Zimbabwe
- [53]. **Reuben D. Risk, Dianne A. Vella-Brodrick, Lea Waters (2017):**A complex dynamic systems approach to lasting positive change: The Synergistic Change Model <https://doi.org/10.1080/17439760.2017.1291853>
- [54]. **Paul Krutko (2021):**Collaborating to solve the big challenges in ISAP2020 Virtual, The Human factor: people, communities and the innovation ecosystem, www.iasp.ws Malaga, Spain
- [55]. **Proton Bakers (2021):** “Proton at 60 Supplement” published by News Day, Friday 25 June 2021 <https://www.bakerias.com> Marondera Zimbabwe
- [56]. **Phulkerd et al (2022):**Moving from silos to synergies: strengthening governance of food marketing policy in Thailand Globalisation and Health (2022) 18:29 <https://doi.org/10.1186/s1292-022-00825-5>
- [57]. **QingQui Gan, Jin Hong, BoJun Hou (2021):**Assessing the different types of policy instruments and policy mix for commercialization of university technologies Technology Analysis & Strategic Management 33:5 554-567, DOI:10.1080/09537325.2020.18311468
- [58]. **Saruchera F (2014):** Determinants of Commercialisation of Technological Innovations in
- [59]. Developing Economies: A study of Zimbabwe’s Research Institutes. A thesis submitted in
- [60]. fulfilment of the requirements for the degree of Doctor of Philosophy, University of
- [61]. KwaZulu-Natal; School of Management, Information Technology-IT and Governance;
- [62]. College of Law and Management Studies; South Africa.
- [63]. **Scientific and Industrial Research and Development Centre-SIRDC (March 2021):** Strategic Plan 2021-2025 – Moving towards an empowered and prosperous upper middle income economy anchored on National Development Strategy 1 SIRDC, Harare, Zimbabwe.
- [64]. **Scientific and Industrial Research and Development Centre (SIRDC) (2016):**Annual Financial Statements for the Year ending 31 December 2016 Audited by Grant Thornton/CAMELSA www.sirdc.ac.zw
- [65]. **SIRDC** Supplement to the Nation published by the Sunday Mail, 10 November 2019 www.sirdc.ac.zw
- [66]. **Constitution of the Scientific and Industrial Research and Development Centre (SIRDC)** registered in terms of Part V, Section 24 of Research Act Chapter 10:22/2001 on 1st of February 1997
- [67]. **The USA Technology Transfer and Commercialisation Act (2000)**<https://www.govinfo.gov>
- [68]. **Tobacco Research Board (TRB) 2018, 2019, 2020:**Annual Report for the Year ended 30 June 2018 & Audited Results for the year ended 31 December 2017 Kutsaga Research Station, Harare, Zimbabwe www.kutsaga.co.zw
- [69]. **University of Zimbabwe (2019):**University of Zimbabwe 2019-2025 Strategic Plan: Educating to Change Lives University of Zimbabwe Office of the Vice Chancellor, Harare, Zimbabwe, 43 pages
- [70]. **Xia Yingqi (2009):**Innovative Development and Human Resources in Zhongguancun (Z-Park) in the ninth (9th) International Workshop on Technological Innovations for Small and Medium Enterprises (SMEs) based on Science and Technology, 31st August – 13 September 2009, Beijing, China.

- [71]. **Vahid Garousi et al (2019)**:Characterising industry-academia collaborations in software engineering: evidence from 101 projects in Empirical Software Engineering (2019) 24: 2540 – 2602 <https://doi.org/10.1007/s10664-019-09711-y>
- [72]. **WAITRO Strategic Plan 2030**: Work Programme 2021-2022 www.waitro.org
- [73]. **Wei'e Wu (2019)**:Industry-University Synergy from the Perspective of Knowledge Complementation: Drives and Roles Advances in Social Science, Education, Humanities Research, Volume 402, and **Third International Conference on Social Science, Public Health and Education (SSPHE 2019)** Atlantis Press
- [74]. **Wei Yao, Heng Li, Mosi Weng (2018)**: The Role the University Could play in an Inclusive Regional Innovation System in Triple Helix: A Journal of University-Industry-Government Innovation and Entrepreneurship. <https://doi.org/10.1186/s40604-018-0058-4>
- [75]. **Yuchen Gao, Yimei Hu (2017)**: The upgrade to hybrid incubators in China – a case study of Tuspark Incubator Journal of Science and Technology Policy Management Vol 8 Issue 3 pp 331-351 <http://doi.org/10.1108/JSTPM-05-2017-0021>
- [76]. **Zhang J (2017)**:“The Trinity”: Synergy Innovation Mechanism of Science and Technology – A Case study based on Nantong Industrial Technology Institute Scientific Research Publishing, Technology and Investment, 2017, 8 44-55 <https://www.scirp.org/journal/ti> ISSN Online: 2150-4067; ISSN Print: 2150-4059
- [77]. **Zhengping Liu (2009)**:Technology Transfer and Promotion: the Chinese model and practices in the ninth (9th) International Workshop on Technological Innovations for Small and Medium Enterprises (SMEs) based on Science and Technology, 31st August – 13 September 2009, Beijing, China.
- [78]. www.iasp.ws **International Association of Science, Technology Parks**
- [79]. www.undp.org/SDG9 (**Sustainable Development Goal number 9**)

Philemon Kwaramba, et. al. “Perspectives on Research-Industry Moral Synergy in Zimbabwe: Differential views- Academia relative to Industry.” *IOSR Journal of Humanities and Social Science (IOSR-JHSS)*, 27(09), 2022, pp. 17-24.