Volume 22
Number 1
Spring 2024

ISSN 1854-6935

Managing Global Transitions International Research Journal

EDITOR IN CHIEF
Jana Hojnik

Managing Global Transitions
International Research Journal
ISSN 1854-6935 · www.mgt.fm-kp.si

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International Research Journal
VOLUME 22 · NUMBER 1 · SPRING 2024 · ISSN 1854-6935

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https://doi.org/10.26493/1854-6935.22_1

INDEXING AND ABSTRACTING

Managing Global Transitions is indexed/ listed in the International Bibliography of the Social Sciences, EconLit, IBZ Online, DOAJ, Erih Plus, EconPapers, Cabell's, EBSCO, and ProQuest.

AIMS AND SCOPE

Managing Global Transitions (MGT) is a quarterly, scholarly journal that covers diverse aspects of transitions and welcomes research on change and innovation in increasingly digitalized and networked economic environments, from a societal, organizational, and technological perspective. MGT fosters the exchange of ideas, experience, and knowledge among developed and developing countries with different cultural, organizational, and technological traditions. MGT invites original scientific, research, and review papers advancing the field of transitions in societies, organizations, and technologies.

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PUBLISHED BY

University of Primorska Press
Titov trg 4, 6000 Koper, Slovenia
zalozba@upr.si · www.hippocampus.si

Revija Managing Global Transitions je namenjena mednarodni znanstveni javnosti; izhaja v angleščini s povzetki v slovenščini. Izid revije je finančno podprla Javna agencija za znanstvenoraziskovalno in inovacijsko dejavnost Republike Slovenije iz sredstev državnega proračuna iz naslova razpisa za sofinanciranje izdajanja domačih znanstvenih periodičnih publikacij.

Goal-Oriented Metropolis Ecosystem Development

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Enterprise architecture (EA) modelling is understood as a system of architecture defined in ISO42010 and EA is intended to ensure a holistic view of business organization. This study analyses the goal-oriented approach to EA development. Justification of selection of this topic results from studies on EA modelling methods. Enterprise architects mainly focus on process modelling as well as on the application of UML language. There is still an open question of what the goals of EA modelling are. This paper presents an application of ArchiMate language and i* notation for goal-oriented EA modelling. The paper methodology covers a literature survey as well as a case study presenting ArchiMate and i* models for goal-oriented EA development by example of metropolis system architecture modelling. In this paper, a metropolis is defined as a consortium of cooperative communities and it is considered as a business organization for which the system architecture is modelled. The paper aims to develop the metropolis architecture model consisting of system components, i.e. business issues, data, software and hardware. The metropolis architecture models are provided to support development of a metropolis strategy. The main findings include the identification of business goals and EA goals, goal mapping, and specification of the key performance indicators (KPIS) to control the achievement of the goals.

Keywords: Enterprise Architecture, ArchiMate, i* language, metropolis, Key Performance Indicators
JEL Classification: M15, D83, M381,

Received 2022/11/07 · Revised 2022/12/25 · Accepted 2022/12/27
Published online 2024/03/31 https://doi.org/10.26493/1854-6935.22.5-26

Introduction

Opportunities for the creation of special-goal business organizations increase with Information Technology (IT) development and with economics, political, and social differentiation. Organizations are shaped by the contexts in which they are established. Thus, contemporary organizations reflect the impact of their historical origins in

local or regional communities characterized by growing profitability and competition over the control and distribution of resources. In this paper, business organization is identified with enterprise. However, in some sense, this interpretation is a metaphor. The author does not consider the economic aspects of enterprise existence, but focuses on enterprise structure, resources, requirements, actors, information systems, and ICT networks and devices. In this sense, enterprise architecture is a formal look available to general managers working on the continuous transformations that are necessary to their business. Commonly, architecture is the synergy of art and science for the design of complex structures, such as buildings, houses, roads, or bridges. In this study, enterprise architecture is a practice to design and control an enterprise's structure, processes, applications, information systems and technology. ArchiMate is a language for expression of all of these issues. Firstly, Enterprise Architecture (EA) has been developed for controlled implementation of information communication technology (ICT) and adequately addressing identified requirements (Desfray and Raymond 2014). However, EA is also useful for controlling the management of business organization, implementation of regulations and processes, as well as for internal auditing support.

In this paper, the author will discuss goal-orientation of enterprises, not just enterprise theory. Enterprises are fascinating social units, of many shapes and sizes, but some of their important characteristics are overlooked by the field of enterprise architecture studies. Enterprise architecture researchers have done an excellent job in explaining how IT is aligned with business resources in organizations, but not how organizations came to be that way. In this study, the research gap concerns EA goals identification and modelling with the i* tool for business organization (i.e. metropolis) strategic management. Hence, this study objective is the identification of Metropolis 5.0 enterprise architecture goals and their structuring. The author aims to write about the emergence of enterprise architecture by example of the metropolis, not just its existence. Although EA models are analysed for strategic management support, high quality enterprise architecture should provide opportunities to translate business strategy goals into goals and operations of ICT implementation, deployment, and management. There are many interests, and connected with them are stakeholders, principles, roles and rules steering the daily operations of EA planning. The multi-

plicity of EA frameworks does not make the work easier, because there is a lack of universal patterns and EA practitioners provide their own separate approaches to EA development. However, they agree that the EA model should consist of the business, information, software and infrastructure perspectives (Salmans and Kappelman 2010; Fischer, Winter, and Aier 2010; Zachman 2010). They emphasize that EA enables business and IT alignment, as well as ICT governance and ICT management alignment. The author of this paper, as a follower of ArchiMate modelling, has highlighted specific aspects of EA development in earlier work (Pańkowska and Sołtysik-Piorunkiewicz 2022), which concerns ICT modelling for sustainable development of the metropolis ecosystem.

This study's purpose is to outline the process of modelling EA in the ArchiMate language, identification of goals, and their diagramming in i* language in a case study to reveal a pragmatic application of Key Performance Indicators (KPIS) in EA and to present how these specifications and applications expand the EA model itself. The findings of this study are useful to both IT people and practitioners, i.e. managers at regional governmental institutions, in specification of strategic goals and in passing information from business people to IT professionals and back in an iterative negotiating process on what they expect of future work. This paper encourages practitioners to invest more in project goals identification and proper acquisition of IT resources and, in turn, IT companies are expected to provide suitable sustainable technology.

The methodology of this study includes a literature survey as well as a case study analysis. Therefore, the paper consists of the following parts. The secon section includes a discussion on goal-oriented approaches in the EA domain for identification of information system requirements. The third section presents essential methodology for goal-oriented EA development. The fourth section defines the metropolis model specification and indicators needed in the i* model. Metropolis system architecture developers should focus on the identification of business goals as well as on the specification of ICT goals, and finally on the business and ICT goals' alignment. The fifth section 5 includes conclusions.

Literature Survey

EA management and development are realized to ensure business organization growth and revenue increase, controlled acquisition of resources, successful implementation of managerial and technology inno-

vations, offering different or innovative products and services to clients, cost minimization in the short term, and assurance of business stability in the long term. Business processes, goals, and tasks of stakeholders in enterprise architecture must constantly be aligned with the many regulations, standards, policies and EA principles imposed by public institutions, national authorities, or regional governments. EA business objectives are complex and the objectives' connections are complex as well. As they are changeable, they require continuous verification and validation.

Enterprise architecture is an idiosyncratic holistic plan, which combines business objectives, vision, strategy, and governance principles (Manzur et al. 2015). ISO/IEC/IEEE 42010:2022 defines architecture as 'fundamental concepts or properties of an entity in its environment and governing principles for the realization and evolution of this entity and its related life cycle processes' (International Organization for Standardization 2022). An enterprise is a system of one or more business units supported by ICT solutions. The enterprise boundaries are defined relatively to information workflows among business units, so they are not constrained by the boundaries of a legal organization (International Institute of Business Analysis 2017). An enterprise as a system uses inputs, i.e. resources, in a controlled and goal-oriented way to provide outputs, i.e. products or services in business processes. EA management focuses particularly on planning, organizing, leading, administrating, and controlling, while EA development functions include conceptualization, design, implementation, deployment, evaluation, assessment, and improvement. EA principles are included in business regulations, legal documents, business plans, de facto standards, and governmental decisions. As they are not expressed in a formal language, they can be freely interpreted. Therefore, there is no mechanism for consistency checking between the principles, business goals, assessments, requirements, or values (Marosin, Zee, and Ghanavati 2016). The lack of cohesion can be problematic; however it allows for creativity in business architecture and system architecture development.

EA developers and managers apply the concept of goals. This concept is needed to explain and justify why business is working as well as why EA is developed. There is a need to differentiate business goals and system goals. Business goals are to be strictly included in the enterprise business plan and strategy, while system goals are the goals of EA development. Another issue covers goal achievement measures. Therefore, a

TABLE 1 Goal-orientation in EA – Literature Review

No.	Reference	Findings
1	Truong et al. 2021	Authors propose reasoning process focused on enterprise reengineering, using data mining rules, and strategic goal orientation. They analyse process effectiveness taking into account business intelligence (BI) indicators.
2	Sellitto et al. 2020	Authors integrate EA approach with a goal-oriented development methodology to facilitate implementation of Internet of Actors in Smart Grid, Industry 4.0, and e-Government.
3	Abrahao et al. 2019	Authors compared GRL with i* language, taking into account the quality of goal models, modelling time and productivity. They found i* modelling less laborious.
4	Babar et al. 2019	Authors applied goal-oriented approach to analyse the requirements for designing cognitive systems and cognitive business processes.
5	Gaol, Danny, and Matsuo 2019	Authors develop organization goal-oriented requirement engineering (OGORE) method. They collected business process data, defined KPIS, and elaborated the Goal Tree Model.
6	Marosin, Zee, and Ghanavati 2016	Authors focused on the requirements for improving the development of a framework to formalize EA principles and apply goal-oriented requirements language (GRL).

Continued on the next page

specification of metrics, i.e. key performance indicators, their thresholds and target values, are necessary.

This paper includes a qualitative survey of literature. The research questions (RQS) have been formulated as follows:

- RQ1: How is goal-orientation related to the EA domain?
- RQ2: How to assess goal-achievement through key performance indicators (KPIS) modelling?

Accordingly, this study covers reviews of the following repositories: Scopus, IEEE Xplore, AIS e-Library, Sage Journals, Science Direct, Google Scholar, ProQuest, DBLP Trier University, Emerald Publishing and Taylor Francis Group. The research questions have been analysed through the main keywords. The search keywords were formulated as follows: 'KPI goal-oriented Enterprise Architecture.' The words were connected using the Boolean 'AND' operators. Although, in total, 2796 publications were found, it was necessary to remove duplications as well as publications considering other aspects of EA development not directly connected with Key Performance Indicators (KPIS) or goal-orientation.

TABLE 1 *Continued from the previous page*

No	Reference	Findings
7	Hamm and Kehrer 2015	Authors integrated the collaborative EA concept, goal-driven decision-making, and ArchiMate Motivation extension.
8	Nwokeji et al. 2014	Authors present a technique for checking the completeness of requirements specification in KAOS.
9	Akhigbe, Amyot, and Richards 2014	Authors introduce the EA framework, which exploits business objectives, decisions, and information systems. They apply GRL and consider business goal modelling and KPIS as having impact on EA.
10	Cardoso 2013	Paper concerns the integration of business services, goals, KPI modelling, and business processes. Author proposes the usage of KPI for EA business goals verification.
11	Lee and Song 2011	Authors argue that ArchiMate is not sufficient for requirements identification. They proposed a goal-oriented approach.
12	Ganesan and Paturi 2009	Authors define compatibility of composite enterprise business architecture Framework, Business Motivation Model, Business Rules, and Balanced Scorecard Approach. KPIS link business strategy to business processes, roles, products, and services

In addition, publications limited to KPI applications for business development support and to goal-orientation only in process modelling were removed. Therefore, eventually, just 45 papers were been selected for the final analysis and the most valuable research findings included in 12 papers are presented in Table 1.

Beyond that, some interesting conclusions are presented in other papers. For example, Bernaert and Poels (2011) argue that goals are system properties that are expressed by system stakeholders. They have investigated how the Knowledge Acquisition in autOmated Specification (KAOS) methodology supports small and medium enterprises (SMES) in documenting their entrepreneurial knowledge. Therefore, researchers have formulated a couple of fundamental questions, i.e. know-who, know-how, know-what, and know-why.

The answer to the know-why question is included in the goal model, where goals are presented in a goal diagram. The answer to the question of know-who is in a responsibility model, in which actors are assigned to goals and resources. The answer to the know-what question is included in the concept model, which is applied to describe the objects of computerized information processing, i.e. entities, agents, and associations. Finally,

the know-how question is answered in the business process model, which provides definitions of agent operations and explains the workflows.

ArchiMate has recently been considered as the de facto standard language for modelling EA. ArchiMate models include the business goals combined with stakeholders, processes, products, business values, assessments, and constraints. Abrahao et al. (2019) argue that nowadays, several goal-oriented languages have been developed to present the EA stakeholders' interests. For example, the Goal Requirements Language (GRL) is applied to identify stakeholders' goals in the context of incremental software development. In general, the goal-oriented modelling enables answering the question of why software is constructed. Goal identification should support the evaluation of system requirements' completeness. Horkoff et al. (2019) have noticed that goal-oriented requirements engineering (GORE) creates many different languages of goal modelling, e.g. i* (Yu 1997), KAOS (Dardenne, Lamsweerde, and Fickas 1993), or the textual notation GBRAM (Goal-Based Requirement Analysis Method) (Subhani and Ravikumar 2019). According to Kavakli and Loucopoulos (2005), i* language encourages focusing on understanding the current business organization situations, while KAOS allows for concentrating on relating business goals to system components.

Usage of KPIS in enterprise modelling as well as in architecture frameworks is emphasized in the publications of Cardoso (2013). She perceives the opportunities of KPI application in EA approaches to measure the properties of EA concepts and to evaluate business goal achievement. For her, KPIS are useful if they are specific, measurable, relevant, and actual measures. Mate, Trujillo, and Mylopoulos (2017) define KPIS as metrics of performance of an enterprise relative to its objectives. Thereby, they are enabling corrective action where there are deviations. For years, KPIS have been used by enterprises to monitor performance of business processes and business strategies relative to their objectives. Objectives can be selected, for example, from Balanced Scorecard (BSC) perspectives, i.e. Financial, Customer, Processes, and Learning. Objectives can be considered on different abstraction levels, i.e. the strategic, tactical, or operational level. The scope of KPIS application is quite wide. In general, they are intensity rates or structure rates, which are applied to assess different socio-economic phenomena. Consequently, the KPIS are applied to control the preliminary established values of parameters. Hence, in the case of significant deviation, one can steer tasks or make

decisions concerning human behaviour to return to the required values of the parameters. Otherwise, one can accept the deviations, next monitor, and eventually implement an organizational change in a longer period of time.

Goal-Orientation in Research Methodology

The goal-oriented EA development approach is derived from the ArchiMate Motivation Extension and Business Architecture modelling. This study focuses on EA conceptualization, the identification of stakeholders, and specification of goals. Therefore, the EA conceptualization includes:

- Stakeholder Identification,
- Identification of Stakeholders' Goals,
- Prioritization of Goals,
- Defining Metrics for Goals.
- Beyond that, the further stages in the EA development process cover:
- Defining Threshold Values and Target Values for Metrics,
- Implementation of Metrics,
- Assessment of measuring results,
- Comparison of received results with predefined values,
- Elaboration of recommendations for stakeholders.

As was mentioned earlier, EA development and management are realized for ICT implementation, management and governance. The ICT operational management is realized to keep the existing status of actual computerized information systems, while ICT strategic management is a proactive approach including the anticipation of ICT needs. The long term strategic management process includes EA planning and development, as well as implementation of critical ICT changes. In short term management, the change implementation is limited, and it is identified along with the maintenance of computerized information systems.

However, goals achievement monitoring as well as particular indicators monitoring are the subjects of interest. ICT governance and ICT strategic management require firstly the identification of business goals and business KPIS specification. Modelling these concepts is possible in ArchiMate and i* languages. As the ArchiMate model is rather complex, the most important concepts for strategic ICT management are presented in Figure 1, and next they are extended in Figure 2.

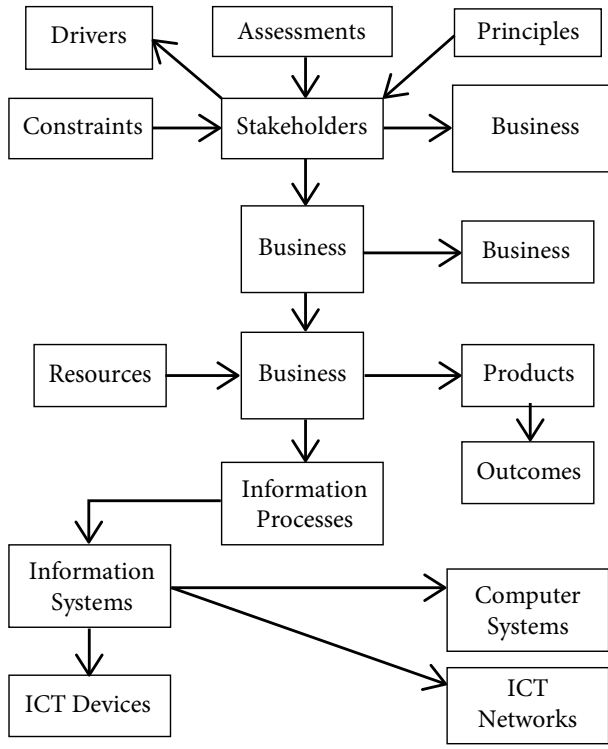

FIGURE 1 ICT Strategic Management Concepts

This study proposes an approach that provides EA stakeholders with an integrated view of strategic business goals, ICT goals, and conceptual KPIs. The main benefit of this approach is that it links the ArchiMate strategic business model to the data for monitoring and assessment. In this study, the i* language is applied as a goal- and actor-oriented tool, which is considered supplementary to other EA modelling notations. In the i* model, the actor is an entity aiming to achieve particular goals through task execution or process realization individually or in collaboration with other actors (Dalpiaz, Franch, and Horkoff 2016). Beyond actors, their tasks, goals, and resources, i* language models include qualities, which are attributes or criteria for the evaluation of achievement of goals. EA developers use the i* goal model to conclude what tasks are assigned to actors, how the tasks are constructed and prioritized, and how the goals are achieved. Unfortunately, the i* language developers have not precisely explained what goals are to be included in models.

In ArchiMate language, goals present a high-level statement of intent of a business organization. However, in EA modelling, there is a need to precisely identify business goals as well as system goals. System goals can be further identified with the achievement of functional requirements, which are described as the necessary capabilities that ICT solutions must have in terms of behaviours and processed data. Beyond the functional requirements, for software and hardware components as well as for ICT services in EA, the identification of non-functional requirements seems to be necessary. Non-functional requirements are named qualities of service requirements (International Institute of Business Analysis 2017). Hence, in this study, the i* language goal-oriented model includes business goals and EA goals, as well as KPIs presenting qualities for businesses, and KPIs for EA.

Case Study

This case study is grounded on the Silesian Province Metropolis. This metropolis is defined as a complex of 41 communities, i.e. towns and villages. Each community has its own business strategy and budget. These communities are closely co-located, hence they have to cooperate to mutually support themselves, protect the environment, and utilize joint resources, which are human, natural, informational, and financial (Ordonez-Ponce 2021). Therefore, beyond issues of governance and management at the community level, there are also problems solved by the metropolis authorities. In this study, the Silesian Province Metropolis is interpreted as an enterprise, for which ICT architecture is to be modelled, because of its particular ICT requirements. The Metropolis Architecture model can be applied to facilitate alignment between the community goals and the metropolis goals in relation to information communication technology (ICT) that supports citizens and visitors in the metropolis. Beyond that, there is the need to consider the alignment between ICT goals and business goals of the metropolis. The alignment is a critical process to support sustainable growth of the metropolis and to improve business services for citizens in their communities.

Naturally, each metropolis is different. They form different constellations of communities, consisting of several equal units, or forming a network around one central point or a few significant points. In any case, their intensive development results from population growth, moving people from villages to towns, reduction of agriculture areas, and

changing green areas into housing and industry areas (Wilson 2020). As with many other metropolises, the Silesian Province Metropolis has problems of transportation, healthcare assurance, natural environment protection, housing, and reduction of green areas because of industrialization (Soyinka and Siu 2018). ICT solutions, particularly the Internet of Things (IoT), cloud computing, and Big Data are expected to support agile management of metropolises. Bokolo (2020) emphasizes the issue of technology for smart cities. He has noticed that Big Data for metropolis management is gaining importance, as the cities deploy ICT architectures supporting the management of energy for electric vehicles and orchestration of the production, consumption, and distribution of energy from renewable sources.

As Industry 4.0 means the application of robots, IoT and advanced analytics of data to facilitate flexible production and Industry 5.0 concerns the collaboration among robots and humans, the concept of City 5.0 means a smart, but sustainable and resilient city (Grabowska, Saniuk, and Gajdzik 2022). The City 5.0 faces many challenges, i.e. stability, safety, healthcare, social services, housing, environment, transportation, employment, culture, and education (Roseman, Becker, and Chasin 2021).

Each metropolis has individual business goals as well as EA system goals. Analysis of metropolis EA can begin from considering the metropolis as an ecosystem, a complex web of symbiotic and cooperative organizations, i.e. cities and communities. Together, they are interrelated through communication and transportation systems. They have common principles and methods that help communities plan and realize their sustainability goals in relation to local business processes and metropolitan information systems. Joint business processes and procedures make the inter-metropolitan information flows easier. Metropolis EA integrates municipalities' information systems of healthcare, energy and water management, and smart parking. However, beyond the integration of local and communal issues, some problems and challenges are assumed to be considered on the upper, i.e. metropolitan, level. These joint problems are as follows: communication and transportation, traffic monitoring, safety and security, accessibility of cultural institutions, investments in higher education, air pollution monitoring, and waste management.

Figure 2 presents the EA model for the Silesian Province Metropolis in ArchiMate language implemented in the Archi 4.10 tool.

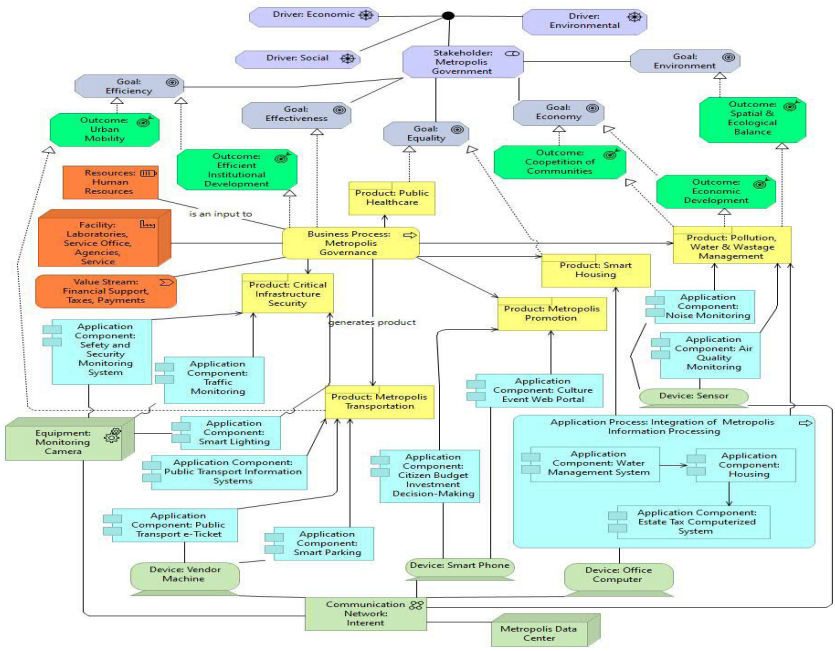

FIGURE 2 EA Model for Silesian Province Metropolis

The ArchiMate model concepts in Figure 2 are derived from Figure 1. Each EA model is an abstract structure of the most important concepts connected through particular relations available in the ArchiMate language. The EA model is applied to facilitate the alignment of metropolis goals, strategic outcomes of the metropolis, and ICT solutions that support stakeholders. The metropolis government is assumed to be the most important stakeholder, although there are also others, i.e. EA developers, business organizations, and public institutions located in the metropolis, as well as individual citizens and visitors. The stakeholders are driven by three types of stimulants, which motivate them to define goals and inputs, plan outputs and outcomes. The drivers are economic, social and environmental. In this model, stakeholders are assumed to have the following business goals: efficiency, effectiveness, equality, economy, and environment. For the business goals' achievement, the metropolis governance process is developed. Human, material, and financial resources facilitate realization of the process. This process's products are public services, i.e. public healthcare, metropolitan security, transportation, pollution monitoring, water and waste management, housing, and metropolis promotion.

The services are supported by ICT solutions, i.e. applications and hardware. In ArchiMate language, a product represents a collection of business services, which are offered by business organizations both internally to that organization and externally to customers and other organizations.

In this model (Figure 2), the product enables the realization of certain outcomes, which identify the results that are assumed to be achieved. In metropolis strategy, outcomes ensure the realization of business goals. In the model in Figure 2, creation of products is possible through the use of business software, i.e. monitoring systems, transportation information system, web portal and others. These software applications are accessible on end users' devices. Data from these devices is stored in a data operation centre. As ArchiMate language models support just the analysis and diagnosis of enterprise on a high abstract level, i.e. strategy level, further detailed planning and design of the system components are realized with the usage of other software development tools and languages, i.e. UML, SysML, etc.

There is a question of what the Metropolis 5.0 is. Therefore, the characteristics of this metropolis are derived from the following standards:

- ISO 37120:2018 Sustainable cities and communities – Indicators for city services and quality of life,
- ISO 37122:2019 Sustainable cities and communities – Indicators for smart cities,
- ISO 37123:2019 Sustainable cities and communities – Indicators for resilient cities.

The metrics presented in these standards are grouped into sub-domains, i.e. economy, education, energy, environment, finance, governance, health, housing, population, safety, solid and water waste, clean water, sport, culture, telecommunication, transportation, urban agriculture and planning. Figure 3 includes characteristics of Metropolis 5.0 selected for the Silesian Province Metropolis. This set of metrics is a sub-set of measures included in the standards, i.e. ISO 37120:2018, ISO 37122:2019, and ISO 37123:2019. The Metropolis 5.0 is characterized as a digitalized, sustainable, and resilient metropolis.

In the identification of characteristics in Figure 3, digitalization means the automation of processes and usage of ICT technologies instead of manual services.

FIGURE 3 Characteristics of Metropolis 5.0

The metrics of the digitalized metropolis concern different technologies used in citizens' daily lives (Hiremath et al. 2013). The sustainable metropolis is oriented towards the performance of services and assurance of a low-carbon economy and renewable sources of energy, as well as social equality, culture and history protection (Adolfsson, Lindblad, and Peacock 2021). Finally, the resilient metropolis is oriented towards survival and prepared to reduce risks of disasters, breakdowns, and failures. The disasters and breakdowns may destroy critical infrastructure in metropolises and may cause environmental degradation, loss of life and health, social inequality, and economic crises. The critical infrastructure covers electricity, water, telecommunication, waste management, sanitation, food and fresh water distribution, and emergency services.

Figure 4 includes the i* language goal-oriented EA model, which is de facto supplementary to the ArchiMate model. The i* language model covers just actors, goals, tasks, and qualities (Centro de Informática

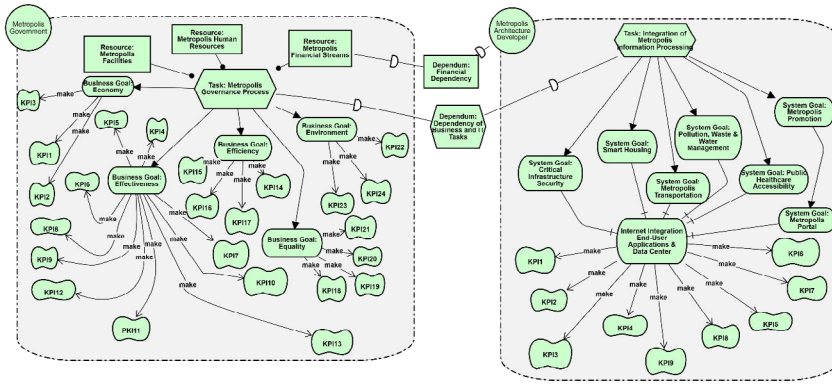

FIGURE 4 Goal-Oriented Model for Metropolis 5.0

of the Universidade Federal de Pernambuco 2021). Business goals have been identified already in the metropolis EA model in Figure 2.

In a goal-oriented model, beyond business goals, there is a place for ICT goals, which are connected with the tasks of the metropolis architecture developer, who is another important actor. The goals identified for actors have been linked with qualities, i.e. KPIS. The specified KPIS for business stakeholders are in Table 2, and KPIS for ICT stakeholders are in Table 3 (International Organization for Standardization 2011; 2017; 2018; 2019a; 2019b; Marr 2012; Adams 2015). There is still the problem that direct mapping of business goals into ICT goals is not possible through i* modelling. In the i* model, these two groups of interests can be combined through the dependency of tasks as well as through financial dependency (Figure 4).

Each group of stakeholders is expected to identify their goals and tasks and processes to ensure goal achievement. Both sides want to achieve a certain consensus and conformity of goals. According to the best practices, the superior role belongs to metropolis government stakeholders, who are expected to formulate ICT governance principles. Hence, the minor role belongs to the EA developers, who are responsible for modelling the ICT solutions enabling the business goals achievement. The EA developers can formulate goals concerning just the quality of ICT and its implementation process. Unfortunately, none of the notations presented in this study enable modelling the hierarchy of dependencies among stakeholders. The only way is to model business processes and consider how each of them can be supported by ICT.

TABLE 2 Metropolis Government KPIs

Category	No	Definition
Economy	KPI 1	'Percentage of labour force employed in ICT sectors as well as in the education and research and development sectors'
	KPI 2	'Annual amount of revenues from the sharing economy as a percentage of own-source revenues'
	KPI 3	'Percentage of public transport services covered by a unified payment system'
Effectiveness	KPI 4	'Number of Internet connections per 100 000 population'
	KPI 5	'Kilometres of public transport system per 100 000 population'
	KPI 6	Percentage of metropolis services accessible online
	KPI 7	'Percentage of the community's population with an online health file accessible to healthcare providers'
	KPI 8	'Percentage of marked pedestrian crossings equipped with accessible pedestrian signals'
	KPI 9	'Number of public library book and ebook titles per 100 000 population'
	KPI 10	'Percentage of community streets covered by real-time online traffic alerts'
	KPI 11	'Percentage of essential service providers covered by a documented continuity plan'
	KPI 12	'Percentage of community electronic data with secure and remote back-up storage'
	KPI 13	'Capacity of designated emergency hospitals per 100 000 population'
Efficiency	KPI 14	Return on Investment for evaluation of the efficiency of an investment
	KPI 15	Percentage of the community's electricity that is produced 'using decentralized electricity production systems'
	KPI 16	'Percentage of households with smart energy meters and smart water meters'
	KPI 17	'Electricity supply capacity as a percentage of peak electricity demand'
Equality	KPI 18	'Percentage of population living below the international poverty line'
	KPI 19	'Number of cultural institutions and supporting facilities per 100 000 population'
	KPI 20	'Percentage of population served by waste water collection'
	KPI 21	'Percentage of public buildings that are accessible by persons with special needs'
Environment	KPI 22	'Percentage of total end use of energy derived from renewable sources'
	KPI 23	'Green area per 100 000 population'
	KPI 24	'Number of real-time remote air quality monitoring stations per square kilometre'

TABLE 3 Metropolis ICT Architecture KPIs

No	Definition
KPI 1	Coherence: 'Degree to which system architecture is logical and consistent'
KPI 2	Usability: 'Degree to which the product has attributes that enable it to be understood'
KPI 3	Compatibility: 'Degree to which two or more components can exchange information'
KPI 4	Security: 'Degree of protection of information and data'
KPI 5	Reusability: 'Degree to which a system repeats the use of any parts of an existing system in a new system'
KPI 6	Adaptability: 'Degree to which a system can effectively and efficiently be adapted for different hardware and software'
KPI 7	Consistency: 'Degree of uniformity, standardization, and freedom from contradiction among the documents or system components'
KPI 8	Correctness: 'Degree to which a system is free from faults in its specification and design'
KPI 9	Modularity: 'Degree to which a system is composed of components such that a change to one component has minimal impact on other components'

Conclusions

The Enterprise Architecture concepts, frameworks and methodologies have been developed for years. The frameworks have various purposes and present different fundamentals and applications. This study focuses on EA goals identification, presentation, and their specified usage for further investigation and development of EA. The survey of literature revealed 45 publications, whose authors emphasized the issues of EA goals and usage of Key Performance Indicators to support those goals' measurement. According to the literature study results, EA goal orientation is combined with goal-oriented development of information systems and goal-oriented requirement engineering, as well as with the application of goal-oriented requirement language and i* notation.

This study covers the author's approach to EA goal identification and goal-oriented EA modelling. This approach is based on ArchiMate Motivation Extension and Business Architecture modelling. The author has identified the ICT strategic management concepts and further proposed a case study application to model the Silesian Province Metropolis as Metropolis 5.0. This research endeavour seems to be beneficial to theorists as well as to practitioners. For theorists involved in EA modelling, this study offers a proposal for the application of ArchiMate and i* languages and tools. The author presents a new direction of ArchiMate application in the Metropolis 5.0 development domain. The study

is also useful for practitioners, as the research covers identification of ICT goals and combining them with measures, i.e. Key Performance Indicators.

In general, EA development is realized as an iterative and incremental process. Continuous changes in ICT as well as political and governmental regulations' renewal lead to changes in the EA model of any business organization. Some technological or political reasons cause smaller changes, but others result in radical modifications of EA. Lately developed Society 5.0 concepts were an inspiration to identify the characteristics of Metropolis 5.0 in this paper and further develop the EA model of Metropolis 5.0. The proposed modelling approach focused on the identification of goals and description of their indicators. For Metropolis 5.0 modelling, the two groups of main stakeholders have been identified. They have different tasks, goals and quality metrics. This paper emphasizes the segregation of goals of particular stakeholders, i.e. business and IT people. The i* model allowed for emphasizing these discrepancies as well as the necessity to align the goals of these two groups. This differentiation cannot be left unsaid because, in practice, each group could dominate the other. Therefore, negotiations and discussions are required to explain priorities of each party and to compromise and reach mutual consensus on the goals.

In this paper, the goal-oriented EA model is supplemented by the i* model to reveal what KPIs can be specified for business goals and ICT architecture goals. This approach should be useful for Metropolis 5.0 EA conceptualization, although the literature study allows for the conclusion that surprisingly many publications on goal-oriented EA or requirement modelling focus on statistical or descriptive literature reviews.

Although the ArchiMate model is rather complex, the most important concepts for strategic ICT management are identifiable in this notation. ArchiMate models as well as i* models are not very popular; therefore, practitioners can have problems in their common application. Both notations have some weaknesses. For example, none of them precisely define types of goals. Both require metamodelling, which would also include other concepts essential for EA development. Usually, they are integrated with business process modelling in Business Process Model and Notation (BPMN). Lack of recognition of the modelling techniques is a real barrier to research and verification in the domain of practice. Beyond that, in business analyses reports, the KPIs are usually presented in descriptive forms, hence additional language would be necessary for

further formalization of KPIs. So far, KPIs have not been widely implemented in EA models, therefore it is a future opportunity to further perfect EA frameworks.

References

Abrahao, S., E. Insfran, F. Gonzalez-Ladron-de-Guevara, M. Fernandez-Diego, C. Cano-Genovés, and R. P. de Oliveira. 2019. 'Assessing the Effectiveness of Goal-Oriented Modelling Languages: A Family of Experiments.' *Information and Software Technology* 116:106171.

Adams, K. M. G. 2015. *Non-Functional Requirements in Systems Analysis and Design.* Cham: Springer.

Adolfsson, P., J. Lindblad, and S. Peacock. 2021. 'Translations of Sustainability in Urban Planning Documents: A Longitudinal Study of Comprehensive Plans in Three European Cities.' *Cities* 119:103360.

Akhigbe, O., D. Amyot, and G. Richards. 2014. 'A Framework for a Business Intelligence-Enabled Adaptive Enterprise Architecture.' In *Conceptual Modelling Lecture Notes in Computer Science,* ER *2014,* edited by E. Yu, G. Dobbie, M. Jarke, and S. Purao, 393–406. Cham: Springer.

Babar, Z., E. Yu, S. Carbajales, and A. Chan. 2019. 'Managing and Simplifying Cognitive Business Operations Using Process Architecture Models.' In *Advanced Information Systems Engineering, 31st International Conference,* CAISE *2019,* edited by P. Giorgini and B. Weber, 643–58. Cham: Springer.

Bernaert, M., and G. Poels. 2011. 'The Quest for Know-How, Know-Why, Know-What and Know-Who: Using KAOS for Enterprise Modelling.' In *Advanced Information Systems Engineering Workshops,* CAISE *2011,* edited by C. Salinesi and O. Pastor, 29–40. Berlin: Springer.

Bokolo, A. 2020. 'Smart City Data Architecture for Energy Prosumption in Municipalities: Concepts, Requirements, and Future Directions.' *International Journal of Green Energy* 17 (13): 827–45.

Cardoso, E. C. S. 2013. 'Challenges in Performance Analysis in Enterprise Architectures.' In *2013 17th* IEEE *International Enterprise Distributed Object Computing Conference Workshops,* edited by E. Bagheri, D. Gašević, S. Halle, M. Hatala, H. R. Motahari Nezhad and M. Reichert, 327–36. Vancouver: Institute of Electrical and Electronics Engineers.

Centro de Informática of the Universidade Federal de Pernambuco. 2021. 'PiStar Tool.' https://www.cin.ufpe.br/~jhcp/pistar/.

Dalpiaz, F., X. Franch, and J. Horkoff, J. 2016. 'iStar 2.0 Language Guide.' *Cornell University,* 25 May 2016. https://arxiv.org/abs/1605.07767.

Dardenne, A., A. van Lamsweerde, and S. Fickas, S. 1993. 'Goal-Directed Requirements Acquisition.' *Science of Computer Programming* 20 (1–2): 3–50.

Desfray, P., and G. Raymond. 2014. *Modeling Enterprise Architecture with* TOGAF*: A Practical Guide Using* UML *and* BPMN. Amsterdam: Kaufmann.

Fischer, C., R. Winter, and S. Aier. 2010. 'What Is an Enterprise Architecture Principle? Towards a Consolidated Definition.' *Computer and Information Science 2010,* edited by R. Lee, 193–205. Berlin: Springer.

Ganesan, E., and R. Paturi. 2009. 'Key Performance Indicators Framework: A Method to Track Business Objectives, Link Business Strategy to Processes and Detail Importance of Key Performance Indicators in Enterprise Business Architecture.' *Proceedings of the Fifteenth Americas Conference on Information Systems,* edited by R. C. Nickerson and R. Sharda. http://aisel.aisnet.org/amcis2009 /736.

Gaol, F. L., J. Danny, and T. Matsuo. 2019. 'Application of Organization Goal-Oriented Requirement Engineering (OGORE) Methods in ERP-Based Company Business Processes.' *Open Engineering* 9 (1): 545–53.

Grabowska, S., S. Saniuk, and B. Gajdzik. 2022. 'Industry 5.0: Improving Humanization and Sustainability of Industry 4.0.' *Scientometrics* 127 (6): 3117–44.

Hamm, T., and S. Kehrer. 2015. 'Goal-Oriented Decision Support in Collaborative Enterprise Architecture.' In *Digital Enterprise Computing 2015,* edited by A. Zimmermann and A. Rossmann, 175–82. Bonn: Gesellschaft für Informatik.

Hiremath, R. B., P. Balachandra, B. Kumar, S. S. Bansode, and J. Murali. 2013. 'Indicator-Based Urban Sustainability: A Review.' *Energy for Sustainable Development* 17 (6): 555–63.

Horkoff, J., F. B. Aydemir, E. Cardosso, T. Li, A. Mate, E. Paja, M. Salnitri, L. Piras, J. Mylopoulos, and P. Giorgini. 2019. 'Goal-Oriented Requirements Engineering: An Extended Systematic Mapping Study.' *Requirements Engineering* 24 (2): 133–60.

International Institute of Business Analysis. 2017. IIBA *Global Business Analysis Core Standard: A Companion to A Guide to the Business Analysis Body of Knowledge (*BABOK *Guide).* Toronto: International Institute of Business Analysis.

International Organization for Standardization. 2011. *Systems and Software* ENGINEERING*: Systems and Software Quality Requirements and Evaluation (*SQUARE*); System and Software Quality Models.* ISO/IEC 25010:2011. Geneva: International Organization for Standardization.

———. 2017. *Systems and Software Engineering: Vocabulary.* ISO/IEC/IEEE 24765:2017. Geneva: International Organization for Standardization.

———. 2018. *Sustainable Cities and Communities: Indicators for City Services and Quality of Life.* ISO 37120:2018. Geneva: International Organization for Standardization.

———. 2019a. *Sustainable Cities and Communities: Indicators for Smart Cities.* ISO 37122:2019. Geneva: International Organization for Standardization.

———. 2019b. *Sustainable Cities and Communities: Indicators for Resilient Cities.* ISO 37123:2019. Geneva: International Organization for Standardization.

———. 2022. *Software, Systems and Enterprise: Architecture Description.* ISO/IEC/IEEE 42010:2022. Geneva: International Organization for Standardization.

Kavakli, E., and P. Loucopoulos. 2005. 'Goal Modelling in Requirements Engineering: Analysis and Critique of Current Methods.' In *Information Modelling Methods and Methodologies: Advanced Topics in Database Research,* edited by J. Krogstie, T. Halpin and K. Siau, 102–24. Hershey: IGI Global.

Lee, H., and Y.-T. Song. 2011. 'Bridging Enterprise Architecture Requirements to ArchiMate.' *Studies in Computational Intelligence* 365:63–78.

Manzur, L., J. M. Ulloa, M. Sánchez, and J. Villalobos. 2015. 'xArchimate: Enterprise Architecture Simulation, Experimentation and Analysis.' *Simulation* 91 (3): 276–301.

Marosin, D., M. van Zee, and S. Ghanavati. 2016. 'Formalizing and Modelling Enterprise Architecture (EA) Principles with Goal-Oriented Requirements Language (GRL).' In *International Conference on Advanced Information Systems Engineering: CAiSE 2023,* edited by S. Nurcan, P. Soffer, M. Bajec and J. Eder, 205–20. Heidelberg: Springer.

Marr, B. 2012. *Key Performance Indicators.* Harlow: Pearson.

Mate, A., J. Trujillo, and J. Mylopoulos. 2017. 'Specification and Derivation of Key Performance Indicators for Business Analytics: A Semantic Approach.' *Data and Knowledge Engineering* 108 (3): 30–49.

Nwokeji, J. C., T. Clark, B. Barn, and V. Kulkarni. 2014. 'Automated Completeness Check in KAOS.' In *Advances in Conceptual Modeling,* edited by M. Indulska and S. Purao, 133–8. Cham: Springer.

Ordonez-Ponce, E. 2021. 'The Role of Institutional Context for Sustainability Cross-Sector Partnerships: An Exploratory Analysis of European Cities.' *Sustainability* 13 (17): 9497.

Pańkowska, M., and A. Sołtysik-Piorunkiewicz. 2022. 'ICT Supported Urban Sustainability by Example of Silesian Metropolis.' *Sustainability* 14 (3): 1586.

Roseman, M., J. Becker, and F. Chasin. 2021. 'City 5.0.' *Business Information System Engineering* 63 (1): 71–7.

Salmans, B., and L. A. Kappelman. 2010. 'The State of EA: Progress, Not Perfection.' In *The* SIM *Guide to Enterprise Architecture,* edited by L. A. Kappelman, 165–87. Boca Raon: CRC Press.

Sellitto, G. P., H. Aranha, M. Masi, and T. Pavleska. 2020. 'Security and Safety by Design in the Internet of Actors: An Architectural Approach.'

In *Subject-Oriented Business Process Management: The Digital Workplace Nucleus of Transformation,* edited by M. Freitag, A. Kinra, H. Kotzab, H. J. Kreowski, and K. D. Thoben, 133–42. Cham: Springer.

Soyinka, O., and K. W. M. Siu. 2018. 'Urban Informality, Housing Insecurity, and Social Exclusion: Concept and Case Study Assessment for Sustainable Urban Development.' *City, Culture and Society* 15:23–36.

Subhani, S., and A. Ravikumar. 2019. 'GBRAM-Based Model for Goal Oriented Requirement Engineering: A Unifying Framework.' *Journal of Emerging Technologies and Innovative Research* 6 (6): 410–6.

Truong, T.-M., L.-S. Le, E. Paja, and P. Giorgini. 2021. 'A Data-Driven, Goal-Oriented Framework for Process-Focused Enterprise Re-Engineering.' *Information Systems and e-Business Management* 19 (2): 683–747.

Wilson, B. 2020. *Metropolis: A History of the City, Humankind's Greatest Invention.* New York: Vintage.

Yu, E. 1997. 'Towards Modelling and Reasoning Support for Early Phase Requirements Engineering.' In *Proceedings of The Third* IEEE *International Symposium on Requirements Engineering,* edited by P. Storms, 226–35. Los Alamitos, CA: Institute of Electrical and Electronics Engineers.

Zachman J. A. 2010. 'Frameworks Standards: What's It All About?' In *The* SIM *Guide to Enterprise Architecture,* edited by L. A. Kappelman, 66–70. Boca Raton, FL: CRC Press.

State-Owned Entities in an African Emerging Market Context: The Role of Entrepreneurial Intensity and Capabilities in Performance

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Research in public sector entrepreneurship is proliferating which indicates that it is viable for organisations operating within a government regulatory regime, such as in state-owned entities (SOEs). This study examined the extent to which entrepreneurial intensity and entrepreneurial capabilities influence the performance of SOEs, while moderating effects of the external environment on this relationship were analysed from an African emerging market perspective. Primary data was collected via a structured questionnaire from SOEs operating in South Africa. After checking for instrument validity and reliability, findings based on moderated regression analyses show that the degree and frequency of entrepreneurial events, as well as human capabilities, can predict improved performance. The originality and contribution of this study is highlighted in appreciating the role that entrepreneurial intensity and capabilities have on improving SOEs' public responsiveness and financial performance in an emerging market context.

Keywords: entrepreneurship, entrepreneurial intensity, innovation, capabilities, performance, state-owned entities, South Africa
JEL Classification: D8, J24

Received 2022/12/14 · Revised 2023/01/30 · Accepted 2023/02/07
Published online 2024/03/31 https://doi.org/10.26493/1854-6935.22.27-51

Introduction

A considerable amount of research shows that corporate innovation and entrepreneurship are essential components of organisational management and strategy (Morris, Kuratko and Covin 2010; Schröder et al. 2021). Entrepreneurship at the organisational level can provide answers

to rapid technological change by delivering flexible innovative solutions, allowing organisations to respond with agility and proactiveness to resolve the various dilemmas they face in the 21st century (Urban and Maswabi 2021).

However, the notion and practice of entrepreneurship is not widely applied in the public sector environment, particularly in emerging markets. The reasons for this range from a highly restrictive regulatory public sector environment to an overall constricting mandate guiding public institutions in emerging markets (Bruton et al. 2015; Gil-López et al. 2020). Such challenges in the public sector realm coincide with a dearth of research undertaken on understanding entrepreneurship in this domain (Tremml 2018). Hence, the aim of this article is to better understand how, under the right circumstances and with the right capabilities, innovation and entrepreneurship can enhance organisational performance and create public value.

While research on innovation and entrepreneurship is prevalent in the general management literature, deliberation on entrepreneurship in public enterprises is only starting to evolve. In this regard, studies indicate that the public sector is also inclined to engage in entrepreneurial practices in the form of public/civic entrepreneurship (González-Álvarez and Argothy 2019; Jia, Huang, and Zhang 2019) and practice sustainability-oriented innovations in public procurement (Davtyan and Piotrowicz 2021), and that public sector entrepreneurship is possible within the confines of organisations operating within a government regulatory regime (Demircioglu and Chowdhury 2020; Meissner, Sarpong, and Vonortas 2019). An understudied yet important context where entrepreneurship can play a role is in state-owned entities (SOEs) (González-Álvarez and Argothy 2019).

SOEs are ingrained in government structures across the world, such as in China, the US, India, and South Africa, and are typified as a statutory institution formed to initiate commercial activities on behalf of the government and to assist the government in meeting its public goals (International Monetary Fund 2020; PricewaterhouseCoopers 2015). While much of the research has focused on SOE public administration issues (Bruton et al. 2015), the contextualisation of important aspects of innovation and entrepreneurship needs to be better understood, particularly under varying conditions such as those found in emerging economies (Urban and Maphumulo 2022). Considering the movement towards marketisation in the conveyance of public services (Kearney, Hisrich,

and Roche 2010), SOEs need to explore new ways of becoming innovative and maximising opportunities by being proactive towards their customers (Meissner, Sarpong, and Vonortas 2019). In this way, SOEs may promote a systematic way of managing their innovation capabilities within the parameters of organisational structures, legislation, and organisational culture (Meynhardt and Diefenbach 2012). Recent research highlights how public authorities need to find agile concepts to meet the challenges ahead (Schaebs 2021).

Recognising the gap in the management literature explaining the role of entrepreneurship in performance in the public sector domain, the objective of this article is to empirically *assess the extent to which (a) entrepreneurial intensity and (b) entrepreneurial capabilities influence the (c) performance of* SOEs*, while (d) the moderating effects of the external environment on this relationship are analysed from an African emerging market perspective.*

The relevance and importance of this study is based on the significant role which SOEs play in the South African economy. Many SOEs were established during the apartheid era to counter the impact of international sanctions against the country (Chitiga-Mabugu et al. 2021). Today, SOEs play a lead role in key sectors such as electricity, transport (air, rail, freight, and pipelines), and telecommunications, where limited competition is allowed in some of these sectors (i.e. telecommunications and air) (International Monetary Fund 2020). The Department of Public Enterprises has oversight responsibility in full or in part for the approximately 700 SOEs that exist at the national, provincial, and local levels, and which employ approximately 105,000 people. SOEs' assets amounted to 34 percent of GDP at the end of FY2019/20. Public-sector capital expenditure decreased by R6.1 billion (-3.0%) between 2020 and 2021, from R204.3 billion to R198.2 billion, representing the fifth consecutive year of decline. For the public sector, capital expenditure represents money spent on construction, machinery, equipment, land, buildings, and other fixed assets. The SOEs of Eskom (electricity) and Transnet (transport) recorded the largest decreases in 2021, where Eskom cut back on capital expenditure by R4.2 billion, from R36.4 billion in 2020 to R32.2 billion in 2021, to meet its liquidity requirements through effective cost management and deferral of capital expenditure (Statistics South Africa 2022).

Deficiencies in SOEs' service delivery, especially in electricity provision, combined with corruption scandals in procurement and administration, have been a source of discontent and have led to demands for

reform in South Africa (Chitiga-Mabugu et al. 2021). Moreover, the financial performance of many SOEs in South Africa continues to deteriorate, intensified by the COVID-19 pandemic and its implications for business, deferring their ability to deliver on their mandates without significant government backing (Statistics South Africa 2022). As a result, where SOEs in South Africa have an unsatisfactory service delivery history and the inadequate quality of their services is an ongoing dilemma, calls have been made for a better governance model that will promote innovation and proactive thinking by administrators to improve service delivery modes to communities (PricewaterhouseCoopers 2015). Considering the current economic climate in South Africa with high inequality levels, low economic growth, and inadequate revenue collection by government (Oualy 2021), it is imperative to establish economically sustainable SOEs (Republic of South Africa 2015). SOEs provide highly significant structuring elements which may influence development patterns such as transportation networks, bulk infrastructure, energy, and ICT infrastructure (International Monetary Fund 2020). With a dominant role in network industries, SOEs in South Africa provide key inputs to business and, given the extent of their influence, innovative, effective, and efficient SOEs are required in South Africa. More specifically, SOEs need evidence-based measures to adopt entrepreneurial practices to transform themselves so that they can provide better services to their many different beneficiaries (Jia, Huang, and Zhang 2019; Kearney, Hisrich, and Roche 2010).

The article provides some novel contributions to the literature on innovation studies and entrepreneurship. On a conceptual and empirical level, the paper elucidates the function of innovation at the organisational level by employing the constructs of entrepreneurial intensity (EI) and entrepreneurial capabilities (EC), and then relates these constructs in terms of improving performance within the context of SOEs. The notion of EI (Liu and Wang 2020; Lumpkin and Dess 2001; Morris, Kuratko, and Covin 2010; Urban and Maphumulo 2022) has been advanced in prior research to appraise the general nature and level of entrepreneurship amongst firms and individuals, insofar as it captures the 'degree and frequency of entrepreneurial events' (Wales et al. 2021). Considering the institutionalisation of 'public value management' in many organisations, entrepreneurial behaviour has now risen to some prominence in public sector organisations (Demircioglu and Chowdhury 2020; Kearney, Hisrich, and Roche 2010; Koe 2013). Accordingly, it seems fitting to evaluate

the usefulness of EI in this public domain setting. Building in this research direction, the study supplements earlier discourse on EI by recognising the significance of adopting a multidimensional approach towards assessing EI in terms of 'innovativeness, risk-taking, and proactiveness' in relation to organisational performance. Similarly, EC are deemed to be important co-determinants of EI and for the purposes of this article reflect a broad range of skills, abilities, or competencies regarded to be imperative to organisational performance (Unger et al. 2011; Urban and Maswabi 2021). Performance also requires contextualisation with respect to public sector environments, and to obtain contextual relevance, various dimensions of performance are operationalised in the context of specific public sector organisational environments, where the focus is not on profitability but also includes responsiveness to changing stakeholder needs (Kearney, Hisrich, and Roche 2010). Globally, SOEs may be subject to a weaker disclosure regime than publicly traded companies if they are liable to weak enforcement of relevant corporate disclosure laws applicable to SOEs. Consequently, specific reporting standards might subject SOEs to a higher level of disclosure about accounting for non-commercial activities, related party transactions, responsible business conduct, and sustainability, among other areas (Organisation for Economic Co-operation and Development 2022).

Lastly, by describing specific contextual influences, this article ensures that external environments are properly accounted for in the relationship between EI, EC, and organisational performance (Lumpkin and Dess 2001). While most studies on EI have been based on a western and Eurocentric perspective, the current study captures the richness of an emerging market context by focusing on South African SOEs. An essential feature of country level dynamics that distinguish 'developed economies from emerging economies' is the incidence of unsuccessful government interventions where prior studies on Africa denote that government engagement is more considerable and 'at times more detrimental than in other developed and emerging economies' (Urban and Maswabi 2021). Appreciating such shortcomings, it is anticipated that by investigating the extent to which both EI and EC can improve SOEs' organisational performance, while at the same time considering any environmental moderating effects, the study will fill an important gap in the innovation literature.

The article is ordered to first provide a relevant literature review on which to base the study hypotheses. Next, details of research design are

discussed concerning issues of sampling and measures used in the study. Research results are presented and analysed, while the last section concludes the study by discussing implications, limitations, and proposals for future research.

Entrepreneurship in the Public Sector

Entrepreneurship is a multi-dimensional construct pertinent to the firm level, where it includes various interactions between individuals and different organisational factors reflecting the collective character of the innovation process as well as the skills and capabilities of participants across the entire organisation (Morris, Kuratko, and Covin 2010). Innovation at the firm level has been conceptualised in many ways, such as 'corporate entrepreneurship, intrapreneurship, venture entrepreneurship, strategic entrepreneurial management, and internal corporate venturing' (Morris and Sexton 1996; Sefalafala and Urban 2015). A stream of studies underscore that an entrepreneurial orientation is essential as a basis for an organisational strategy leading to a competitive advantage (Lumpkin and Dess 2001; Urban and Maswabi 2021).

There is a wide-ranging literature on entrepreneurial orientation (Lumpkin and Dess 1996) and its derivative EI, which captures the 'degree and frequency of entrepreneurship' (Morris and Sexton 1996). The construct of EI determines the overall manner of entrepreneurship amongst firms and individuals (Morris, Kuratko, and Covin 2010). Studies reveal how EI is associated with the amount of dedication and concentration in bringing about an innovation (Liao, Murphy, and Welsch 2005). Several studies show that EI can be seen either as an all-encompassing construct incorporating 'innovativeness, risk-taking, and proactiveness' or as a multi-faceted construct where 'innovativeness, risk-taking, and proactiveness' are viewed as autonomous elements of EI (Liao, Murphy, and Welsch 2005; Lumpkin and Dess 1996; Morris, Kuratko, and Covin 2010). For the purposes of this article, it was necessary to portray the distinctive nature of the public sector context, and to take Covin and Lumpkin's (2011, 865) definition of entrepreneurial orientation as it applies to the public sector domain, where 'entrepreneurship in a public sector organisation is demonstrated by the extent to which the top managers are inclined to favour change and innovation for the organisation (the innovativeness dimension), to take business-related risks (the risk-taking dimension), and to take proactive strategic action (the proactiveness dimension) in order to achieve goals and objectives for the

greater good of society at large'. Moreover, in this article, the multi-faceted point of view of EI is accepted, and each dimension is examined in terms of the 'degree and frequency of entrepreneurial events' occurring in an organisation (Morris and Sexton 1996).

Furthermore, in the context of SOEs, scholars have given consideration to issues that 'mediate and moderate SOE strategy, structure, and outcomes, by extending transaction cost, agency, and neo-institutional theories' (Bruton et al. 2015; Liang, Ren, and Sun 2014). Organisational performance in fast and changing environments, especially in emerging markets, requires SOEs to efficiently develop and use their resources to meet different stakeholders' demands, particularly where customer satisfaction and responsiveness to changing stakeholders needs are now key performance measures (Mahmoud and Hinson 2012). Past studies (Kearney, Hisrich, and Roche 2010) have empirically evaluated the influence of EI on organisational performance, with evidence suggesting that EI is effective in achieving outcomes within the organisation over a certain period (Sefalafala and Urban 2015). Additionally, it has been noted that in the public sector domain there is a tendency for managers to be risk-averse, due to the magnitude of exposure associated with such risky undertakings, and consequently risk tends to be avoided (PricewaterhouseCoopers 2015). Other research findings show that the act of being proactive is useful in acquiring networking abilities and leveraging resources, although due to a diversity of demands from different stakeholders, this is a fine balancing act and may be curtailed in the public sector (Kearney, Hisrich, and Roche 2010; Meynhardt and Diefenbach 2012). Based on the above-mentioned theoretical discussions and prior research on EI as it relates to its different sub-dimensions, the first hypothesis is formulated as:

> HYPOTHESIS 1 *There is a positive relationship between EI (the degree and frequency of events with respect to innovativeness, risk-taking, and proactiveness) and organisational performance (in terms of contribution to local development, responsiveness to changing stakeholder needs and financial performance) of South African SOEs*

ENTREPRENEURIAL CAPABILITIES

The Resource-Based Theory (RBT) has developed into a 'dominant paradigm in strategic management', focusing on inherent non-substitutable tangible and intangible heterogeneous personnel-based resources

within the organisation, which have the potential to create a sustainable competitive advantage (Barney 2018). From the lens of RBT, EC can be viewed as an organisational resource which enhances the organisational capabilities to identify and develop new market opportunities (Morris, Kuratko, and Covin 2010). Consequently, capabilities are defined as 'accumulated knowledge and skills that enable a firm to coordinate its activities and advantageously deploy its resources' (Barney 2018: 3312). Following the major precepts of the RBT, the integration of internal capabilities and resources in the establishment of an organisation represent a fundamental ingredient of the human capital factor needed for successful performance (Unger et al. 2011). The RBT has been linked with entrepreneurial studies where capabilities in the form of EC are conceived as the organisation's capacity to sense, identify, and exploit business opportunities, and integrate its strategic objectives to generate a competitive advantage (Morris, Kuratko, and Covin 2010).

In the SOES domain, EC are relevant but restricted, often because of prevailing mechanistic structures, political interference, and a high degree of formalisation and bureaucracy (Kearney, Hisrich, and Roche 2010). Studies indicate that the organisational culture in public sector organisations is also an area of concern, as it may inhibit developing EC (Demircioglu and Chowdhury 2020; Jia, Huang, and Zhang 2019). Notwithstanding such constraints, EC can function as enablers in SOES for developing innovative internal organisational and structural systems (Gil-López et al. 2020; Sefalafala and Urban 2015). In this regard, public managers must be agile and assertive enough to maintain a balance between proactiveness and managing stakeholder demands (Kearney, Hisrich, and Roche 2010). Accordingly, there is a fundamental role played by EC in the development and maintenance of well-run SOES. SOES require tangible and competitive EC to augment their efforts to deliver public services to communities, especially in uncertain environments (González-Álvarez and Argothy 2019). In general, scholars have identified three forms of EC relevant for an organisation to be successful, namely:

1. Human capabilities, which include institutional knowledge, experience, skills, and attitudes (Unger et al. 2011), offer the resulting benefits: '(a) capabilities to discover opportunities; (b) capabilities to exploit opportunities; and (c) capabilities to consolidate and grow the business' (Urban and Maswabi 2021).

2. Social capabilities include social networks, strategic partnering, and relationship management. Social capabilities have often been classified as a resource that can harvest multiple benefits such as the sharing of knowledge and the increasing of information flow within an organisation, both of which have been positively linked to corporate entrepreneurship (Urban and Maswabi 2021).
3. Technology capabilities involve keeping abreast of new technological developments and refer to the managerial proficiencies that allow various technologies to be employed to yield innovations (Meissner, Sarpong, and Vonortas 2019; Tremml 2018).

Based on these arguments and by building on this research direction it is hypothesised that:

> HYPOTHESIS 2 *There is a positive relationship between* EC *(human capability, social capability, technology capability) and the organisational performance (in terms of contribution to local development, responsiveness to changing stakeholder needs and financial performance) of South African* SOES.

ENVIRONMENT INFLUENCES (SOES)

RBT theorists maintain that the relationship between resources and the value of such resources (Barney 2018) varies according to their environment (Lumpkin and Dess 2001). Consequently, many scholars adopt a contingency perspective in organisational studies where environmental impact and involvement has been diagnosed and associated with the performance of organisations across different industries and contexts (e.g. Uzkurt et al. 2012). In this regard, different external environment factors can affect the failure and success of innovations at organisations. These factors include 'environmental munificence (i.e., favourable environmental conditions) or hostility (i.e., unfavourable environmental conditions)' (Edelman and Yli-Renko 2010). Consistent with prior research on the environment and organisational performance, the 'environmental dimensions of dynamism and hostility' are adopted to represent environmental influences at SOES (Uzkurt et al. 2012). Prior studies demonstrate that these two dimensions are valuable for predicting EI and organisational performance (Lumpkin and Dess 2001).

In terms of the South African SOES context, adherence to 'best practice standards such as the OECD Guidelines on Corporate Governance of State-Owned Enterprises are recognised as the global benchmark for

government SOE oversight' (Organisation for Economic Co-operation and Development 2018). The South African government aspires to implement such principles associated with proficiency and competency development, ensuring that conditions for enhanced SOE performance are in place. The reform of the institutional governance framework is an attempt by government to address the challenges faced by SOEs, which have traditionally been typified by weak governance and operational inefficiency (Republic of South Africa 2015).

Under such a scenario, where the SOEs environment is considered to be convoluted and dynamic, organisations must foresee future circumstances and foster EI to manage such uncertain environments (Covin and Lumpkin 2011; Koe 2013). Prior studies show how 'dynamism acts as a positive moderator in explaining organisational performance where institutions are typically weak and often underdeveloped in the African context' (Urban and Maswabi 2021). Other studies shed light on the 'moderating effect of the environment on the relationship' between EI and organisational performance and illustrate the distinctiveness of contingency factors in a transition economy, as well as in an African market context (Urban and Maphumulo 2022).

Consequently, in line with research pleas to analyse EI from a 'contingency perspective in terms of how environmental, organizational, and individual factors, may moderate, mediate or interact' with EI to enhance organisational performance (Edelman and Yli-Renko 2010; Uzkurt et al. 2012), it seems plausible to predict that environmental hostility and dynamism may interact with EI and EC to increase overall organisational performance.

> HYPOTHESIS 3 *The relationship between (a) entrepreneurial intensity, (b) EC (human capability, social capability, technology capability) and organisational performance (in terms of contribution to local development, responsiveness to changing stakeholder needs and financial performance) of South African SOEs is positively moderated by the external environment (dynamism and hostility)*

Methodology

The paper was survey-based and cross-sectional in design, with SOEs targeted in the Gauteng Province, South Africa. Gauteng Province in South Africa is the major contributor to the GDP of the country (Republic of South Africa 2015). Since the end of apartheid in 1994, South

Africa has experienced many reform measures and has the most industrialised economy on the African continent. However, South Africa also has one of the highest inequality rates in the world and is characterised by a massive infrastructure backlog legacy, corruption, and a lack of services delivery where many citizens continue to struggle with access to elementary services such as electricity, housing, water, and sanitation (Organisation for Economic Co-operation and Development 2015; PricewaterhouseCoopers 2015). Moreover, a decline in SOEs productivity has shown a substantial negative impact on the rest of the economy (Chitiga-Mabugu et al. 2021).

In terms of the study population, 23 Agencies and Trading Entities operating as SOEs within the Gauteng metropolitan municipalities were targeted. These SOEs, which served as the study sampling frame, include, amongst others the Gauteng Growth and Development Agency (GGDA), Gauteng Enterprise Propeller (GEP), Gauteng Tourism Authority (GTA), Automotive Industry Development Centre (AIDC), Gauteng Industrial Development Zone (GIDZ), and The Innovation Hub (TIH) (Republic of South Africa 2015). The study unit of analysis and target respondent was middle-level management, as past studies indicate that these managers tend to have engaged with policy implementation and have public interface, and can impact their organisation's EI and EC, since they are allocated the duties of resource distribution, project development and implementation (Kearney, Hisrich, and Roche 2010; Sefalafala and Urban 2015). The size of the target population is an aggregate of 420 respondents based on the official staff numbers obtained and maintained by the respective human resources divisions of the SOEs.

An appeal was presented to each of the Gauteng metropolitan regional municipalities offices to attain needed consent for managers to partake in the online survey. An ethics authorisation procedure ensured that the participant's privacy and confidentiality was preserved. A consent form was sent to all the participants with a 'yes' or 'no' option to participate. The data collection phase was conducted during the September 2021-December 2021 period, and after several follow-up remainder requests a response rate of 13.8 percent was obtained, considered satisfactory for surveys of this type (Schindler 2019). To counter any potential sampling bias, responding and non-responding individuals were assessed using 'tenure of employment' as a control variable, and the t-test result indicated a non-significant result ($p > .10$).

Sample characteristics show that respondents are mostly female (55%), and most of the sample (31%) are in the 21–30 years age group, followed by 26 percent in the 31–40 years age group, 24 percent in 41–50 years age group, and 19 percent in the 51–65 years age group. Most respondents (63%) had tenure of more than 7 years' employment in the same organisation. In terms of organisational characteristics, most of the sample (71.4%) had between 51–250 employees as their workforce, and most organisations (73%) had been established for less than 25 years.

The research was based on a structured, self-administered questionnaire. This instrument was founded on previously used measures based on past theory, which concurs with the principal constructs under examination. Perceptual appraises were used as they are commonly utilised in EI research (Morris, Kuratko, and Covin 2010), and all items were measured with a 7-point Likert scale ranging from 1= strongly disagree to 7 = strongly agree.

During the pilot phase (n = 10), it became clear that minor modifications needed to be made to accommodate the local context relating to SOES as relevant to the external moderating environment in South Africa. Table 1 shows the measuring instrument in terms of the level of construct and sub-dimensions, definitions, and sources for each measure.

Using the SPSS software package, data was analysed in terms of descriptive statistics, factor and reliability analyses, and regression analyses with moderating effects. To check for common-method bias (Podsakoff, Mackenzie, and Podsakoff 2012), several procedural and statistical steps were taken where existing scales were pilot tested to ensure that the scale items were clear and unambiguous to the study respondents. Statistically, a single 'principal component analysis (PCA), using Harman's one-factor test was used on all measurement items' (Podsakoff, Mackenzie, and Podsakoff 2012), which resulted in nine different components, accounting for 50 percent of variance, suggesting that no single factor accounted for most of the variance and consequently no evidence of common method bias is evident. With the 'multi-level dimensionality of the constructs, level 1, 2, and 3 analyses' are displayed in the results section in line with the study hypotheses, where the moderating effects are only displayed in terms of the 'higher-level (1) formulation' to allow for overall descriptions to emerge.

Exploratory factor analysis (EFA) was conducted with all the scale items to assess the validity of the constructs under investigation (Schindler 2019). The 'Kaiser-Meyer-Olkin (KMO) Measure of Sampling Ade-

TABLE 1 Measurement Instrument

Description of construct/sub-dimensions / Definition		Sources
Independent variable: EI: Innovativeness, risk-taking, and proactiveness (12 items) and degree x frequency of events (4 items).	EI is the scale of entrepreneurship at the organisational level which considers both the 'degree and frequency of events with respect to innovativeness, risk, and proactiveness. Frequency of entrepreneurship was measured by using summative measures of these three dimensions as they apply to the degree and frequency of entrepreneurial events (associated with multiple events over time).'	Lumpkin and Dess (1996); Morris, Kuratko, and Covin (2010); Morris and Sexton (1996); Sefalafala and Urban (2015).
Independent variable: EC: Human capabilities (4 items); social capabilities (4 items); technology capabilities (5 items).	EC are quantified as 'distinct entrepreneurial competencies' associated with increased improved performance; these are: (1) human capabilities in terms of knowledge, experience, skills, and attitudes which allow individuals to discover and exploit opportunities; (2) social capabilities in terms of social networking, strategic partnering, and relationship management; (3) technology capabilities that include keeping abreast of new technological developments and refer to the managerial proficiencies that allow various technologies to be employed to yield innovations.	Barney (2018); Unger et al. (2011); Urban and Maswabi (2021).
Dependent variable: Organisational performance (4 items).	In the public sector performance is centred on contribution to local development, responsiveness to changing stakeholder needs and financial performance. Performance was operationalised as an aggregate financial performance of the SOE sector including key financial indicators in terms of the performance of the portfolio from the state owner's perspective. Non-financial information bearing on environmental, social and governance practices was also sourced.	Mahmoud and Hinson (2012); Organisation for Economic Co-operation and Development (2022); Sefalafala and Urban (2015).
Moderator variables: Environmental hostility (4 items). Environmental dynamism (4 items).	'Environmental hostility was operationalised as an unfavourable business climate', such as restrictive legislation facing SOEs. 'Environmental dynamism was operationalized as both the rate and unpredictability of change' in the SOEs context.	Edelman and Yli-Renko (2010); Uzkurt et al. (2012).

quacy value' for the various scales ranged between 0.733 to 0.876, indicating the sample was adequate for running EFA as 'it was greater than the required threshold 0.5, and the Bartlett's Test of Sphericity was significant' ($p \leq 0.001$) across all variables (Schindler 2019). Variables showed factor loadings ranging from 0.612 to 0.887 explaining between 61.8 percent and 87.9 percent variance across distinct factors where communalities less than 0.3 were eliminated during the factor analysis. EFA using the principal component analysis with Harris Kaiser Case II rotation was used and components with eigenvalues > 1 converged in 6 iterations after rotation.

Built on the Scree plot and proportions of variation explicated, a nine-factor model emerged connected with the main constructs as per the study hypotheses. These factors were checked for 'internal consistency and scale reliabilities were calculated using Cronbach's alpha coefficient' (Nunnally 1978), with the following result:

Factor 1 = EI innovativeness $\alpha = 0.877$, Factor 2 = EI risk-taking $\alpha = 0.811$, Factor 3 = EI proactiveness $\alpha = 0.632$, Factor 4 = EI degree and frequency of events $\alpha = 0.771$, Factor 5 = EC human capability $\alpha = 0.786$, Factor 6 = EC social capability $\alpha = 0.798$, Factor 7 = EC technology capability $\alpha = 0.836$, Factor 8 = Environment influence (dynamism and hostility merged as one factor) $\alpha = 0.702$, Factor 9 = Organizational performance $\alpha = 0.814$. In this respect acceptable reliability results were attained (> 0.70) in terms of all the factors.

Results and Interpretation

Descriptive statistics are shown in Table 2, where on the Likert-scale 1 to 7, mean scores are above-average mid-point (3.5) with the highest for EI innovativeness (M = 5.98, SD = 0.99), followed by EI proactiveness (M = 5.87, SD = 0.92), and the lowest mean score was for EC technology capability (M = 4.03, SD = 1.21) with a relatively high standard deviation. Table 2 additionally indicates several positive and mostly significant Pearson correlation coefficients. For instance, the results show performance is significantly correlated with all the variables and several intercorrelations are noted between the different variables. This configuration of intercorrelations emphasises elevated levels of correlations amongst the factors and performance (Schindler 2019).

Initially the suppositions for regression analyses were ascertained in terms of 'linearity, homoscedasticity, independence of error terms, multicollinearity and normality of error terms' (Schindler 2019). All the

TABLE 2 Descriptive statistics and correlation matrix

	Variable	Mean	SD	1	2	3	4	5	6	7	8	9
1	EI innovation	5.98	0.99	1								
2	EI risk-taking	5.53	0.92	0.598**	1							
3	EI proactiveness	5.87	0.89	0.568**	0.694**	1						
4	EI degree and frequency	5.11	0.93	0.636**	0.537**	0.490**	1					
5	EC human capability	5.55	0.98	0,697**	0.602	0.641	0.608	1				
6	EC social capability	5.04	0.82	0.573**	0.549*	0.499	0.501	0.660**	1			
7	EC technology capability	4.03	1.21	0.342	0.411*	0.649	0.683*	0.609**	0.330	1		
8	Environment influence	5.75	1.07	0.476*	0.413	0.511	0.608*	0.622	0.553*	0.417	1	
9	Performance	4.97	1.05	0.536*	0.403*	0.361*	0.589*	0.728*	0.556*	0.542*	0.535*	1

NOTE **Correlation is significant at the 0.05 level (2-tailed)*

study variables were mean centred prior to analysis, and separate regression models were fitted to test H1 and H2, while a moderation regression model was used to assess H3.

To check for multicollinearity, the variance inflation factor (VIF) was used and VIF values were obtained which were deemed to be within the acceptable level, insofar as small VIF values indicate low correlation among variables and under ideal conditions are VIF< 3. Statistical independence of error terms was evaluated using the Durbin-Watson test. The test looks for the presence of autocorrelation in residuals and for this study the Durbin-Watson values were 1.849 and 1.881 indicating that there was no serial correlation, since this value was within the acceptable range of 1.4 to 2.6 (Schindler 2019).

For H1, the summary regression results indicated in Table 3 show a significant regression output ($F = 5.795$, $p < 0.001$) with an R^2 of 0.392 indicating that the independent variables explain 32.5 percent of the variability of organisational performance. Even though most of the constructs are positively correlated with organisational performance ($p < 0.05$), only one of the regression coefficients is significant (EI degree and frequency of events, $\beta = 0.410$; $p < 0.05$). Thus, H1 is only partially supported.

Interpreting H1 shows that the results obtained for these constructs explain a relatively meaningful amount of variance on the dependent variable and that the EI sub-dimensions of innovativeness and risk-taking show positive correlations with organisational performance. Howev-

TABLE 3 Hypothesis 1: Model summary showing different sections.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.626[a]	0.392	0.324	0.55188	1.849

NOTES [a] Predictors: (Constant), EI proactiveness, EI innovativeness, EI risk-taking, EI degree and frequency of events. [b] Dependent Variable: Organisational Performance.

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7.060	4	1.765	5.795	0.001[b]
	Residual	10.964	36	0.305		
	Total	18.024	40			

NOTES [a] Dependent Variable: Organisational Performance. [b] Predictors: (Constant), EI proactiveness, EI innovativeness, EI risk-taking, EI degree and frequency of events.

Coefficients[a]

Model		(1)		(2)	t	Sig.	(3)	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2.632	0.537		4.905	0.000	1.543	3.720
	EI Proactiveness	-0.009	0.117	-0.015	-0.079	0.938	-0.247	0.229
	EI Risk-taking	0.025	0.134	0.036	0.187	0.853	-0.248	0.298
	EI Innovativeness	0.169	0.120	0.263	1.404	0.169	-0.075	0.413
	EI degree and frequency of events	0.304	0.130	0.410	2.347	0.025	0.041	0.567

NOTE [a] Dependent Variable: Organisational Performance. (1) Unstandardiszed Coefficients, (2) Standardiszed Coefficients, (3) 95.0% Confidence Interval for B

er, the only regression coefficient which was statistically significant was the combined EI degree and frequency of events construct, suggesting that EI is best captured as an all-encompassing construct incorporating 'innovativeness, risk-taking, and proactiveness', rather than as a multidimensional construct where these are viewed as autonomous elements of EI (Liao, Murphy, and Welsch 2005; Morris, Kuratko, and Covin 2010). This finding resonates with the argument that all EI dimensions are 'central to understanding the entrepreneurial process, although they may occur in different combinations, depending on the type of entrepreneurial

opportunity the firm pursues' (Covin and Lumpkin 2011). Other studies report that frequent innovations disseminated among different innovative localities can be part of the cause to enhance the value of public service offerings (Kearney, Hisrich, and Roche 2010), particularly as innovation can increase the capability of the public sector to manage societal challenges (Meynhardt and Diefenbach 2012). As privatisation initiatives and management re-education – the most common approaches in SOE reform (PricewaterhouseCoopers 2015) – cannot by themselves bring about the necessary change, there is a need for entrepreneurial and innovative managers with requisite entrepreneurial capabilities to grapple with societal challenges.

For H2, the summary regression results indicated in Table 4 show a significant regression equation ($F = 15.627$, $p < 0.001$) with an R^2 of 0.559, which indicates that the independent variables explain 52.3 percent of the variability of organisational performance. Even though all constructs are positively correlated with organisational performance ($p < 0.05$), only one of the regression coefficients is significant (EC Human Capital, $\beta = 0.520$; $p < 0.05$). Thus, H2 is only partially supported.

A significant positive relationship between EC human capital capabilities and organisational performance was obtained for H2; however, for social capabilities and technology capabilities, despite positive relationships established with the DV, these were non-significant relationships. This finding aligns with several studies which indicate that entrepreneurial behaviour has a direct impact on an organisation's EI (Urban and Maswabi 2021), particularly as entrepreneurial human capital provides several advantages in the direction of organisational performance in terms of imparting capabilities to realise and use new opportunities (Unger et al. 2011). However, not entirely surprising was that EC social capability and technology capability were not significantly associated with organisational performance of South African SOEs. Such a lack of significant findings could be attributed to the unique circumstances of SOEs in South Africa, where many SOEs are often the only providers of essential goods and services, such as electricity. Until recently, ESKOM has enjoyed a monopoly of power generation in South Africa and the resultant effect of such monopolistic tendencies is the absence of market competitive forces which are required to stimulate the need for developing technological capabilities (International Monetary Fund 2020). Moreover, many public organisations' administrative systems are fundamentally contrary to the innovative and entre-

TABLE 4 Hypothesis 2: Model summary showing different sections.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.748[a]	0.559	0.523	0.46355	1.881

NOTES [a] Predictors: (Constant), EI proactiveness, EI innovativeness, EI risk-taking, EI degree and frequency of events. [b] Dependent Variable: Organisational Performance.

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	10.074	3	3.358	15.627	.000[b]
	Residual	7.951	37	0.215		
	Total	18.024	40			

NOTES [a] Dependent Variable: Organisational Performance. [b] Predictors: (Constant), EI proactiveness, EI innovativeness, EI risk-taking, EI degree and frequency of events.

Coefficients[a]

Model		(1)		(2)	t	Sig.	(3)	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.589	0.565		2.811	0.008	0.443	2.734
	EC Human Capability	0.411	0.138	0.520	2.987	0.005	0.132	0.690
	EC Social Capability	0.145	0.137	0.155	1.057	0.297	-0.133	0.422
	EC Technology Capability	0.122	0.097	0.175	1.260	0.216	-0.074	0.318

NOTE [a] Dependent Variable: Organisational Performance. (1) Unstandardiszed Coefficients, (2) Standardiszed Coefficients, (3) 95.0% Confidence Interval for B

preneurial behaviour required to nurture EI and EC, which means that modern technologies which would permit more openness and limit corruption in SOES while streamlining their administrative obligations are often not introduced (Organisation for Economic Co-operation and Development 2015).

In terms of H3, Table 5 shows a significant regression equation in the moderator model ($F = 25.849$, $p < 0.001$), with an R^2 of 0.662 and a change in R^2 of 0.120, suggesting that the interactions between the independent and moderator variables explain a weak to moderate change in organisational performance. Table 5 further highlights that only one of

TABLE 5 Hypothesis 3: Moderated regression summary

Constructs	Base Model				Including Moderator			
	B	SE	Beta	p	B	SE	Beta	p
Intercept	0.000	0.076			0.107	0.068		
EI	0.095	0.135	0.108		0.126	0.121	0.144	
EC	0.624	0.162	0.588	***	0.346	0.151	0.325	*
Environment influences	0.352	0.146	0.253	*	0.442	0.124	0.317	**
EI* Environment influences					-0.026	0.150	-0.020	
EC* Environment influences					-0.575	0.168	-0.396	**

NOTES * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; R^2 Base = 0.662; $\Delta R^2 = 0.120$; F (3,38) Base = 24.846; F (5,36) with moderator = 25.849

the moderated regression coefficients is significant (EC*Environment influences, $\beta = -0.396$, $p < 0.001$). Such a negative coefficient implies a weak negative effect, at the same time as the p value for the relationship was greater than 0.001, consequently, the relationship was significant. This result means that H3 is partially supported, and that the supplementary investigation of these moderated associations is worthy of deliberation in forthcoming analyses.

Although the results for H3 showed a significant effect this was a weak negative influence, suggesting that the interactions between the EI and EC and moderator variables explain a weak to moderate change in organisational performance. This finding is supported by the prevailing socio-economic milieu evident in the South African SOE environment where ineffective legislation and a restrictive regulatory context function as a negative external influence that can erode an SOE's capabilities and lead to detrimental organisation performance (Organisation for Economic Co-operation and Development 2015). Other plausible reasons for the partial support for H3 may be attributed to the South African public sector environment, where SOEs typically operate in a monopolistic or oligopolistic environment (Organisation for Economic Co-operation and Development 2015) and hence do not perceive any need for adopting innovativeness and proactiveness. The absence of statistical significance findings for H3 resonates with SOEs' weak financial performance which has been characterised by consistently poor profitability, liquidity, and solvency indicators, the latter reflected in a high level of indebtedness

(International Monetary Fund 2020). Furthermore, the government, as a main shareholder, tends to intervene in these SOEs, which are highly structured and governed in terms of a strict legislative regime and oversight committees (Republic of South Africa 2015), thereby limiting their levels of EI.

Comparatively, while internationally many SOEs are especially prevalent in utilities, transportation, and banking, as is the case in South Africa, 60 percent of utility firms in other emerging markets have a mix of public- and private-sector owners. In the case of Brazil and China these countries have taken advantage of private involvement to improve incentives for efficiency in SOEs. However, in South Africa, the largest SOEs are typically 100 percent government-owned (International Monetary Fund 2020).

Given that several emerging markets have faced difficulties with SOEs, a variety of reform measures have been implemented in stages over many years depending on country-specific contingencies. For example, SOE reforms in China increased private participation in the economy from what was originally a soviet-style system. These reforms included creating a favourable political economy environment, and markets were developed to be sufficiently competitive to encourage SOE managers to be efficient. Many emerging markets have liberalised trade, removed barriers to entry and levelled the playing field by removing specific SOE advantages, such as special tax breaks and preferential procurement arrangements to attract private participants. Moreover, by unbundling large SOEs some countries have changed the ownership structure of theses SOEs either by 'retaining majority shareholding with corporate governance reforms (e.g., Brazil, China, India, Poland), maintaining minority shareholding after a sale of the majority to the private sector (e.g., Brazil, Poland, Spain, UK, Norway), or fully divesting companies (e.g., Argentina, Brazil, New Zealand)' (International Monetary Fund 2020).

Conclusion

Recognising that many unanswered questions remain regarding how entrepreneurship can be advanced in public sector organisations, this article addressed this gap by empirically testing the influence of EI and EC on organisational performance in the South African SOEs context. Furthermore, in acknowledging the importance of contextualisation of EI and EC, particularly under varying contexts such as found in emerg-

ing economies (Urban and Maphumulo 2022), the article evaluated the moderating effects of the environment on the relationship between EI and EC and organisational performance.

This article highlights the value of innovation and entrepreneurship in a unique SOE African emerging market context. Entrepreneurship can play a significant role in SOEs which can augment their performance in terms of contribution to local development, responsiveness to changing stakeholder needs and financial performance. This study has made an important contribution by conducting empirical research on EI and EC, while accounting for the moderating environment effects of environmental hostility, such as restrictive legislation facing SOEs, and environmental dynamism, such as the rate and unpredictability of change in the SOEs context. Consequently, these article findings may be deemed beneficial, especially as only a small number of empirical analyses have focused on EI and EC, while accounting for the environmental influences in the public sector sphere. Moreover, by evaluating the study instruments for reliability and validity the adequacy of these measures in a non-western, African emerging market context has been established.

Based on the study findings, recommendations are aimed at SOE leaders and managers to employ evidence-based measures to adopt entrepreneurial practices to improve performance and deliver better services to its different constituencies. It is recommended that SOEs foster higher levels of EI and EC in the form of innovativeness, risk-taking, and proactiveness as well as human, social and technology capabilities to plan and execute service delivery programmes. In this regard it is suggested that employees, and in particular managers, in SOEs must be exposed to an intensive training programme which is anchored in research evidence-based EI and EC domains. Furthermore, since SOEs tend to operate independently and in silos because of their unique service delivery mandates, it would be prudent that clusters of SOEs be formed to coordinate and collaborate, and build on each other's accruals of EI and EC.

In terms of furthering the study's contextual understanding it must be recognised that in South Africa, pre-existing circumstances such as low economic growth, crime, and corruption are now magnifying the effects of poor management for many SOEs. The government in South Africa should consider adopting a series of institutional reforms and capital resource developments as conducted in other transitioning and emerging economies over the past four decades, where governments privatised some SOEs through public-listed shares in the stock mar-

ket and restructured others through corporatisation and consolidation methods (Organisation for Economic Co-operation and Development 2015).

Study limitations revolve around issues of cross-sectional design which prohibits achieving causality in results and cannot be used to analyse behaviour over a period to time. A *longitudinal study* using the same sample at several points in time may potentially yield different results on the influence of EI and EC on organisational performance. The study findings should be interpreted with the understanding that other contingencies not incorporated in this study may affect the complex EI and EC and performance relationship, particularly as they relate to emerging market measurement issues. Future researchers could examine how some of the more informal and cultural aspects of the African ecosystem affect the framework in which SOEs function. For instance, a culture of non-payment for essential services which SOEs offer has permeated some African economies. Future studies could pay greater attention to how some SOEs have greater immunity to absorb shocks and major disturbances, such as during the COVID-19 pandemic, and how they adopt and practice EI and develop EC to improve their performance in terms of responsiveness to changing stakeholder needs.

References

Barney, J. B. 2018. 'Why Resource-Based Theory's Model of Profit Appropriation Must Incorporate a Stakeholder Perspective.' *Strategic Management Journal* 39 (13): 3305–25.

Bruton, G. D., M. W. Peng, D. Ahlstrom, C. Stan, and K. Xu. 2015. 'State-Owned Enterprises Around the World as Hybrid Organizations.' *Academy of Management Perspectives* 29 (1): 92–114.

Chitiga-Mabugu, M., M. Henseler, R. A. Mabugu, and H. Maisonnave. 2021. 'The Implications of Deteriorating State-Owned Enterprise Performance on the South African Economy.' *Annals of Public and Cooperative Economics* 93 (3): 731–54.

Covin, J. G., and G. T. Lumpkin. 2011. 'Entrepreneurial Orientation Theory and Research: Reflections on a Needed Construct.' *Entrepreneurship Theory and Practice* 35 (5): 855–72.

Davtyan, R., and W. Piotrowicz. 2021. 'Cleantech: State of The Art and Implications for Public Procurement.' *Managing Global Transitions* 19 (3): 85–207.

Demircioglu, M., and F. Chowdhury. 2020. 'Entrepreneurship in Public Organizations: The Role of Leadership Behaviour.' *Small Business Economics* 54 (1). https://doi.org/10.1007/s11187-020-00328-w.

Edelman, L., and H. Yli-Renko. 2010. 'The Impact of Environment and Entrepreneurial Perceptions on Venture-Creation Efforts: Bridging the Discovery and Creation Views of Entrepreneurship.' *Entrepreneurship Theory and Practice* 34 (5): 833–56.

Gil-López, Á., U. Arzubiaga, E. S. Román, and A. Massis. 2020. 'The Visible Hand of Corporate Entrepreneurship in State-Owned Enterprises: A Longitudinal Study of the Spanish National Postal Operator.' *International Entrepreneurship and Management Journal* 18 (3): 1033–71.

González-Álvarez, N., and A. Argothy. 2019. 'Research, Development, And Growth in State-Owned Enterprises: Empirical Evidence from Ecuador.' *Industry and Innovation* 26 (2): 158–75.

International Monetary Fund. 2020. 'State-Owned Enterprises: The Other Government.' International Monetary Fund. https://state-owned-enterprises.worldbank.org/report/fiscal-monitor-chapter-3-state-owned-enterprises-other-government

Jia, N., K. G. Huang, and C. M. Zhang. 2019. 'Public Governance, Corporate Governance, and Firm Innovation: An Examination of State-Owned Enterprises.' *Academy of Management Journal* 62 (1): 220–47.

Kearney, C., R. Hisrich, and F. Roche. 2010. 'Change Management through Entrepreneurship in Public Sector Enterprises.' *Journal of Developmental Entrepreneurship* 15 (4). https://doi.org/10.1142/S1084946710001646.

Koe, W. L. 2013. 'Entrepreneurial Orientation and Performance of Government-Linked Companies.' *Journal of Entrepreneurship, Management, and Innovation* 9 (3): 21–41.

Liao, J., P. J. Murphy, and H. Welsch. 2005. 'Developing and Validating a Construct of Entrepreneurial Intensity.' *New England Journal of Entrepreneurship* 8 (2): 31–8.

Liang, H., B. Ren, and S. L. Sun. 2014. 'An Anatomy of State Control in the Globalization of State-Owned Enterprises'. *Journal of International Business Studies* 45 (6): 919–42.

Liu, Y., and M. Wang. 2020. 'Entrepreneurial Orientation, New Product Development and Firm Performance: The Moderating Role of Legitimacy in Chinese High-Tech SMEs.' *European Journal of Innovation Management* 25 (1): 130–49.

Lumpkin, G. T., and G. G. Dess. 1996. 'Clarifying the Entrepreneurial Orientation Construct and Linking It to Performance.' *Academy Of Management Review* 21 (1): 135–72.

———. 2001. 'Linking Two Dimensions of Entrepreneurial Orientation to Firm Performance: The Moderating Role of Environment and Industry Life Cycle.' *Journal of Business Venturing* 16 (5): 429–51.

Mahmoud, M. A., and R. E. Hinson. 2012. 'Market Orientation in a Developing Economy Public Institution: Revisiting the Kohli and Jaworski's Framework.' *International Journal of Public Sector Management* 25 (2): 88–102.

Meissner, D., D. Sarpong, and N. S. Vonortas. 2019. 'Introduction to the Special Issue on "Innovation in State Owned Enterprises: Implications for Technology Management and Industrial Development"'. *Industry and Innovation* 26 (2):121–6.

Meynhardt, T., and F. E. Diefenbach. 2012. 'What Drives Entrepreneurial Orientation in the Public Sector? Evidence from Germany's Federal Labor Agency.' *Journal of Public Administration Research and Theory* 22 (4): 761–92.

Morris, M. H., D. F. Kuratko, and J. G. Covin. 2010. *Corporate Entrepreneurship and Innovation.* 3rd ed. Boston: Cengage Learning.

Morris, M. H., and D. L. Sexton. 1996. 'The Concept of Entrepreneurial Intensity: Implications for Company Performance.' *Journal of Business Research* 36 (1): 5–13.

Nunnally, J. C. 1978. *Psychometric Theory.* 2nd ed. New York: McGraw-Hill.

Organisation for Economic Co-operation and Development. 2015. 'State-Owned Enterprises in the Development Process.' https://doi.org/10.1787/9789264229617-en.

———. 2018. 'Ownership and Governance of State-Owned Enterprises: A Compendium of National Practices.' https://www.oecd.org/corporate/ca/Ownership-and-Governance-of-State-Owned-Enterprises-A-Compendium-of-National-Practices.pdf.

———. 2022. 'Monitoring the Performance of State-Owned Enterprises: Good Practice Guide for Annual Aggregate Reporting.' https://www.oecd.org/corporate/monitoring-performance-state-owned-enterprises.htm.

Oualy, J. M. R. 2021. 'Income Inequality and Socio-Political Instability in Sub-Saharan Africa.' *Managing Global Transitions* 19 (1): 49–72.

Podsakoff, P. M., S. B. Mackenzie, and N. P. Podsakoff. 2012. 'Sources of Method Bias in Social Science Research and Recommendations on How to Control it.' *Annual Review of Psychology* 63 (5): 539–69.

PricewaterhouseCoopers. 2015. 'State-Owned Enterprises Catalysts for Public Value Creation?' https://www.pwc.com/gr/en/publications/government/state-owned-enterprises-catalysts-for-public-val ue-creation.html

Republic of South Africa. 2015. 'Presidential Review Committee on State-Owned Entities.' https://www.gov.za/sites/default/files/gcis_document/201409/presreview.pdf

Schaebs, D. S. 2021. 'The Digital Transformation of Public Authorities: Creating an Agile Structure and Streamlining Government Presence Using the Example of Tax Offices.' *Managing Global Transitions* 19 (4): 327–42.

Schindler, P. 2019. *Business Research Methods.* 13th ed. New York: McGraw-Hill.

Schröder, K., V. Tiberius, R. B. Bouncken, and S. Kraus. 2021. 'Strategic Entrepreneurship: Mapping a Research Field.' *International Journal of Entrepreneurial Behavior and Research* 27 (3): 753–76.

Sefalafala, M., and B. Urban. 2015. 'The Influence of Entrepreneurial Intensity on Internationalisation and Firm Performance.' *South African Journal of Economic Management Sciences* 18 (2). http://dx.doi.org/10.4102/sajesbm.v13i1.331.

Statistics South Africa. 2022. 'The public-sector: Shy on infrastructure investment.' https://www.statssa.gov.za/?p=15865

Tremml, T. 2018. 'Linking Two Worlds? Entrepreneurial Orientation in Public Enterprises: A Systematic Review and Research Agenda.' *Annals of Public and Cooperative Economics* 90 (1): 25–51.

Unger, J. M., A. Rauch, M. Frese, and N. Rosenbusch. 2011. 'Human Capital and Entrepreneurial Success: A Meta-Analytical Review.' *Journal of Business Venturing* 26 (3): 341–58.

Urban, B., and M. W. Maphumulo. 2022. 'The Moderating Effects of Entrepreneurial Orientation on Technological Opportunism and Innovation Performance.' *European Journal of Innovation Management* 25 (3): 901–21

Urban, B., and L. Maswabi. 2021. 'Determining the Mediating Effects of Entrepreneurial Self-Efficacy on the Relationship between Organizational Antecedents and Entrepreneurial Orientation.' *Managing Global Transitions* 19 (2): 145–66.

Uzkurt, C., R. Kumar, H. S. Kimzan, and H. Sert. 2012. 'The Impact of Environmental Uncertainty Dimensions on Organizational Innovativeness: An Empirical Study on SMES.' *International Journal of Innovation Management* 16 (2). https://doi.org/10.1142/S1363919611003647.

Wales, W. J., S. Kraus, M. Filser, C. Stöckmann, and J. Covin. 2021. 'The Status Quo of Research on Entrepreneurial Orientation: Conversational Landmarks and Theoretical Scaffolding.' *Journal of Business Research* 128 (1): 564–77.

The Dynamic Impact of Renewable Energy Consumption on Economic Growth in Zimbabwe: An ARDL Approach

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Motivated by the study country's active involvement in the reduction of global greenhouse gas emissions and the positive strides it has made domestically in increasing renewable energy in its energy mix, on the one hand, and the need to find out whether renewable energy consumption can also assist in reviving the economy, on the other hand, this study empirically examines the dynamic impact of renewable energy consumption on economic growth in Zimbabwe. Using annual time-series data from 1990 to 2019, and the autoregressive distributed lag approach, the results of the study show that in Zimbabwe, renewable energy consumption has a positive impact on economic growth, both in the short and long run. Increasing the usage of renewable energy increases the growth of the economy in the country of study. These results imply that Zimbabwe can achieve two goals using one strategy – increasing renewable energy consumption to decrease the negative impact climate change and greenhouse gas emission have on the environment and the economy, and increasing economic growth. Policy makers in Zimbabwe are, therefore, recommended to support increased use of renewable energy over alternative energy sources, as this would have positive implications on the economy, both in the short and long term.

Key Words: renewable energy consumption, energy mix, economic growth, Zimbabwe, impact
JEL Classification: O40, Q40

Received 2023/02/06 · Revised 2023/04/12 · Accepted 2023/04/14
Published online 2024/03/31 https://doi.org/10.26493/1854-6935.22.53-72

Introduction

Renewable energy has turned overnight into a buzzword among researchers and policy makers alike as they seek solutions to global warming threats in particular, and to climate change in general. It has become generally accepted that there is no path to protecting the climate without

dramatically changing how energy is produced and consumed (United Nations 2021). The new dawn is now ushering in renewable energy as the gateway to reduced greenhouse gas emissions, and minimisation of climate change and its global impact.

Just like many other countries, Zimbabwe has also been negatively affected by climate change shifts and challenges, resulting in increased occurrences of severe droughts and floods arising from cyclones (United Nations 2021). As part of a joint force, according to All Africa (2022), Zimbabwe has pledged to reduce greenhouse emissions by 2030 and has set a target to have 2000 megawatts of energy produced from renewable sources by the year 2030. The country also tabled this bold national position before the Conference of the Parties (COP) 26 in Glasgow, United Kingdom in 2021 (All Africa 2022). Given all this national effort, the question for any development economist is whether renewable energy production and consumption is only good for climate change and greenhouse gaseous emission control or if there is more to it.

As the country battles to revive its ailing economy, could the consumption of renewable energy lead to economic growth as well in Zimbabwe? As simple as this question may appear, its answer is not straightforward. The nexus between renewable energy use and economic growth is a concept little explored, but a review of empirical literature leaves one confused as to what renewable energy consumption could hold for Zimbabwe, as divergent views are revealed. To be specific, three views have emerged where the impact of renewable energy consumption on economic growth has been empirically investigated. The first view posits that renewable energy consumption is good for economic growth (see Majeed, Anwar, and Luni 2021; Charfeddine and Kahia 2019; Haseeb et al. 2019), while an alternative view postulates the opposite (see Venkatraja 2020; Smolović et al. 2020; Tsaurai and Ngcobo 2020). Then, the third view suggests that renewable energy use does not impact significantly on economic growth (see Smolović et al. 2020; Nyoni and Phiri 2018; Dogan 2016). The lack of consensus on the subject makes it impossible to predetermine whether the influence of renewable energy use on economic growth in Zimbabwe is positive, negative or neutral – calling for a study on Zimbabwe to unravel the relationship between the two variables in the country. The closest there is, is a study by Hlongwane and Daw (2022). However, the study was narrower in scope as it focused on the impact of renewable electricity consumption on economic growth –

where renewable electricity is only a subset of the total renewable energy consumption.

Given this backdrop, the objective of this study is to investigate, empirically, the impact of renewable energy consumption on economic growth in Zimbabwe, in an effort to unravel whether renewable energy consumption can be useful in more ways than one – combatting climate challenges and directly growing the economy. The study uses data from 1990 to 2019 and the autoregressive distributed lag (ARDL) methodology to uncover this renewable energy-growth nexus. This method is chosen because of advantages it has over the other orthodox methods, hence the results are expected to be robust. The outcome of the study is expected to have key policy implications specific to Zimbabwe and will also contribute to the body of knowledge as it assists in providing a step towards the conclusion of the current debate.

The study is organised into six sections. The second section provides highlights of the renewable energy landscape and economic growth trends in Zimbabwe, while the third and fourth sections present the literature review and methodology, respectively. Data analysis, presentation and discussion of results is covered in the fifth section, leaving the sixth and last section to conclude the study.

Renewable Energy Landscape and Economic Growth Trends in Zimbabwe

According to Mordor Intelligence (2022), Zimbabwe is among the countries with the fastest-growing energy markets in Africa. Its electricity generation prospects from various renewable energy sources have also been highlighted (Mordor Intelligence 2022). The prominent sources indicated include biomass and hydro, as well as solar, energy. However, despite this potential, realisation of such power has been a challenge. In 2020, less than half of the population in the country had access to electricity. Mordor Intelligence (2022) put this group with access at about 41.09%, acknowledging that it is the urban population that occupies the greater portion of this percentage, leaving 19% for rural electricity access.

In an effort to join hands with the globe in combatting the fast deteriorating climate and carbon emissions at both domestic and global levels, the country has pushed itself and set a high target of renewable energy capacity increase (Mordor Intelligence 2022). In 2019, the government of Zimbabwe crafted and implemented a National Renewable Energy

Policy (NREP) with various renewable energy-related targets (Ministry of Energy and Power Development 2019). These targets include achieving 16.5% of the total energy generation capacity from renewables by 2025. The target is to increase this to 26.5% in five years, i.e. by 2030. Greenhouse gas emissions have also been targeted to be reduced by 33% by 2030, while the ethanol blending ratio has been set to decline by 20% over the same period (Ministry of Energy and Power Development 2019; Mordor Intelligence 2022). Such a policy is expected to propel the market for renewable energy in the study country across the short-, medium- and long-term horizons.

In 2022, according to the Zimbabwe Energy Regulatory Authority (Zimbabwe Energy Regulatory Authority N. d.) and Mutasa (2022), the bulk of Zimbabwe's energy supply mix is made up of hydropower, about 68.17%, while the remainder is from coal and other sources of renewable energy. Anchored on the NREP of 2019, Zimbabwe's renewable energy space has seen heightened activity by independent power producers (IPPS) recently as they explore alternative sources of energy. The outcome has not only been an increase in the mix of the renewable energy within the country's energy mix, but has also resulted in the creation of economic opportunities as IPPS have generated incentives in the renewable energy value chain in towns and rural villages – from supply and distribution and demand nodes (Mutasa 2022).

Zimbabwe's efforts to green and reduce the carbon footprint has been consistent, not only on the national front but also on the global level. According to All Africa (2022), Zimbabwe announced its target of 2000 megawatts of renewable energy production by 2030 at the COP26 gathering in Glasgow as part of its efforts to significantly cut down carbon emission by the same date. Due to constant power outages, solar energy investments have been sizeable in the country, which saw an increase in off-grid electricity demand by residents being met by solar home systems that are standalone (All Africa 2022).

Although there has been notable commitment from the government of Zimbabwe to push the renewable energy agenda, numerous challenges mar the renewable energy landscape in Zimbabwe. These include delays in carrying out projects in the renewable energy space due to competing priorities on the identified land; policy inconsistencies regarding the issuance of licences and regulation of such projects; Power Purchase Agreements that are expressed in local currency and currency fluctuations that tend to affect these agreements; elevated costs of produc-

tion affecting the economic feasibility and sustainability of renewable energy projects, a challenge which is exacerbated by the less competitive renewable energy production market currently dominated by five companies – which has implications on the affordability of renewable energy and consumption thereof; and climate change, which has led to persistent droughts that have the effect of easing the capacities of power generation across hydro power plants in the country, with the Kariba Hydro Station being the most affected (Zimbabwe Energy Regulatory Authority N. d.; Mutasa 2022).

Economic growth-wise, Zimbabwe's economy has been ailing for some time. According to the African Development Bank (African Development Bank Group N. d.), the COVID-19 pandemic found Zimbabwe's economy waning already, contracting by 6.0% in 2019. An unstable economy, as well as the scrapping of a number of subsidies such as those on electricity, fuel and mealie meal and stifled foreign exchange earnings, coupled with extreme money creation, led to the plunge in output. On the back of COVID-19 and its effects, and constant droughts, real gross domestic product (GDP) dipped by 10% in 2020 (African Development Bank Group N. d.). The World Bank Group (2022) has also weighed in, adding resource misallocation, limited and narrow structural transformation, sky-rocketing costs of production, a hyper inflationary environment and depressed investment – both domestic and foreign direct – to the list of Zimbabwe's economic development woes.

Despite these challenges, economic growth significantly rebounded in 2021 by 8.5% (World Bank Group N. d.), most likely due to base effect as the economy recovered from the sharp plunges in economic growth during the COVID-19 period. Following a growth stint in 2021, the World Bank Group (N. d.) projects Zimbabwe's growth of real GDP to ease to 3.4% in 2022, because of economic activity that slackened in 2022, amid agricultural conditions that worsened and price volatility. Figure 1 shows trends in renewable energy consumption for Zimbabwe, expressed as a percentage of total energy consumption, and economic growth, proxied by the growth rate of real GDP, during the study period.

As shown in Figure 1, there has been a consistent increase in renewable energy consumption from 63.7% in 1990 to 81.5% of total energy consumption in 2019 (World Bank Group N. d.), which is evidence of an appreciation of clean energy, on the one hand, and a quest by economic agents to find a reliable source of energy, on the other hand, in the wake of prolonged blackouts that have negatively affected production

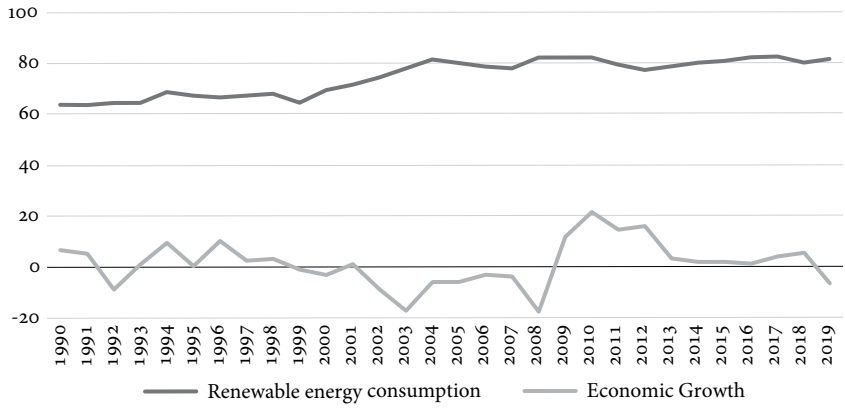

FIGURE 1 Renewable energy consumption and economic growth trends in Zimbabwe (1990-2019)
SOURCE World Bank Group (N. d.)

and household daily activities. By any standard, having more than 80% renewable energy consumption is a great achievement.

However, the consistent increase in the use of renewable energy is not mimicked by the growth in the economy of Zimbabwe. Although unusual, this should not be surprising given the economic woes the country is facing; and it can be argued that without increased usage of renewable energy, it could have been worse. Despite its volatility over the review period, in the main, the economic growth has been trending upwards, albeit with a far less steep slope, as reflected by the economic growth linear trend in Figure 1.

Literature Review

Studies on the impact of renewable energy consumption on economic growth are scanty though mounting. A review of empirical literature regarding the impact of renewable energy use on the growth of the economy reveals that besides being still nascent, the existing literature is far from being conclusive. Three categories have emerged – those studies that found a positive contribution of renewable energy use to economic growth, then those that found a negative impact of renewable energy use on economic growth, and lastly, those studies that found renewable energy to be neutral.

Majeed, Anwar, and Luni (2021) investigated the impact of renewable energy on economic growth for 174 economies using panel data spanning from 1980–2019. The sample was divided into two categories – developed

economies and developing economies, and renewable energy consumption data was disaggregated according to the production sources. Employing panel estimation, the study found renewable energy to contribute to economic growth. These results were consistent across developed and developing country groups, showing the importance of renewable energy irrespective of the level of economic development. The outcome of the study was similar to that of Charfeddine and Kahia (2019) and Haseeb et al. (2019).

Charfeddine and Kahia (2019) analysed the impact of renewable energy utilisation on economic growth, the development of the financial system and carbon dioxide production for 24 countries in North Africa and the Middle East. The study used data from 1980–2015 and the panel vector autoregressive model. The findings of the results revealed a positive contribution of the utilisation of renewable energy to the growth of the economies under study. Haseeb et al. (2019) found the same results for Malaysia using data covering 1980–2016.

Kamoun, Abdelkafi, and Ghorbel (2019) put to empirical test the nexus between renewable energy use on sustainable growth for Organisation for Economic Co-operation and Development (OECD) economies using data for the 1990 to 2013 period. The findings from the study corroborated the results from the previous studies, affirming the positive contribution of renewables to economic growth. In a separate study, Rafindadi and Ozturk (2017) examined the impact of renewable energy usage on economic growth for Germany using quarterly data from 1971 to 2013. Employing the ARDL procedure, Clemente-Montanes-Reyes detrending structural breaks and Bayer-Hanck cointegration test, the study found renewable energy usage to have a positive impact on economic growth, boosting it by 2.2% for every 1% increase in the consumption of renewable energy.

Cetin (2016) examined the impact of renewable energy consumption on economic growth for seven emerging economies, employing data from 1992 to 2012. Using heterogenous panel data analysis, the study found renewable energy consumption to influence economic growth positively. In the same spirit, Inglesi-Lotz (2016) did a study on the impact of renewable energy on economic welfare in OECD countries using panel data. The study found that increasing renewable energy use leads to the improvement of economic welfare in the study countries.

Besides empirical literature attesting to the positive impact of renewable energy on economic growth, there is a strand of literature that found

the consumption of renewable energy to negatively affect economic growth. For example, Hlongwane and Daw (2022), who examined the relationship between renewable electricity consumption for South Africa as well as Zimbabwe using data of time-series nature covering the 1990–2019 period. Using the ARDL-based methodology, the results of the study found renewable energy to negatively affect economic growth in both countries in the short run. However, in the long run, renewable energy proved to have the same effect on the economy of South Africa only.

Venkatraja (2020), in a study on the impact of renewable energy use on economic growth in the case of BRIC countries – Brazil, Russia, India and China – using data from 1990–2015 and panel regression, confirmed a negative association between renewable energy use and economic growth. The same finding was established by Smolović et al. (2020) and Tsaurai and Ngcobo (2020) in separate studies on EU member states and BRICS countries, respectively. The two studies found a negative contribution of renewable energy utilisation to the growth of the economies, supporting the same findings by Venkatraja (2020). Matei (2017) also put to the test the effect of using renewable energy on economic growth in the case of 34 OECD economies. The period of study was from 1990 to 2014. The study also found that using renewable energy negatively influences the real economy.

The last strand of literature found renewable energy consumption to have a neutral effect on economic growth. For example, Hlongwane and Daw (2022) for Zimbabwe, in the long term. Smolović et al. (2020) also assessed the relationship between renewable energy consumption and economic performance for EU member states using data from 2004–2018 and established that renewable energy use has a neutral impact on economic growth, but only in traditional member states. Nyoni and Phiri (2018) also found the same results in a separate study on South Africa using data from 1991–2016 and linear and non-linear ARDL models; so did Dogan (2016) based on Turkish regional data, and Ocal and Aslan (2013) based on Turkish national data. Although this strand is still unpopular, of late, it has been gaining visibility.

From the reviewed literature, it can be concluded that despite the little harmony on the impact of renewable energy on the economic growth process, overall, empirical literature is in favour of renewable energy use having a positive influence on economic growth. Nonetheless, even at that, it is also prudent to recognise that the presence, in literature, of

the evidence suggesting otherwise, albeit thin, requires an assumption that 'renewable energy consumption has a positive impact on economic growth' to be taken with a pinch of salt. Though predominantly positive, the impact of renewable energy consumption on economic growth has been found to vary depending on the country or region of study and on the methodology used – with most studies utilising cross sectional and panel methodologies, even though it is known that such methods pay less attention to country-specific effects. This exposes a gap in the literature that requires filling through further research on the subject in specific jurisdictions of interest – in this case, Zimbabwe.

Methodology

ARDL BOUNDS TESTING APPROACH

The autoregressive distributed lag (ARDL) bounds testing approach is utilised in this study to empirically examine the impact of renewable energy consumption on economic growth in Zimbabwe. This approach was originally developed by Pesaran and Shin (1999). However, it was later refined by Pesaran, Shin, and Smith (2001). The rationale for using this method is based on the various advantages it offers compared to the orthodox approaches (Engle and Granger 1987; Johansen and Juselius 1990).

The ARDL procedure is well known for its flexibility, yet with robust outcomes (Nyasha and Odhiambo 2019). It does not foist the limiting condition that all the study variables should have the same order of integration, allowing the application of the ARDL bounds testing procedure even when some variables are integrated of order zero while others are of order one (Nyasha and Odhiambo 2015; 2019). Furthermore, the chosen method of data analysis is executed in a simpler way as it is centred on a single reduced form equation as compared to the more complicated conventional procedures that utilise a system of equations to estimate relationships between variables (Duasa 2007; Nyasha and Odhiambo 2020; Nyasha, Odhiambo, and Musakwa 2022). With the ARDL bounds test, the endogeneity problem is automatically resolved. The method provides unbiased long-run model estimates as well as valid t-statistics even in the cases where some of the independent variables could be endogenous (Nyasha and Odhiambo 2020).

Whereas other orthodox cointegration methods are sensitive to the sample size, the ARDL approach is appropriate and still yields robust results even when the sample size is small (Pesaran and Shin 1999; Nya-

sha and Odhiambo 2022). Thus, the chosen method has superior small sample properties, a trait which makes this approach to data analysis plausible given the limited data points of the series utilised in this study. Based on these offerings, the ARDL bounds testing approach is, therefore, considered the most appropriate method of analysis of the underlying relationships as the study seeks to explore the impact of renewable energy consumption on economic growth in Zimbabwe. Over the years, the method has also gained traction, pointing to its effectiveness over other conventional methods.

SPECIFICATION OF THE EMPIRICAL MODEL

In this study, economic growth (y) is the dependent variable, proxied by the annual growth rate of real GDP. The measure has been utilised expansively in past studies (see Nyasha and Odhiambo 2015; 2019; Asongu and Diop 2022). Meanwhile, renewable energy consumption (RECON) is proxied by the amount of the renewable energy that is consumed as a proportion of the total energy consumed (Arzova and Sahin 2023; Nyasha and Odhiambo 2022; El-Karimi 2022; Sahin and Yilmazer 2021). This indicator shows the overall extent to which renewable energy is used within a country as a source of energy. According to Majeed, Anwar, and Luni (2021) and Charfeddine and Kahia (2019), renewable energy consumption has a positive effect on economic growth. Therefore, the coefficient of this variable is expected to be statistically significant, and positive.

To fully specify the growth model, and to ensure that the results do not suffer from the variable omission bias, three more variables – control variables – are added. These are domestic investment, trade openness and labour force. Investment is measured by the share of gross fixed capital formation on GDP (GF). According to Nyasha and Odhiambo (2015) and Abu-Bader and Abu-Qarn (2008), among others, this variable is regarded as one out of a handful of economic variables robustly correlated with economic growth, and a positive coefficient is anticipated.

Trade openness (TR) is another control variable utilised in this research. It is measured by the summation of imports and exports as a percentage of GDP. The relationship between trade openness and the growth of the economy is fully recognised and well documented in the literature (Ang and McKibbin 2007; Nyasha and Odhiambo 2017). The coefficient of trade openness is envisaged to be positive and statistically significant.

The third control variable utilised is labour force (LF). It is measured by total labour force participation rate expressed as a percentage of total population aged 15 years and above. The proxy has been used widely in energy consumption and economic growth studies (Zeshan and Ahmad 2013; Saad and Taleb 2018). While it is associated with economic growth, it has been identified as a better measure than employment and population in estimating the renewable energy use in an economy as energy use is a function of affordability, among others. The bigger the labour force, the more renewable energy is consumed and the faster the economy is expected to grow (see Young 2018), hence the coefficient of labour force is anticipated to be positive and significant.

Therefore, the empirical model adopted in this study to examine the effect of renewable energy consumption on economic growth in the study country is specified as follows:

$$y_t = \delta_0 + \delta_1 RECON_t + \delta_2 GF_t + \delta_3 TR_t + \delta_4 LF_t + \varepsilon_t \tag{1}$$

where *y* is GDP annual growth rate, a proxy for economic growth; RECON is renewable energy consumption expressed as a proportion of total energy consumption; GF is share of domestic investment in GDP; TR is trade openness, proxied by the share of the summation of imports and exports in GDP; and LF is labour force, which is total labour force participation as a percentage of the total population aged at least 15 years; δ_0 is a constant; δ_1- δ_4 are coefficients; while ε_t is the error term.

ESTIMATION TECHNIQUE – THE ARDL MODEL

Following Pesaran, Shin, and Smith (2001) and Nyasha and Odhiambo (2015; 2022), the ARDL representation of the estimated model (Equation 1) is expressed as follows:

$$\begin{aligned}\Delta y_t = {} & \delta_0 + \sum_{i=1}^{n} \delta_{1i} \Delta y_{t-i} + \sum_{i=0}^{n} \delta_{2i} \Delta RECON_{t-i} \\ & + \sum_{i=0}^{n} \delta_{3i} \Delta GF_{t-i} + \sum_{i=0}^{n} \delta_{4i} \Delta TR_{t-i} \\ & + \sum_{i=0}^{n} \delta_{5i} \Delta LF_{t-i} + \delta_6 y_{t-1} \\ & + \delta_7 RECON_{t-1} + \delta_8 GF_{t-1} + \delta_9 TR_{t-1} \\ & + \delta_{10} LF_{t-1} + \mu_t,\end{aligned} \tag{2}$$

where δo is a constant; δ1- δ5 and δ6- δ10 are coefficients – short-run and long-run, respectively; Δ is the difference operator, n is the lag length,

and μ_t is the white noise-error term. All the other variables are as defined in Equation 1.

The ARDL-based error-correction model associated with Equation 2 is as follows:

$$\begin{aligned}\Delta y_t = {} & \delta_0 + \sum_{i=1}^{n} \delta_{1i} \Delta y_{t-i} + \sum_{i=0}^{n} \delta_{2i} \Delta RECON_{t-i} \\ & + \sum_{i=0}^{n} \delta_{3i} \Delta GF_{t-i} + \sum_{i=0}^{n} \delta_{4i} \Delta TR_{t-i} \\ & + \sum_{i=0}^{n} \delta_{5i} \Delta LF_{t-i} + \delta_{11} ECM_{t-1} + \mu_t, \end{aligned} \tag{3}$$

where ECM is the error-correction term; is the coefficient of the error-correction term; μ_t = mutually uncorrelated white-noise residuals; and all other variables and characters are as defined in Equations 1 and 2.

DATA SOURCES

The study utilises annual time series data from 1990 to 2019. All the data is collected from the World Bank Economic Indicators (World Bank Group N. d.).

Results: Presentation and Analysis

STATIONARITY TESTS

To establish whether the variables in the study are not integrated of order two or higher – a condition which nullifies the use of the ARDL bounds test approach – all the variables are tested for stationarity. To this end, two tests are employed, the Dickey-Fuller Generalised Least Square and the Phillips-Perron unit root tests. The results are summarised in Table 1.

As reflected in Table 1, the variables in the study are found to be stationary, either in levels or in first difference, depending on the unit root test used and whether an intercept only or both intercept and trend are included in the tests. The results confirm the applicability of the chosen estimation procedure – the ARDL bounds testing approach.

COINTEGRATION

Having confirmed that all the variables are integrated of order one or zero, cointegration tests are carried out to examine whether there exists a long-run stable relationship among the variables in the specified model. Table 2 presents the cointegration results for this study.

TABLE 1 Results of the Stationarity Tests

Variable	Dickey-Fuller generalised least square				Phillips-Perron			
	Variables in levels		Variables i n 1st difference		Variables in levels		Variables in 1st difference	
	Intercept	Intercept & Trend	Intercept	Intercept & Trend	Intercept	Intercept & Trend	Intercept	Intercept & Trend
y	-3.185***	-3.214**	-	-	-3.195**	-3.156	-	-6.845***
RECON	-0.636	-1.803	-4.951***	-5.023***	-1.208	-1.812	-4.937***	-5.012***
GF	-2.111**	-2.691	-	-7.164***	-2.154	-2.661	-7.168***	-7.013***
TR	-2.340**	-2.806	-	-8.468***	-2.903*	-2.941	-	-8.151***
LF	-1.746*	-2.234	-	-3.785***	-0.623	-1.186	-2.776*	-3.615**

NOTES *, ** and *** denote stationarity at 10%, 5% and 1% significance levels, respectively.

As shown in Table 2, the calculated F-statistic of 4.41 is greater than the upper bound critical value of 4.01 at the 5% significance level. Based on these results, the null hypothesis of no cointegration cannot be accepted; therefore, it is concluded that a long-run stable relationship exists between the variables in the specified model. This confirmation allows the study to proceed to the next level, allowing for the assessment of the coefficients of the specified model, both in the long and short run.

ESTIMATION OF COEFFICIENTS – ARDL APPROACH

Following the confirmation of cointegration, the long-run and the short-run coefficients are estimated based on the ARDL estimation procedure. The optimal lag-length for the specified model is selected manually as the resultant model is more parsimonious than the Akaike Information Criterion- and the Schwarz Information Criterion-based models. The lag-length selected, based on its optimality, is ARDL(1,1,0,2,0). The results of the selected model are presented in Table 3.

As displayed in Table 3, in both panels, the regression results show that the coefficient of renewable energy consumption is statistically significant and positive, as expected. This suggests that in Zimbabwe, renewable energy utilisation has a positive impact on economic growth. An increase in the consumption of renewable energy in Zimbabwe results in increased economic growth. These results are found to be valid regardless of whether estimation is in the long run or short run. While the long-run positive impact is evidenced by the coefficient of renewable energy consumption (RECON) in Panel 1, the short-run positive impact is validated by the coefficient of renewable energy consumption (ΔRECON)

TABLE 2 Results of Cointegration Test

Dependent Variable	Function	F-statistic	Cointegration Status
y	F(y | RECON, GF, TR, LF)	4.41**	Cointegrated

Asymptotic Critical Values						
Pesaran, Shin, and Smith (2001), p. 300, Table CI(iii)	10%		5%		1%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
Case III	2.45	3.52	2.86	4.01	3.74	5.06

NOTE ** denotes statistical significance at 5% level. ΔTR1 = TR(-1)-TR(-2)

TABLE 3 Empirical Results of the Estimated ARDL Model

Panel 1: Estimated long-run coefficients [Dependent variable: y]

Independent variable	Co-efficient (t-statistic)
C	-22.420 (0.385)
RECON	0.591** (2.040)
GF	0.982*** (3.740)
TR	0.265* (1.855)
LF	0.580 (0.155)
Panel 2: Estimated short-run coefficients [Dependent variable: Δy]	
ΔRECON	0.287* (1.762)
ΔGF	0.985*** (3.688)
ΔTR	0.217 (1.427)
ΔTR1	0.307** (2.463)
ΔLF	0.528 (0.152)
Ecm (-1)	-0.911*** (-4.624)

NOTE R-Squared 0.707 R-Bar-Squared 0.684. SE of Regression 6.180 F-Stat F(6,21) 7.648[0.000]. Residual Sum of Squares 725.685 DW statistic 2.143. *, ** and *** denote stationarity at 10%, 5% and 1% significance levels, respectively.

in Panel 2, that is both statistically significant and positive. These results are consistent with the literature – both theoretical and empirical (see Kamoun, Abdelkafi, and Ghorbel 2019; Charfeddine and Kahia 2019; Cetin 2016). These results could be a reflection that the efforts by the Zimbabwean Government on the renewable energy front are not in vain.

The other results in Table 3 reveal that in Zimbabwe, domestic investment (GF), just like the consumption of renewable energy, has a positive effect on economic growth – both in the long and short run. Trade openness is also found to have a positive impact on economic

TABLE 4 Diagnostic Tests

LM Test Statistic	Results [Probability]
Serial Correlation: CHSQ (1)	1.937 [0.164]
Heteroscedasticity: CHSQ (1)	0.114 [0.736]
Functional Form: CHSQ (1)	0.377 [0.539]
Normality: CHSQ (2)	0.739 [0.691]

NOTE CHSQ = Chi-square

growth in the study country, both in the long run and in the short run. These results imply that in the study country, increasing domestic investment and foreign trade leads to an increase in economic growth, irrespective of whether it is in the long run or in the short run. However, in the short run, it is trade openness in previous periods that is found to matter positively in the economic growth process of Zimbabwe. Contrary to expectations, labour force is found to be neutral in both time periods, implying that in Zimbabwe, the size of the labour force does not matter as labour force does not exert any significant impact on economic growth in Zimbabwe. As expected, the coefficient of the error correction term [ECM (-1)] emerged negative and significant. Should a shock occur in Zimbabwe, the results indicate that the equilibrium is restored in just over a year, at a rate of 91% per annum.

The regression of the model was found to fit well, as highlighted by R-squared of 70.7%, indicating that about 70.7% of the economic growth dynamics in Zimbabwe are captured by the specified model. To check the robustness of the model and the reliability of the results, a battery of diagnostic tests are performed against serial correlation, heteroscedasticity, functional form and normality, and these results are reported in Table 4.

The results on the model diagnostics, shown in Table 4, reveal that the model passed all the tests. Following the stability tests that are performed based on the Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squares of Recursive Residuals (CUSUMQ), with results reported in Figure 2, the parameters in this model are found to be stable over the sample period at the 5% level of significance.

Conclusion

In this study, the impact of renewable energy use on economic growth in Zimbabwe has been empirically examined. The study was motivated by the study country's active involvement in the reduction of global greenhouse gas emission and the positive strides it has made domesti-

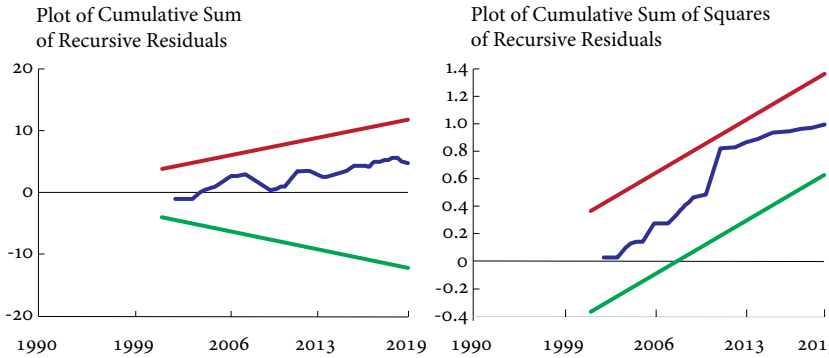

FIGURE 2 CUSUM and CUSUMQ
SOURCE World Bank Group (N. d.)

cally to keep its end of the pledges to the global engines propelling the gas emission reduction agenda – such as the United Nations Framework Convention on Climate Change (UNFCCC) and the various Conferences of the Parties (COP), including the famous COP 17 – on the one hand, and the need to find out if, in the process, the country can turn its fortunes around through the increased consumption of renewable energy, on the other hand. The unavailability of studies on the renewable energy consumption and economic growth link on Zimbabwe necessitated this study. For a country with a depressed economy, authorities in Zimbabwe stand to gain from the policy direction illuminated by the outcome of this study – enhancing evidenced-based policy formulation and implementation in the study country.

Using yearly data stretching from 1990 to 2019, and the relatively newly developed ARDL bounds testing methodology, the findings of the study have shown that in Zimbabwe, the consumption of renewable energy has a positive influence on economic growth, both in the long and short run. Thus, an uptake in the usage of renewable energy increases economic growth in the study country. These results imply that Zimbabwe can kill two birds with one stone. While increasing renewable energy in its energy mix to combat the negative impact of climate change and greenhouse gas emissions, it can also increase its economic growth, thereby reviving the economy that has been on its knees for some time.

Grounded on these results, policy makers in Zimbabwe are recommended to rally behind increased renewable energy, as the consumption of this type of energy has positive ramifications on the economy across all the time horizons.

References

Abu-Bader, S., and A. Abu-Qarn. 2008. 'Financial Development and Economic Growth: Empirical Evidence from MENA Countries.' *Review of Development Economics* 12 (4): 803–17.

African Development Bank Group. N. d. 'Zimbabwe Economic Outlook.' https://www.afdb.org/en/countries/southern-africa/zimbabwe/zimbabwe-economic-outlook.

All Africa. 2022. 'Zimbabwe: Renewable Energy Lights Up Africa.' All Africa, 24 March. https://allafrica.com/stories/202203240653.html.

Ang, J. B., and W. J. McKibbin. 2007. 'Financial Liberalization, Financial Sector Development and Growth: Evidence from Malaysia.' *Journal of Development Economics* 84 (1): 215–33.

Arzova, S. B., and B. S. Sahin. 2023. 'Does Financial Development Support Renewable Energy or Carbon Emissions? A Panel Data Analysis on Emerging Countries.' *International Journal of Sustainable Economy* 15 (1): 93–117.

Asongu, S., and S. Diop. 2022. 'Resource Rents and Economic Growth: Governance and Infrastructure Thresholds.' Working Paper 72, African Governance and Development Institute.

Cetin, M. A. 2016. 'Renewable Energy Consumption-Economic Growth Nexus in E-7 Countries.' *Energy Sources, Part B: Economics, Planning, and Policy* 11 (12): 1180–5.

Charfeddine, L., and M. Kahia. 2019. 'Impact of renewable Energy Consumption and Financial Development on CO2 Emissions and Economic Growth in the MENA Region: A Panel Vector Autoregressive (PVAR) Analysis.' *Renewable Energy* 139:198–213.

Dogan, E. 2016. 'Analyzing the Linkage between Renewable and Non-Renewable Energy Consumption and Economic Growth by Considering Structural Break in Time-Series Data.' *Renewable Energy* 99:1126–36.

Duasa, J. 2007. 'Determinants of Malaysian Trade Balance: An ARDL Bounds Testing Approach.' *Journal of Economic Cooperation* 28 (3): 21–40.

El-Karimi, M. 2022. 'Economic Growth and Non-Renewable and Renewable Energy Consumption Nexus in Morocco: Causality Analysis in VAR Model.' *International Journal of Sustainable Economy* 14 (2): 111–31.

Engle, R. F., and C. J. Granger. 1987. 'Cointegration and Error-Correction: Representation, Estimation and Testing.' *Econometrica* 55 (2): 251–78.

Haseeb, M., I. S. Z. Abidin, Q. M. A. Hye, and N. H. Hartani. 2019. 'The Impact of Renewable Energy on the Economic Well-Being of Malaysia: Fresh Evidence from Autoregressive Distributed Lag Bound Testing Approach.' *International Journal of Energy Economics and Policy* 9 (1): 269–75.

Hlongwane, N. W., and O. D. Daw. 2022. 'Renewable Electricity Consumption and Economic Growth: A Comparative Study of South Africa and Zimbabwe.' Working Paper 115154, Munich Personal RePEc Archive.

Inglesi-Lotz, R. 2016. 'The Impact of Renewable Energy Consumption to Economic Growth: A Panel Data Application.' *Energy Economics* 53:58–63.

Johansen, S., and K. Juselius. 1990. 'Maximum Likelihood Estimation and Inference on Cointegration with Applications to the Demand for Money.' *Oxford Bulletin of Economics and Statistics* 52 (2): 169–210.

Kamoun, M., I. Abdelkafi, and A. Ghorbel. 2019. 'The Impact of Renewable Energy on Sustainable Growth: Evidence from a Panel of OECD Countries.' *Journal of the Knowledge Economy* 10 (1): 221–37.

Majeed, M. T., A. Anwar, and T. Luni. 2021. 'The Impact of Renewable and Non-Renewable Energy Consumption on Economic Growth: A Global Perspective with Developed and Developing Economies.' *Pakistan Journal of Commerce and Social Sciences* 15 (2): 286–307.

Matei, I. 2017. 'Is There a Link between Renewable Energy Consumption and Economic Growth? A Dynamic Panel Investigation for the OECD Countries.' *Revue d'*économie *politique* 127 (6): 985–1012.

Ministry of Energy and Power Development. 2019. *National Renewable Energy Policy.* Harare: Ministry of Energy and Power Development. https://www.zera.co.zw/National_Renewable_Energy_Policy_Final.pdf.

Mordor Intelligence. 2022. 'Renewable Energy Market-Growth, Trends, Covid-19 Impact, and Forecasts (2022–2027).' https://www.mordorintelligence.com/industry-reports/zimbabwe-renewable-energy-market/market-trends

Mutasa, R. 2022. 'Africa Energy Futures: Zimbabwe.' *Lexology,* 3 November. https://www.lexology.com/library/detail.aspx?g=eb65f2df-8444-4f66-b064-3fd1fe8fae98.

Nyasha, S., and N. M. Odhiambo. 2015. 'The Impact of Banks and Stock Market Development on Economic Growth in South Africa: An ARDL-Bounds Testing Approach.' *Contemporary Economics* 9 (1): 93–108.

———. 2017. 'Banks, Stock Market Development and Economic Growth in Kenya: An Empirical Investigation.' *Journal of African Business* 18 (1). https://doi.org/10.1080/15228916.2016.1216232.

———. 2019. 'Do Financial Systems Spur Economic Growth in the USA? An Empirical Investigation.' *Panoeconomicus* 66 (2): 165–85.

———. 2020. 'Does Remittance Inflow Granger-Cause Economic Growth in South Africa? A Dynamic Multivariate Causality Test.' *Review of Black Political Economy* 47 (1): 86–103.

———. 2022. 'Energy Consumption and Economic Growth in Zambia: A Disaggregated Approach.' *Journal of Economic Policy and Management Issues* 1 (1). http://www.sacs.com/index.php/jepmi/article/view/89/65.

Nyasha, S., N. M. Odhiambo, and M. T. Musakwa. 2022. 'Bank Development and Unemployment in Kenya: An Empirical Investigation.' *Managing Global Transitions* 20 (2): 85–107.

Nyoni, B., and A. Phiri. 2018. 'Renewable Energy-Economic Growth Nexus in South Africa: Linear, Nonlinear or Non-Existent?' Working Paper 89761, Munich Personal RePEc Archive.

Ocal, O., and A. Aslan. 2013. 'Renewable Energy Consumption-Economic Growth Nexus in Turkey.' *Renewable and Sustainable Energy Reviews* 28:494–9.

Pesaran, M. H., and Y. Shin. 1999. 'An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis.' In *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium,* edited by S. Strøm, 371–413. Cambridge: Cambridge University Press.

Pesaran, M., Y. Shin, and R. Smith. 2001. 'Bounds Testing Approaches to the Analysis of Level Relationships.' *Journal of Applied Econometrics* 16 (3): 289–326.

Rafindadi, A. A., and I. Ozturk. 2017. 'Impacts of Renewable Energy Consumption on the German Economic Growth: Evidence from Combined Co-Integration Test.' *Renewable and Sustainable Energy Reviews* 75:1130–41.

Saad, W., and A. Taleb. 2018. 'The Causal Relationship between Renewable Energy Consumption and Economic Growth: Evidence from Europe.' *Clean Technologies and Environmental Policy* 20 (5): 127–36.

Sahin, B. S., and S. Yilmazer. 2021. 'The Relationship between Financial Development and Renewable Energy Consumption: An Empirical Investigation on Emerging Countries.' *International Journal of Sustainable Economy* 13 (4): 336–56.

Smolović, J. C., M. Muhadinović, M. Radonjić, and J. Durasković. 2020. 'How Does Renewable Energy Consumption Affect Economic Growth in the Traditional and New Member States of the European Union?' *Energy Reports* 6:505–13.

Tsaurai, K., and L. Ngcobo. 2020. 'Renewable Energy Consumption, Education, and Economic Growth in Brazil, Russia, India, China, South Africa.' *International Journal of Energy Economics and Policy* 10 (2): 26–34.

United Nations. 2021. 'Statement by the President of the Republic of Zimbabwe His Excellency, Dr. E. D. Mnangagwa, at the World Leaders Summit During the 26th Session of the Confernce of Parties (Cop26): 1–2 November 2021.' https://unfccc.int/documents/309517.

Venkatraja, B. 2020. 'Does Renewable Energy Affect Economic Growth? Evidence from Panel Data Estimation of BRICS Countries.' *International Journal of Sustainable Development and World Ecology* 27 (2): 107–13.

World Bank Group. 2022. 'The World Bank in Zimbabwe.' https://www.worldbank.org/en/country/zimbabwe/overview.

———. N. d. 'World Bank Open Data.' http://data.worldbank.org.

Young, A. O. 2018. 'Impact of Labour Force Dynamics on Economic Growth in Nigeria: An Empirical Analysis Using ARDL Bound Testing Approach.' *Journal of Resources Development and Management* 42:31–46.

Zeshan, M., and V. Ahmad. 2013. 'Energy Consumption and Economic Growth in Pakistan.' *Bulletin of Energy Economics* 1 (2): 8–20.

Zimbabwe Energy Regulatory Authority. N. d. 'Moving to Zero Carbon Emission by Adopting Solar Energy Technologies.' https://www.zera.co.zw/.

Insidious Impact of the COVID-19 Pandemic on Leverage of the Tourism and Hospitality Sector in India

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The COVID-19 pandemic has had a massive cascading effect on the entire tourism and hospitality sector, acting as a demand shock, affecting not only customary travellers but also wiping out any transient demand. The upside of these difficult circumstances is that they can be used to test the sector's resilience. In this context, this paper analyses the deleveraging risk that industry players in India face by employing a qualitative response model, 'Logit'. The study concludes that the deleveraging risk that sector players face depends upon the amount of debt and leverage ratios, both during the pre-and post-pandemic period. However, the influence of other financial indicators on deleveraging has been different in terms of its intensity and bi-directional impact. Moreover, during COVID-19 deleveraging tendencies were noticed only in 204 firms, compared to 242 firms before COVID-19, discrediting the forced deleveraging as predicted in the literature.

Keywords: travel and hospitality, deleveraging risk, debt, COVID-19, Logit
JEL Classification: H63, L83, I15

Received 2023/07/13 · Revised 2023/10/06 · Accepted 2023/10/31
Published online 2024/03/31 https://doi.org/10.26493/1854-6935.22.73-93

Introduction

Tourism is one of the vibrant sectors of the economy, accounting for 29 percent of the world's services exports and generating employment for 300 million people globally (United Nations Conference on Trade and Development 2020). The tourism sector in India contributes around $194bn, or 6.9%, to total GDP while employing 30.80 million people and

was expected to grow to $512bn by 2028 (Statista 2021). However, the COVID-19 pandemic has disturbed the significant aspects of the travel and hospitality sector; therefore, to achieve the pre-pandemic position is an uphill task. The pandemic has overwhelmingly affected the countries in Asia, leading to an estimated USD 2.7 trillion decline in world travel and tourism GDP (World Travel and Tourism Council 2020). Nearly 65 percent of the experts from UN Tourism (2022) reiterate that this sector will not recover before 2024. As of 2022, international tourist arrivals are closer to the late 1980s level, about 72 percent lower than the pre-pandemic level. It is significantly lower than the past episodes of epidemics or economic recessions (EHL Insights 2022). As economists predict, firms will now move to the 'new normal' - the so-called 90% economy (The Economist 2020). Keeping in view this scenario, currently the sustainability of the industry participants seems to be minimal but they should take strides to achieve the new normal level sensibly and cautiously.

The paper aims to test the resilience of the Indian hospitality and travel firms given the amount of leverage in their balance sheets and to highlight the financial variables that may lead to deleveraging, comparing the pre-COVID era to the COVID era. This helps to understand the crucial variables that play a role in determining the deleveraging dynamics for the firm in normal vs shock periods and unearth whether Indian firms faced the forced deleveraging suggested in debt cycle theory.

The paper is organised as follows. The second section details the review of literature, organised into three sections: the current scenario, the leverage dynamics and the nexus between debt and deleveraging. The third section consists of the data and methodology, which is followed by results and discussion in the fourth section. Finally, the fifth section concludes the paper.

Review of Literature

LEVERAGE DYNAMICS IN THE HOSPITALITY INDUSTRY

The presence of leverage in a firm's capital structure has remained a matter of interest among researchers. While some have argued that it is a relevant financial decision for determining the value of the firms (Gordon 1962; Walter 1963), others have argued it is an irrelevant decision (Modigliani and Miller 1958). It is argued that debt offers a differential advantage to the firms, being a cheaper source of finance, and can be utilised to expand productive capacity and shorten the turnover time, thereby augmenting the power of the borrowing entity (Hilferding 1981; Veblen

1904). However, recent history demonstrates that though financial leverage allows a borrower to expand business assets, thereby increasing gains in good times, on the other hand, it has a multiplying effect on the value of the firm during bad times. The debt can be used to jack up the shareholders' wealth and give impetus to the firm's power (Robbins and Di Muzio 2016). Contrarily, it has the power to increase vulnerability to downside shocks (Turner 2017).

The hospitality industry is unique because it is capital-intensive, having substantial investment properties and other fixed assets such as buildings, furniture, fixtures and equipment, which increases the share of fixed operating costs in their total cost. The existence of fixed operating costs and fixed financial costs (i.e. interest on debt capital) inflates their degree of combined leverage, and any volatility in their earnings will severely impact their valuation (Enz and Potter 1998; Peng et al. 2015). Hospitality firms use heavy debt to support their fixed-asset investments, particularly long-term debt financing (Singh and Upneja 2008). Also, they incur high fixed operating costs such as property taxes, management fees, and engineering and maintenance costs, which are impossible to eliminate (Upneja and Dalbor 2001). The high level of leverage required by hospitality firms and their high operating costs entails maintenance of high liquidity, a feature of paramount importance. It is mainly due to operating and financial leverage that these firms perform poorly relative to other firms during economic downturns, as the revenue stream has a high correlation to the macroeconomy. A decline in hotel profitability has severe implications for the hotel owner and lenders as the debt service ability gets impaired (Woodworth and Mandelbaum 2010). The problem will swell up when the revenue per available room (RevPAR) declines drastically (Corgel and Gibson 2016). The travel and hospitality sectors are highly cyclical and seasonal, with stability largely susceptible to sharp upcycles and deep downcycles. The tourism industry often finds itself overwhelmed by social or political instability, economic or natural uncertainties and an increased risk of terrorism and climate change (Williams and Baláž 2015). In such cases, a marginal decline in sales volume can lead to a sharp decline in profits and cash flows available for debt servicing. Stress analysis for major hotel companies revealed that a 25% revenue decline for major chains would result in many companies grappling for survival (Agrawal 2020).

The recent banking crisis adds to industry woes as credit availability has become scarce. Amid the dispirited economic growth, rising un-

certainties and policy fiascos, the industry might witness several hotel projects and airliners defaulting on debt. With bankers becoming highly selective in providing development finance for hotel projects and airlines in view of expected defaults and rising Non-Performing Assets from all major sectors, establishing credibility for extended finance will be difficult. Therefore, the credit impact of the pandemic on the hospitality sector will have short- and long-term effects. The immediate implications for loss of revenues and dwindling cash flows will lead to problems with debt service obligations. The higher leverage means firms are susceptible to delinquency, with survival requiring pruning all costs, fixed and variable. However, this will affect the guest experience, followed by a decline in occupancy and an associated drop in the average rate of return of an already stressed balance sheet. In the long run, it may affect the total valuation of these firms (Riaz 2020).

The policy choices of the government will determine whether COVID-19 will be followed by zombification,[1] bankruptcies, consolidation or debt deleveraging. One of the policy choices for the government is to extend credit to these distressed firms or extend state guarantees, both of which are artificial measures that will prevent the exit of unproductive firms from the market, leading to growth in the number of zombie firms. It is estimated that COVID-19 may result in widespread bankruptcies as hotels may shut down due to rising credit levels. However, the government's focus on flattening the insolvency curve makes private debt resolution or restructuring the priority (Aharon et al. 2021).

NEXUS OF DEBT-AT-RISK AND DELEVERAGING

The empirical research on the various crisis episodes has established the leverage–sustainability nexus, with a highly leveraged borrower facing substantial losses on high debt service costs. It unfolds two aspects of leveraged positions of organisations. First, the majority of market downturns are accompanied by deterioration in the value of assets. If the value of the assets drops lower than the value of the debt, the risk of default increases (Kiyotaki and Moore 1997). Second, the loss of income makes highly leveraged firms more susceptible to bankruptcy to service the debt. In both instances, deleveraging follows, contrary to the 'beautiful deleveraging' referred to by Ray Dalio in his book. The deleveraging Dalio referred to is forced and will reduce the market volatility on the borrowers' balance sheet and exchange current returns for future risks (Dalio 2018). However, the deleveraging necessitated due to crises is forced and ugly. It is

driven by the need to cover financial costs leading to capital depletion, to reduce risks and prevent defaults. Such a scenario usually shifts lenders' attitudes to a more conservative approach, demanding more collateral, down payment, and higher interest rates to cover the higher associated risk. Specifically, in the aftermath of a crisis, the level of investment is held back due to debt accumulated during the boom years. The tightening of lending conditions and weak credit supply is called 'debt overhang' (Cuerpo et al. 2013; Kalemli-Ozcan, Laeven, and Moreno 2018).

The rapid deleveraging, cutting down of consumption, and depressing demand is the outcome of debt overhang. A study by Eggertsson and Krugman (2012) studied how the debt overhang forces highly indebted firms to go for rapid deleveraging, mainly because of erosion in their debt servicing capacity resulting from disruptions in the functioning of payment flows, which will magnify financial instability. The household sector in advanced economies and the corporate sector in emerging economies are likely to replicate the deleveraging and austerity predicted in the model. The existence of private debt with longer maturities and collateral constraints makes the economy susceptible to financial or economic shocks. If the collateral value exceeds the value of outstanding debt, borrowers can secure additional borrowing through new loans on existing collateral. If the collateral value is lower than the outstanding debt, a negative shock to the economy and a subsequent credit contraction will force the firms into a gradual deleveraging path (Andrés et al. 2020). Private deleveraging depresses economic activity and the natural interest rate while also causing welfare losses throughout the economy (Guerrieri and Lorenzoni 2017; Ivens 2018). During the 2008 global financial crisis, economies underwent a massive deleveraging process, with the deleveraging dynamics being heterogeneous between countries (Martin and Ventura 2016).

Therefore, it is essential to recognise that hotels with high debt-to-equity ratios will be forced to deleverage (McKinsey Global Institute 2012). With the ability to raise cash impaired because of the reduced demand, the industry might witness a distressed selling of assets at discounted rates to meet current creditor obligations. In addition, COVID-19 has also influenced the already dysfunctional capital markets, making it difficult to raise fresh capital through public issues. The story is not much different for private equity firms, who have incurred heavy losses and are reluctant to part with their resources (CARE Ratings 2021; Fowler 2022). In response to the shocks to the highly leveraged economy, the industry might

witness waves of consolidations, with more significant and front-loaded consolidations increasing the risk and duration of deleveraging episodes, hampering the medium-term output losses (Andrés et al. 2020).

Stabilising or bringing down the debt to sustainable levels is a major challenge. Firms can deleverage either by increasing revenues, decreasing expenditure, or additional borrowing. The latter is hardly reassuring as the debt increase must be paid back with interest. The ex-ante business problems, such as financing issues or excessive leverage that had persisted before the pandemic, challenge the resilience of these firms to withstand shocks or changes in the wake of a crisis. The firm's resilience depends on *'a firm's ability to effectively absorb, develop situation-specific responses to, and ultimately engage in transformative activities, to capitalize on disruptive surprises that potentially threaten firms' survival'* (Lengnick-Hall, Beck, and Lengnick-Hall 2011).

The current study examines the change in the capital structure of tourism and hospitality firms over two time periods, the pre-COVID and COVID period, to develop a model for the prediction of deleveraging tendency on the lines of observations by Altman (1968) and Ohlson (1980). To the best of the author's knowledge, this is a novel study in the area of the Indian tourism sector which designs models by identifying the financial variables and ratios that influence the deleveraging potential for a firm. It is an attempt to test that deleveraging factors vary between normal times in comparison to shock periods. It also disregards the presence of forced deleveraging as anticipated by Ray Dalio's debt cycle theory.

Data and Methodology

DATA

In order to examine corporate deleveraging, a firm-level longitudinal approach of three prime tourism sub-sectors, viz. hotels, travel services and airlines, is used in the present study. The relevant data of the firms was collected from CMIE Prowess for an initial sample of 729 firms. After removing firms with critical data missing, the final sample size used is 478 Indian firms.

A dummy variable was created by assigning the value '1' if the debt-to-equity ratio had declined (i.e. deleveraging), and '0' if it had remained relatively constant or increased (i.e. no deleveraging). The dependent variable is categorical and dichotomous. Therefore, the authors used a binary dependent variable model, 'Logit', to analyse and predict the probability of deleveraging based on a set of independent variables. The paper select-

TABLE 1 List of Independent Variables

	Independent variables	Definition	Symbol
1	Debt	The absolute level of debt	DEBT
2	Debt to Equity	The ratio of debt to equity	DTE
3	Debt Service Coverage Ratio	The ratio of net operating income to debt service	DSCR
4	Vulnerability to income shock	The ratio of current assets to total assets	VIS
5	Vulnerability to funding shocks	The ratio of current liability to total liability	VFS
6	Size	Log of total assets	SIZE
7	Liquidity	The ratio of working capital to total assets	LIQ
8	Current ratio (times)	Current assets to current liabilities	CR
9	PBIT	Profit before income and tax	PBIT
10	PBIT to total assets	The ratio of Profit before income and tax to total assets	PBIT_TA
11	Net sales	Gross sales minus returns, allowances, and discounts	NSALES
12	Sales to total assets	The ratio of sales to total assets	SALTA
13	Total assets utilisation ratio	Total revenue to total assets	TAUR
14	Net income for the past two years	Net Income = 1 if the firm had a net loss for the last two years, 0 otherwise	Ti_2
15	Retained earnings to total assets	The ratio of Retained earnings to total assets	RETA
16	Total Debt to total assets	The ratio of total debt to total assets	D_A
17	Operating expenses to total expense	The ratio of Operating expenses to total expense	OPEXTE
18	Tangibility	Tangible net worth	TANG

ed preliminary parameters (variables or ratios) listed in McKinsey Global Institute (2010). Since the literature on deleveraging motivators is scant, the present study used the variables closely related to financial distress or bankruptcy prediction, including current ratio, profitability, size, total asset utilisation, past income and retained earnings (Altman 1968; Ohlson 1980; Shetty and Vincent 2021). Based on the available literature, the independent variables finally selected to run the Logit model are outlined in Table 1.

LOGIT MODEL

The concept of the logit model is based on the cumulative distribution function of a random variable Y, which represents the probability that it takes a value $\leq y_o$ (where y_o is a specified numerical value of Y). Algebraically,

$$F(y) = F(Y = y_0) = P(Y \leq y_0).$$

A typical logit model has a specific exponential functional form, as follows:

$$P_i = \frac{1}{1 + e^{-(\beta_1 + \beta_2 x)}} = \frac{1}{1 + e^{-z}} = \frac{e^z}{1 + e^z}.$$

For a multivariate logit model, the estimated probability of happening of an event (deleveraging in the current case) is

$$P_i = \frac{e^{(\beta_1 + \beta_2 x_2 + \beta_3 x_3 + \ldots + \beta_i x_i)}}{1 + e^{(\beta_1 + \beta_2 x_2 + \beta_3 x_3 + \ldots + \beta_i x_i)}},$$

where the regression function is the nonlinear function of the coefficients. Since the parameter betas are non-linearly related to , the usual OLS procedure cannot be used, which has linearity of parameters as the basic assumptions. The maximum likelihood principle is used for estimating parameters.

Now, represents the probability of a firm deleveraging, whereas (1-) represents the probability of the firm not deleveraging. Thus,

$$\frac{P_i}{1 - P_i} = \frac{1 + e^z}{1 - e^z} = e^z.$$

Here, $P_i / (1 - P_i)$ represents the odds ratio, interpreted as the ratio of the probability that a firm deleverages to the probability that it will not deleverage. Thus, =0.8 indicates that the odds of deleveraging to not deleveraging are 4:1.

Taking the log of the equation,

$$L_i = \ln \frac{P_i}{1 - P_i} = Z_i = \beta_1 + \beta_2 x, \text{ where L is known as the Logit.}$$

In short, Logit is based on a cumulative standard distribution function which produces the probabilities 1 and 0 for logistic distribution.

MODEL ASSUMPTIONS

Certain basic assumptions are to be fulfilled before building the model. These include having the appropriate outcome type, large sample size, no extreme outliers, independence of observations, absence of multicollinearity, and linearity of regressors and log odds.[2]

MODEL BUILDING

The final model was achieved through a stepwise regression involving a series of iterative cycles for identifying the independent variable combination that increases the chances of detecting the observed outcome. The forward selection strategy enters the independent variables till the inclusion of additional variables does not contribute significantly to outcome determination. The statistical significance for the inclusion of variables was initially set at 0.25 and later reduced to 0.10 after manual iterations to ensure the inclusion of significant variables in the model. Two models are used in this analysis to estimate the deleveraging trends pre-pandemic (from 2016) and post-pandemic (from 2019). It enables us to determine what factors were essential to predict deleveraging before and after the pandemic.

POST ESTIMATION

As a post-estimation criterion, a few tests are conducted to test the model's goodness of fit. A popular measure is the Hosmer-Lemeshow goodness of fit, which estimates the model efficiency in representing how well the model fits the data. In addition, the confusion matrix and ROC curve were also used. The former summarises the performance of the classification algorithm with details on true positives, false negatives, false positives and true negatives in the matrix, with

$$\text{accuracy} = \frac{TP + TN}{TP + FP + FN + TN}.$$

The ROC curve plots the sensitivity (true positive) values vs specificity (true negative) between 0 and 1. For any model, there is usually a trade-off between the two. A ROC curve that hugs the upper left corner of the display indicates a model with high sensitivity and specificity. The AUC (area under the curve) indicates how well the model can differentiate between positive and negative outcomes. The higher the AUC, the more accurate the model categorises outcomes.

Results and Discussion

ASSUMPTION TESTING

In the present study, two models were used to evaluate the deleveraging trends in the pre-pandemic (2016–2018) and post-pandemic (2019–2021) period, enabling the authors to identify the factors to predict deleverag-

ing before and after the pandemic. In both the models, the dependent variables *'cdelev6'* and *'cdelev3'* are binary, where 1 represents that deleveraging has taken place, while 0 represents instances where leverage remained either constant or increased. As per the recommendations of Long (1997) and Hair et al. (2010), a minimum of 10 observations for each explanatory variable (with a minimum of 100) represents an adequate sample. The sample in the present study satisfies this requirement, with an initial sample of 478 companies. The independence assumption of the sample is automatically satisfied as there are no repeated measurements, and the data consists of individual firm observations. Variables with a correlation coefficient of 0.8 and higher indicated the presence of multicollinearity and were excluded from the analysis. The usual method of the Box-Tidwell Test is performed to test the linearity, wherein each independent variable's cross-product or interaction term is added to its natural logarithm in the logistic regression model. If the results reveal that the interaction term is significant (p-value <0.05), the linearity assumption is violated (Box and Tidwell 1962). The variables with a p-value < 0.05 can either be removed, dummy coded or transformed into a different scale. Subsequently, Log, square or binary transformation for variables was done. Since the firms included in the sample are from diverse sectors, such as tour operators, restaurants, hotels, and airlines, only highly influential outliers were removed to improve regression results.

DESCRIPTIVE STATISTICS

Table 2 presents the descriptive statistics for the deleveraging variables; cdelev6 represents the deleveraging in the pre-pandemic period while cdelev3 represents deleveraging in the post-pandemic period.

REGRESSION RESULTS

Deleveraging During Normal Times: Model 1

The results of logit regression for deleveraging and post-estimation test results are presented in Table 3. As is evident from the table, the logit model for pre-COVID deleveraging has a Pseudo R^2 of 0.236, which lies within the specified limit of 0.2-0.4 for good model fit, as suggested by McFadden (1973). The Hosmer-Lemeshow test has a Chi^2 of 7.16 with a p-value > 0.05, which suggests a good fit. The model accuracy of 71.79 represents a good fit supported by the ROC curve with an area under the curve of 81.09 percent (Menard 2010; Garson 2014; Hilbe 2015).

TABLE 2: Descriptive statistics for deleveraging variable

	cdelev3		cdelev6	
	Freq.	Per cent	Freq.	Per cent
Firms Not Deleveraging(0)	274	57.32	236	49.37
Firms Deleveraging (1)	204	42.68	242	50.63
Total	478	100	478	100

It is deduced from the results that an increase in debt to equity and high vulnerability to income shocks increases the odds of deleveraging by 1.67 and 1.27, respectively. In contrast, an increase in debt service capability does not affect the deleveraging, with odds ratio =1. However, the firm's current profitability and net income of the past two years are significant, with an odds ratio of 9.60 and 9.42, respectively. On the other hand, the high initial level of debt and liquidity prevents firms from deleveraging. As initial debt rises, the odds of deleveraging decline by 0.15 (i.e. 1-0.85), while an increase in liquidity leads to a decrease in deleveraging odds by 0.11 (i.e.1-0.89).

The estimated logistic Model equation (Model 1) is reproduced below:

$$\begin{aligned} logit(\,cedelev6\,) = {} & 0.115 - 0.16 \log DEBT + 0.51 \log DTE \\ & + 0.004\, DSCR + 0.24 \log VIS + 2.24\, Ti_2 \\ & - 0.11\, CR + 2.26\, PBIT_{TA}. \end{aligned}$$

The results of Model 1 reveal that the debt-to-equity ratio, vulnerability to income shocks, net income, and firm profitability have increased the odds of deleveraging. Intuitively, it is observed that the higher the leverage in the balance sheets, that is, as the debt increases compared to the supporting equity so does the firm's vulnerability (De Fiore and Uhlig 2015). Similarly, it is evident from the logit results that the higher the firm's vulnerability to income shocks, the higher the odds of deleveraging. This is because a constrained revenue stream weakens the ability of the firm to meet creditors' obligations. In either case, the perceived risk of solvency or bankruptcy becomes greater, prompting asset sell-offs, the proceeds of which could be utilised to repay debt, increasing the instances of deleveraging (Sahm 2014). However, firms with adequate debt service coverage ability because of the healthy net income from previous years and/or high level of current profitability are better equipped to pay off their debt obligations. In their case, the asset sell-offs may not necessarily follow, if they intend to go for deleveraging (Zingales 2000).

TABLE 3 Logit Regression and Post-Estimation Test Results of Pre-COVID Period

A. Logistic Regression Results

					Number of obs	475
					LR chi2(7)	155.41
					Prob > chi20	0
Log-likelihood = -251.48971					Pseudo R2	0.236
cdelev6	Coef.	Odds ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]
LDEBT	-0.1591	0.85	0.0499	-3.19	0.001*	-0.2569 -0.0613
LDTE	0.5141	1.67	0.0675	7.61	0.000*	0.3818 0.6464
DSCR	0.0040	1.00	0.0024	1.66	0.098**	-0.0007 0.0088
LVIS	0.2417	1.27	0.0908	2.66	0.008*	0.0638 0.4196
Ti_2	2.2426	9.42	0.2916	7.69	0.000*	1.6712 2.8141
CR	-0.1132	0.89	0.0654	-1.73	0.084**	-0.2414 0.0150
PBIT_TA	2.2615	9.60	1.1664	1.94	0.053**	-0.0246 4.5476
_cons	0.1157	1.12	0.3890	0.30	0.766	-0.6467 0.8781

B. Post-Estimation Test Results:

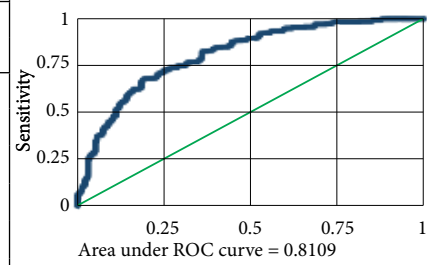
a. Hosmer-Lemeshow goodness of fit

Hosmer-Lemeshow chi2(8)	7.16
Prob > chi2	0.5192

b. Classification matrix

Classified	D	~D	Total
+	185	78	263
-	56	156	212
Total	241	234	475
Correctly classified			71.79%

c. ROC curve



NOTES: LDEBT is the log of the DEBT, LDTE is log of DTE, LVIS is log of the variable Vulnerability to income shocks. * significant at 5% level of significance, ** significant at 10% level of significance

The present study reveals that factors that restrict deleveraging include an absolute level of debt and the liquidity ratio, which a debt overhang situation can explain. This debt overhang arises when a firm fails to secure additional loans or roll over its debt amid the reluctance of creditors, supporting the observations of Kalemli-Ozcan, Laeven, and Moreno (2018) and Philippon (2009).At the same time, the higher the liquidity of a firm the lesser the deleveraging intentions because firms will have high debt servicing abilities. On the other hand, low liquidity indicates financial distress, forcing firms to sell off their assets to repay their debt, which will inflate the odds of deleveraging (Banerjee and Ćirjaković 2021; Chauhan 2017).

TABLE 4 Logit Regression and Post-Estimation Test Results of the COVID Period

A. Logistic Regression Results					Number of obs	475
					LR chi2(7)	137.39
					Prob > chi2	0
Log likelihood = -255.80659					Pseudo R2	0.2117
cdelev3	Coef.	Odds ratio	Std. Err.	Z	P>|z|	[95% Conf.	Interval]
LDEBT	-0.4446	0.64	0.1322	-3.36	0.001*	-0.7037	-0.1855
LDTE	0.7958	2.21	0.1193	6.67	0.000*	0.5620	1.0297
VFS	-1.1359	0.32	0.5479	-2.07	0.038*	-2.2098	-0.0620
SQSIZE	0.1197	1.13	0.0572	2.09	0.036*	0.0075	0.2319
PBIT	-0.0005	1.00	0.0003	-1.74	0.082**	-0.0011	0.0001
OPEXTE	0.0097	1.01	0.0054	1.81	0.071**	-0.0008	0.0202
I.D_A	2.6663	14.39	0.3243	8.22	0.000*	2.0308	3.3019
_cons	-0.9605	0.38	0.5654	-1.70	0.089	-2.0686	0.1475

B. Post-estimation test results:

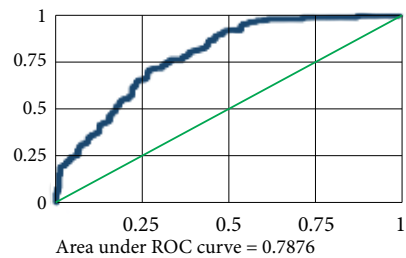
a. Hosmer-Lemeshow goodness of fit

Hosmer-Lemeshow chi2(8)	10.69
Prob > chi2	0.22

b. Classification matrix

Classified	D	~D	Total
+	139	72	211
-	65	199	264
Total	204	271	475
Correctly classified			71.16%

c. ROC curve



NOTES: LDEBT is the log of the DEBT, SQSIZE represents the square of the SIZE, I.D_A is used to represent the categorical nature of the variable D_A. * significant at a 5% level of significance, ** significant at a 10% level of significance

Deleveraging in the Event of Shock (COVID-19): Model 2

The logit regression results performed on data during the COVID-19 pandemic are presented in Table 4.

The logit model for deleveraging during the COVID-19 period has a Pseudo R^2 of 0.2117, which lies within the specified limit of 0.2-0.4 for a good model fit as suggested by McFadden (1973). The post-estimation test results of the Hosmer-Lemeshow Test have witnessed a Chi^2 Value of 10.89 with a p-value > 0.05, indicating a good fit. The model has an accuracy of 71.16% and an area under the curve of 78.76 percent, both suggesting that the model is a good fit.

In the post-COVID-19 deleveraging scenario, the leverage ratios, namely debt to equity ratio and debt to assets, play a crucial role. Any increase in debt to equity increases the odds of a firm deleveraging by 2.21. The debt-to-asset ratio is highly significant for deleveraging during a crisis, with an odds ratio of nearly 14. It is also observed that larger-size firms have higher odds of deleveraging (odds ratio = 1.13). Similarly, firms with a high ratio of operating expenses to total expenses have a higher impact on the deleveraging odds.

Furthermore, higher initial levels and vulnerability to funding shocks during the crisis decrease the odds of deleveraging by 0.36 (i.e.1-0.64) and 0.68 (i.e.1-0.32), respectively. The profitability has weak coefficients and an odds ratio close to 1 despite being significant, indicating that changes to profitability have little or no impact on the odds of deleveraging firms. The Logit regression model (Model 2) of deleveraging during the post-COVID-19 period takes the following shape.

$$\begin{aligned} logit(\, cedelev3\,) = {} & -0.96 - 0.44 \log DEBT + 0.79 \log DTE \\ & - 1.14\, VFS + 0.12\, SIZESQ - 0.0005\, PBIT \\ & + .01\, OPEXTE + 2.27\, D\_A \end{aligned}$$

Higher initial debt levels together with higher vulnerability to funding shocks affect the odds of deleveraging negatively. The firms facing such a situation are caught up in a debt overhang situation, which may threaten the adjustment process during shocks. Due to the loss of revenues during the COVID-19 pandemic, many firms depended on additional short-term debt to fund their operating activities and meet their liquidity requirements. However, firms with a high prior debt build-up may find it difficult to raise new debt, making debt rollovers and consequent deleveraging nearly impossible, corroborating the results of Kalemli-Ozcan, Laeven, and Moreno (2018). Furthermore, the results show that firms with high short-term debt (Vulnerability to Funding Shocks) have higher rollover risk as lenders are reluctant to renew expiring credit lines given deteriorating financial conditions, similar to observations of Diamond and He (2014).

In contrast, firms with high leverage ratios (debt to equity and debt to assets) have higher odds of deleveraging. The same can be explained on account of considerable debt service obligation, which forces the firms to liquidate tangible assets as revenue generation remains weak and the credit market is constrained (Carletti et al. 2020; Goretti and Souto 2013). The

debt-to-assets ratio is particularly concerning as a crisis often results in a fall in the asset's fundamental value, which deteriorates the debt capacity of the assets amid a market freeze (Acharya, Gale, and Yorulmazer 2011). Since larger firms have higher access to credit and secure suitable grants from the government, the shock impact is less damaging for such firms, allowing them to deleverage. The asset sell-off by larger firms, though leading to deleveraging, prevents them from bankruptcy. On the other hand, smaller firms with high short-term debt and weaker access to credit are more likely to be liquidated rather than restructured in a crisis (Mitton 2008).

In comparison, the debt and debt-to-equity ratios similarly affect pre -and post-crisis models. At the same time, firms in the pre-COVID era were more susceptible to income shocks as compared to the post-COVID era, where funding shocks were more significant. During the COVID era, the debt-to-asset ratio and size also played a role in determining the deleveraging odds. It is argued that the higher the obligations of the firm, whether due to higher debt levels, high debt service, high operating expenses, or other short-term liabilities, the higher the odds of deleveraging. Profitability, liquidity and debt serviceability have been identified as crucial factors in the pre-COVID era, but the same is not valid during the pandemic. It may be due to the pressures of the COVID-19 shock; the subsequent safety nets by the government prevented the vulnerabilities created due to high debt service and income shock from forcing firms into deleveraging. The primary observation of the study is that a larger number of firms were deleveraging before the pandemic. Despite the downward pressures of the COVID-19 shock, very few firms continued on this path. Thus, as hypothesised in the literature, forced deleveraging had not been evident among Indian firms. As opposed to deleveraging, firms have used the accommodative monetary policy and unprecedented support to increase their leverage rather than decrease it.

Conclusion

The capital structure of hospitality organisations consists of more debt content and is more vulnerable, especially during any economic shock. The main reason for such a state of affairs is the instability of cash inflows and their dwindling ability to service the debt. In such a situation, researchers believe that firms tend to attempt deleveraging to do away with the fixed interest outflow on the debt capital. However, there are such variables that may influence their deleveraging

intention. Against this backdrop, the present study was undertaken, and it is concluded that the influence of financial indicators on deleveraging may be different in terms of direction and intensity in the event of a shock compared to regular times. During normal times, a high debt-to-equity ratio, high debt service coverage ratio, high current-to-total assets ratio, hefty retained earnings, and high profitability motivate the firms to deleverage as opposed to the crisis period. It is mainly because firms during crisis periods concentrate on meeting operating expenses and try to maintain sufficient liquidity rather than bring down debt levels.

Moreover, the absence of forced deleveraging during the initial three-year period following COVID-19 does not necessarily indicate the sector's stability. Finding a sustainable solution depends on the economy's behaviour during the coming months. The fire sale of assets is a major challenge for the sector. The excessive leverage that amplifies the downturn may result in fire sales of assets as repricing of assets during the crisis period is unfolding sharply due to disruption of economic activity and inflation in uncertainty. Asset fire sales may ensue to meet the funding withdrawal requests by investors in a pessimistic market with financial intermediaries liquidating their holdings (International Monetary Fund 2020). Unfortunately, the reality is that the worth of many hotels is less than the debt, and the lender has already lost money on the note. In the event of a lack of support from the government and lenders, the hotels will face two alternative solutions to pare the effects of this debt shock. One is deleveraging by asset sell-off, and the other is more extreme – filing for bankruptcy. Furthermore, despite the downward pressures of the COVID-19 shock, very few firms have used a deleveraging path. The study's results reveal that forced deleveraging was not evident among Indian firms. The firms have used the accommodative monetary policy and unprecedented support to increase their leverage rather than decrease it.

Due to the presence of high leverage, it is crucial to ensure organisations in the travel and hospitality sector do not turn into non-performing entities, forcing them to foreclose, which may have adverse effects for all stakeholders. The impact on the indebted party is that its future borrowing ability is constrained, and the banking sector will also be stressed because of the accumulation of non-performing advances. It may lead to an economic crisis if the non-performing advances in the banking sector cross 10 percent of the gross advances of the whole banking industry.

In the event of fiscal consolidation in the economy, the existing deleveraging pressures in these firms, though necessary, may be a source of concern for the economy as a whole.

The Indian hospitality sector has been resilient in the wake of the pandemic, being able to sustain its debt obligations and diversify its operations in the challenging times. Despite this, the sector may face financial distress in view of high inflation and rising interest rates. Thus, government and policymakers must earmark a separate fund provided at lower interest rates or direct financial aid or debt moratoriums to this sector which has not received adequate support from the government's stimulus package.

In the long run, tourism firms must ensure higher provisions for uncertainties to make up for the loss of demand. A lower debt-to-equity and debt-to-assets ratio will offer greater stability to the firms and must be prioritised. In the short run, the cash flows must also be managed such that less important purchases are delayed and retained profits used to support a possible shortfall in revenues. Thus, businesses must adopt robust liquidity management practices.

Notes

1 Zombie firms are highly indebted unproductive firms that face being unable to cover debt servicing costs from current profits. As per Banerjee and Hofmann (2020), a zombie firm is one with an interest coverage ratio of less than one over three consecutive years.

2 For more information read Schreiber-Gregory and Bader (2018), and Stoltzfus (2011).

References

Acharya, V. V., D. Gale, and T. Yorulmazer. 2011. 'Rollover Risk and Market Freezes.' *Journal of Finance* 66 (4): 1177–209.

Agrawal, R. 2020. 'Worries Mount for Hotel Companies: Should You Check In?' *Moneycontrol,* 15 April. https://www.moneycontrol.com/news/business/moneycontrol-research/worries-mount-for-hotel-companies-should-you-check-in-5147741.html.

Aharon, D. Y., A. Jacobi, E. Cohen, J. Tzur, and M. Qadan. 2021. 'COVID-19, Government Measures and Hospitality Industry Performance.' PLOS ONE 16 (8). https://doi.org/10.1371/journal.pone.0255819.

Altman, E. I. 1968. 'Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy.' *Journal of Finance* 23 (4): 589–609.

Andrés, J., O. Arce, D. Thaler, and C. Thomas. 2020. 'When Fiscal Consolidation Meets Private Deleveraging.' *Review of Economic Dynamics* 37:214–33.

Banerjee, R., and B. Hofmann. 2020. 'Corporate Zombies: Anatomy and Life Cycle.' Working Paper 882, Bank for International Settlements.

Banerjee, B., and J. Ćirjaković. 2021. 'Firm Indebtedness, Deleveraging, and Exit: The Experience of Slovenia during the Financial Crisis, 2008–2014.' *Eastern European Economics* 59 (6): 537–70.

Box, G. E. P., and P. W. Tidwell. 1962. 'Transformation of the Independent Variables.' *Technometrics* 4 (4): 531–50.

CARE Ratings. 2021. Hospitality Industry: Survival before Revival. CARE *Ratings,* 28 September. https://www.careratings.com/uploads/newsfiles/28092021020615_Hospitality_Industry_-_Survival_before_Revival.pdf.

Carletti, E., T. Oliviero, M. Pagano, L. Pelizzon, and M. G. Subrahmanyam. 2020. 'The COVID-19 Shock and Equity Shortfall: Firm-level Evidence from Italy.' Working Papers 566, Centre for Studies in Economics and Finance.

Chauhan, G. S. 2017. 'Corporate Financing and Deleveraging of Firms in India.' IIMB *Management Review* 29 (3): 170–87.

Corgel, J. B., and S. Gibson. 2016. 'The Use of Fixed-Rate and Floating-Rate Debt for Hotels.' *Cornell Hotel and Restaurant Administration Quarterly* 46 (4): 413–30.

Cuerpo, C., I. Drumond, J. Lendvai, P. Pontuch, and R. Raciborski. 2013. 'Indebtedness, Deleveraging Dynamics and Macroeconomic Adjustment.' Economic Papers 477, Directorate-General for Economic and Financial Affairs.

Dalio, R. 2018. *Principles for Navigating Big Debt Crises.* Westport: Bridgewater.

De Fiore, F., and H. Uhlig. 2015. 'Corporate Debt Structure and the Financial Crisis.' *Journal of Money, Credit and Banking* 47 (8): 1571–98.

Diamond, D. W., and Z. He. 2014. 'A Theory of Debt Maturity: The Long and Short of Debt Overhang.' *Journal of Finance* 69 (2): 719–62.

Eggertsson, G. B., and P. Krugman. 2012. 'Debt, Deleveraging, and the Liquidity Trap: A Fisher-Minsky-Koo Approach.' *Quarterly Journal of Economics* 127 (3): 1469–513.

EHL Insights. 2022. 'Hospitality Industry Statistics to Have on Your Radar in 2022.' EHL Insights, 18 August. https://www.hospitalitynet.org/news/4112059.html

Enz, C. A., and G. S. Potter. 1998. 'The Impacts of Variety on the Costs and Profits of a Hotel Chain's Properties.' *Journal of Hospitality and Tourism Research* 22 (2): 142–57.

Fowler, D. S. 2022. 'Impact of COVID-19 on the Global Hospitality Industry: A Brief Review of Current Academic Literature and Meta-Analy-

sis to Determine Primary Qualitative Themes.' *Research in Hospitality Management* 12 (1): 29–34.

Garson, D. 2014. *Logistic Regression: Binary and Multinomial.* Chapel Hill: Statistical Associates Publishers.

Gordon, M. J. 1962. 'The Savings, Investment, and Valuation of a Corporation.' *Review of Economics and Statistics* 44: 37–51.

Goretti, M., and M. R. Souto. 2013. 'Macro-Financial Implications of Corporate (De)Leveraging in the Euro Area Periphery.' Working Paper 154, International Monetary Fund.

Guerrieri, V., and G. Lorenzoni. 2017. 'Credit Crises, Precautionary Savings, and the Liquidity Trap.' *Quarterly Journal of Economics* 132 (3): 1427–67.

Hair, J. F., W. C. Black, B. J. Babin, and R. E. Anderson. 2010. *Multivariate Data Analysis.* 7th ed. New York: Pearson.

Hilbe, J. M. 2015. *Practical Guide to Logistic Regression*. Boca Raton, FL: Taylor & Francis.

Hilferding, R. 1981. *Finance Capital: A Study of the Latest Phase of Capitalist Development.* London: Routledge.

International Monetary Fund. 2020. *World Economic Outlook: The Great Lockdown.* Washington, DC: International Monetary Fund. https://www.imf.org/-/media/Files/Publications/WEO/2020/April/English/text.ashx.

Ivens, A. 2018. 'Optimal Fiscal Policy under Private Debt Deleveraging.' *Journal of Economic Dynamics and Control* 97. https://doi.org/10.1016/j.jedc.2018.09.003.

Kalemli-Ozcan, S., L. Laeven, and D. Moreno. 2018. 'Debt Overhang, Rollover Risk, and Corporate Investment: Evidence from the European Crisis.' Working Paper 24555, National Bureau of Economic Research.

Kiyotaki, N., and J. Moore. 1997. 'Credit Cycles.' *Journal of Political Economy* 105 (2): 211–48.

Lengnick-Hall, C. A., T. Beck, and M. L. Lengnick-Hall. 2011. 'Developing a Capacity for Organizational Resilience through Strategic Human Resource Management.' *Human Resource Management Review* 21 (3): 243–55.

Long, J. S. 1997. *Regression Models for Categorical and Limited Dependent Variables.* Thousand Oaks, CA: Sage.

Martin, A., and J. Ventura. 2016. 'Managing Credit Bubbles.' *Journal of the European Economic Association* 14 (3): 753–89.

McFadden, D. 1973. 'Conditional Logit Analysis of Qualitative Choice Behavior.' In *Frontiers in Econometrics,* edited by P. Zarembka, 105–42. New York: Academic.

McKinsey Global Institute. 2010. *Debt and Deleveraging: The Global Credit Bubble and Its Economic Consequences.* New York: McKinsey Global Institute.

———. 2012. *Debt and Deleveraging: Uneven Progress on the Path to Growth.* New York: McKinsey Global Institute. www.mckinsey.com/mgi.

Menard, S. W. 2010. *Logistic Regression: From Introductory to Advanced Concepts and Applications.* Thousand Oaks, CA: Sage.

Mitton, T. 2008. 'Why Have Debt Ratios Increased for Firms in Emerging Markets?' *European Financial Management* 14 (1): 127–51.

Modigliani, F., and M. H. Miller. 1958. 'The Cost of Capital, Corporation Finance and the Theory of Investment.' *American Economic Review* 48 (3): 261–97.

Ohlson, J. A. 1980. 'Financial Ratios and the Probabilistic Prediction of Bankruptcy.' *Journal of Accounting Research* 18 (1): 109–31.

Peng, B., H. Song, G. I. Crouch, and S. F. Witt. 2015. 'A Meta-Analysis of International Tourism Demand Elasticities.' *Journal of Travel Research* 54 (5): 611–33.

Philippon, T. 2009. 'The Macroeconomics of Debt Overhang.' Paper presented at the 10th Jacques Polak Annual Research Conference, Washington, DC, 5–6 November 2009. https://www.imf.org/external/np/res/seminars/2009/arc/pdf/Philippon.pdf.

Riaz, U. 2020. 'COVID-19: What Hotel Companies Should Do Now and Beyond.' https://assets.ey.com/content/dam/ey-sites/ey-com/en_us/topics/covid-19/ey-covid-19-hospitality.pdf.

Robbins, R. H., and Di Muzio, T. 2016. *Debt as Power.* Manchester: Manchester University Press.

Sahm, C. R. 2014. 'Deleveraging: Is It Over and What Was It?' FEDS *Notes,* 24 June. Washington, DC: Board of Governors of the Federal Reserve System.

Schreiber-Gregory, D., and K. Bader. 2018. 'Logistic and Linear Regression Assumptions: Violation Recognition and Control.' Paper presented at the South-Central SAS Conference, Austin, TX, 4–7 November 2018. https://www.researchgate.net/publication/341354759_Logistic_and_Linear_Regression_Assumptions_Violation_Recognition_and_Control.

Shetty, S. H., and T. N. Vincent. 2021. 'Corporate Default Prediction Model: Evidence from the Indian Industrial Sector.' *Vision.* https://doi.org/10.1177/09722629211036207.

Singh, A., and A. Upneja. 2008. 'The Determinants of the Decision To Use Financial Derivatives in the Lodging Industry.' *Journal of Hospitality and Tourism Research* 32 (4): 423–47.

Statista. 2021. 'Total Contribution of Travel and Tourism to GDP in India 2013–2021.' https://www.statista.com/statistics/313724/total-contribution-of-travel-and-tourism-to-gdp-in-india-by-segment/.

Stoltzfus, J. C. 2011. 'Logistic Regression: A Brief Primer.' *Academic Emergency Medicine* 18 (10): 1099–104.

The Economist. 2020. 'The 90% Economy That Lockdowns Will Leave Behind.' *The Economist,* 30 April. https://www.economist.com/briefing/2020/04/30/the-90-economy-that-lockdowns-will-leave-behind.

Turner, A. 2017. *Between Debt and the Devil: Money, Credit, and Fixing Global Finance.* Princeton, NJ: Princeton University Press.

United Nations Conference on Trade and Development. 2020. COVID-*19 and Tourism: Assessing the Economic Consequences.* Geneva: United Nations Conference on Trade and Development. https://unctad.org/system/files/official-document/ditcinf2020d3_en.pdf.

UN Tourism. 2022. 'Impact Assessment of the COVID-19 Outbreak on International Tourism.' https://www.unwto.org/impact-assessment-of-the-covid-19-outbreak-on-international-tourism.

Upneja, A., and M. C. Dalbor. 2001. 'The Choice of Long-Term Debt in the Hotel Industry.' *Journal of Hospitality Financial Management* 9 (1): 82–3.

Veblen, T. 1904. *The Theory of Business Enterprise.* New York: Scribner.

Walter, J. E. 1963. 'Dividend Policy: Its Influence on the Value of the Enterprise.' *Journal of Finance* 18 (2): 280–91.

Williams, A. M., and V. Baláž. 2015. 'Tourism Risk and Uncertainty: Theoretical Reflections.' *Journal of Travel Research* 54 (3): 271–87.

Woodworth, R. M., and R. Mandelbaum. 2010. 'Seventy-Five Years of U.S. Hotel Revenues, Expenses, and Profits.' Cornell Hospitality Quarterly 51 (1): 20–6.

World Travel and Tourism Council. 2020. *Travel and Tourism: Global Economic Impact and Trends 2020.* Edited by N. Jus. London: World Travel and Tourism Council. https://wttc.org/Portals/0/Documents/Reports/2020/Global%20Economic%20Impact%20Trends%202020.pdf?ver=2021-02-25-183118-360.

Zingales, L. 2000. 'In Search of New Foundations.' *Journal of Finance* 55 (4): 1623–53.

Ciljno usmerjen razvoj ekosistema metropole

Małgorzata Pańkowska

Modeliranje arhitekture podjetja (AP) razumemo kot sistem arhitekture, ki je opredeljen v ISO42010, pri čemer je AP namenjena zagotavljanju celovitega pogleda na poslovno organizacijo. Ta raziskava analizira ciljno usmerjen pristop k razvoju AP. Utemeljitev izbire teme izhaja iz raziskav metod modeliranja AP. Arhitekti podjetij se osredotočajo predvsem na procesno modeliranje pa tudi na apliciranje jezika UML. Še vedno obstaja odprto vprašanje, kateri so cilji modeliranja AP. Pričujoči prispevek predstavlja aplikacijo jezika ArchiMate in notacijo i* za ciljno usmerjeno modeliranje AP. Metodologija v prispevku zajema tudi pregled literature ter študijo primera, ki predstavlja modele ArchiMate in i* za ciljno usmerjen razvoj AP na primeru arhitekturnega modeliranja sistema metropole. V prispevku je metropola opredeljena kot konzorcij sodelujočih skupnosti in se obravnava kot poslovna organizacija, za katero je modelirana arhitektura sistema. Prispevek je namenjen razvoju arhitekturnega modela metropole, sestavljenega iz sistemskih komponent, tj. poslovnih tematik, podatkov, programske in strojne opreme. Opišemo modele arhitekture metropole, s čimer želimo podpreti razvoj strategije metropole. Glavne ugotovitve vključujejo identifikacijo poslovnih ciljev in ciljev AP, kartiranje ciljev in specifikacijo ključnih kazalnikov uspešnosti za nadzor doseganja ciljev.

Ključne besede: arhitektura podjeta, ArchiMate, jezik i, metropola, ključni kazalniki uspešnosti*
Klasifikacija JEL: M15, D83, M38
Managing Global Transitions 22 (1): 5–26

Subjekti v državni lasti v kontekstu afriškega nastajajočega trga: vloga podjetniške intenzivnosti in sposobnosti pri uspešnosti

Boris Urban in John Mgwenya

Raziskav podjetništva v javnem sektorju je čedalje več, kar kaže, da je takšno podjetništvo ustrezna pot za organizacije, ki delujejo v okviru režima vladne regulative, npr. v podjetjih v državni lasti (PDL). Naša raziskava je preučevala, v kolikšni meri podjetniška intenzivnost in podjetniške sposobnosti vplivajo na uspešnost PDL-jev, hkrati pa so bili učinki moderatorja zunanjega okolja na ta odnos analizirani s per-

spektive afriškega nastajajočega trga. Primarne podatke smo od v Južni Afriki delujčih PDL-jev pridobili s strukturiranim vprašalnikom. Po preverbi veljavnosti in zanesljivosti raziskovalnega inštrumenta lahko rečemo, da ugotovitve, temelječe na moderatorskih regresijskih analizah, kažejo, da lahko stopnja in pogostost podjetniških dogodkov ter človeških sposobnosti napovesta izboljšano uspešnost. Izvirnost in prispevek pričujoče raziskave se še zlasti kažeta v pripoznanju vloge, ki jo imajo podjetniška intenzivnost in sposobnosti pri izboljšanju javne odzivnosti ter finančne uspešnosti PDL-jev v kontekstu nastajajočega trga.

Ključne besede: podjetništvo, podjetniška intenzivnost, inovacije, sposobnosti, uspešnost, podjetja v državni lasti, Južna Afrika
Klasifikacija JEL: D8, J24
Managing Global Transitions 22 (1): 27–51

Dinamičen vpliv porabe obnovljivih virov na gospodarsko rast v Zimbabveju: pristop ARDL

Sheilla Nyasha

Na podlagi aktivnega vključevanja preučevane države pri zmanjševanju globalnih emisij toplogrednih plinov in pozitivnih korakov, ki jih je država naredila v domačem okolju pri povečanju obnovljive energije v svoji kombinaciji energetskih virov, na eni strani, in na podlagi potrebe po ugotovitvi, ali lahko poraba obnovljive energije pomaga tudi pri oživitvi gospodarstva, na drugi strani pričujoča raziskava empirično preučuje dinamičen učinek porabe obnovljive energije na gospodarsko rast v Zimbabveju. S pomočjo podatkov letnih časovnih vrst od leta 1990 do 2019 in pristopa ARDL rezultati kažejo, da ima v Zimbabveju poraba obnovljive energije pozitiven učinek na gospodarsko rast, tako kratko- kot dolgoročno. Povečanje uporabe obnovljivih virov energije povečuje gospodarsko rast v tej državi. Ti rezultati nakazujejo, da lahko Zimbabve z uporabo ene strategije doseže dva cilja – povečanje porabe obnovljive energije, s čimer se zmanjša negativen vpliv na podnebne spremembe in emisije toplogrednih plinov na okolje in gospodarstvo, ter povečanje gospodarske rasti. Oblikovalcem politik v Zimbabveju se zato priporoča podpiranje povečane uporabe obnovljivih virov energije namesto alternativnih virov energije, kar bi imelo za gospodarstvo pozitivne posledice, tako kratko- kot dolgoročno.

Ključne besede: poraba obnovljive energije, kombinacija energetskih virov, gospodarska rast, Zimbabve, učinek
Klasifikacija JEL: O40, Q40
Managing Global Transitions 22 (1): 53–72

Pritajen vpliv pandemije covida-19 na finančne vzvode turističnega in gostinskega sektorja v Indiji

Bashir Ahmad Joo in Simtiha Ishaq Mir

Pandemija covida-19 je imela na celoten sektor turizma in gostinstva ogromen kaskadni učinek in je povzročila šok povpraševanja, pri čemer ni prizadela le običajnih potnikov, ampak je tudi zmanjšala občasno povpraševanje. Dobra stran teh težkih okoliščin je, da jih je mogoče uporabiti za testiranje odpornosti sektorja. V tem kontekstu pričujoči prispevek analizira tveganje razdolževanja, s katerim se soočajo udeleženci v tej dejavnosti v Indiji, s pomočjo uporabe modela kvalitativnega odziva, »logit«. Raziskava ugotavlja, da je tveganje razdolževanja, s katerim se soočajo udeleženci v sektorju, odvisno od zneska dolga in razmerij finančnega vzvoda tako v obdobju pred pandemijo kot po njej. Vendar pa je bil vpliv drugih finančnih kazalnikov na razdolževanje različen, in sicer v smislu intenzivnosti in dvosmernosti. Še več, med pandemijo covida-19 so bile tendence razdolževanja opažene le pri 204 podjetjih v primerjavi z 242 podjetji pred pandemijo, kar diskreditira prisilno razdolževanje, kot ga predvideva literatura.

Ključne besede: potovanja in gostinstvo, tveganje razdolževanja, dolg, COVID-19, logit
Klasifikacija JEL: H63, L83, I15
Managing Global Transitions 22 (1): 53–93