

Appraisal of the Theoretical, Contextual and Methodological Elements of Operation Research Society for East Africa (ORSEA) Journal Articles (2011-2017)

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Abstract: Indubitably, for operational research journals articles are meant to entail content to do with Operations research models, theories and fields. This provides organisations and companies with best optimization solutions so as to achieve a competitive age among other benefits. This article aimed appraising the content of the ORSEA Journal articles (2011-2017) to deduce the theoretical, philosophical, methodological, and contextual aspects used in operations research. Using a matrix designed specifically for the study, content analysis was applied and utilised in analysing fifty (50) articles. 21 used theories, 14 developed and used models that emanated from theoretical frameworks and 15 articles which had neither theories nor models. 38 articles used quantitative methods, 6 qualitative approach and 6 mixed methods. Findings revealed that the theoretical contributions of the articles in the context of OR in East Africa are questionable; implying that most of the theories derived in other context can be totally adopted in East Africa which is far from the truth. In addition to the above, the over reliance on positivism and deductive approaches dominant in the ORSEA Journal articles can be complimented with more Interpretivism and inductive approaches that might generate mid-range contextual theories and models.

Keywords: Theoretical, Contextual, Methodological Elements, Operations Research (OR), ORSEA

1. Introduction

Operations Research (OR) and Operations Management (OM) as an academic field with practical importance have expanded over the years both in depth of understanding as well as research in different geographical contexts. This expansion has also been felt within the African context, particularly with the launching of the Operations Research Society of East Africa (ORSEA). ORSEA was established as a result of the resolutions of the fourth International Conference on Operations Research Development that was held in South Africa in May 2001 as part of EURO Operations Research Society Africa initiative for the networking of operations researchers within Africa and

between African countries and other parts of the world. The purpose of ORSEA was to foster the development of OR discipline in the Eastern African region for the benefit of its people and in particular for the socio – economic development. The department of Management Science in the School of Business University of Nairobi was allotted the secretariat position coupled with the role of coordinating office of the ORSEA activities. The founder members of ORSEA are Makerere University Business School (Uganda), University of Dar es salaam Business School (Tanzania) and the School of Business- University of Nairobi (Kenya) and each Business School was dispensed the mandate to inaugurate her own country or chapter representative. Relevant school or faculties from neighbouring countries like

Rwanda and Burundi were argued to join ORSEA by the chairman of ORSEA (Professor Isaac. M. Mbeche) on behalf of the board before the end of year, 2010. Although by now, the two countries have not yet formerly joined ORSEA as evidenced from annual conferences held each year, among other sources. ORSEA aims at promoting both theoretical and practical development of Operations Research in the East African region. The Society has three country chapters: Uganda, Tanzania and Kenya with negotiations of Rwanda, Burundi, and South Sudan to join in.

A common cry by operations researcher and operations management researchers has been the proliferation of empirical research that are theoretical [17, 3, 14, 1], too mathematical following quantitative perspectives and lack contextual factors [2]. White, Smith, and Currie [19] indicate, despite the fact that operations research being a discipline that is gaining recognition in the developing countries, Africa inclusive, reviews specifically focusing on the respective continents and countries are missing. Such a trend has provoked the OR discipline to be considered atheoretical one as theories are mainly derived from other disciplines coupled with the studies being deprived of practical contextual issues. As a means of evaluating the publications of the ORSEA, this study aimed at appraising the theoretical, contextual, and methodological contents of the articles in the Journal since 2011- 2017.

2. Literature Review

2.1. Theory in Operation Research /Operation Management Empirical Research

A theory is a coherent description, explanation and representation of observed or experienced phenomenon [6]. Theories are important as they explain facts as well as signifying the operations under the phenomenon under consideration [13]. If theories are important in explaining the reality, then in any reality there can be derived a theory to explain it; such an assertion reflects Van de Ven's [16] notion that a good theory is practical as it explains reality. In fact tying theories to facts should be the ideal situation that informs both scholars and practitioners of OR [5]. Despite theories being considered crucial in elucidating reality, including those in operations research and management, many researches in the discipline are considered barren or devoid of theories [17, 3]. Some of the claimed reasons for empirical research in the field of operations research include the belief that OR is an applied discipline addressing practical issues that should not be "theoretical" [17]. Another propounded reason for the discipline being theoretical, is the newness of the field compared to others that have led it to rely heavily on theories from other disciplines [5]. The newness of the discipline coupled with paucity rather absence of theories was expected to motivate scholars onto theory generation which is still missing in the field.

It is worth mentioning that the common theories that have been used in operations management and operations research

among others entail: game theory, resource base theory, transaction cost theory, queuing theory, contingency theory, theory of constraints, systems theory, social exchange theory, network theory, theory of swift even flow, and broader behavioural theories [17, 7, 11]. These theories appear to emanate from organizational, strategic management, marketing, economics, sociology, and other related disciplines. Despite the common freebies rather claims of OR to be more practical oriented, and thus less concern for theories, as a discipline, it should focus on theories as they serve in organizing the body of knowledge as well as theories themselves offering practical solutions [16]. Albeit the continued debate whether OR should be theoretical or a theoretical and whether it should develop its own theories rather than clinging to theories developed from other disciplines, it is worthwhile to appraise the theoretical inclinations of OR researchers in different context, and in this particular case the ORSEA.

2.2. Contextual Factors in Empirical Study

The context of the research includes the physical and social aspects of the phenomenon being studied [6]; these are important considerations in OR research as both human and non-human factors play a role in management decisions [14]. The disentanglement of these two bifurcated aspects of OR (human and non-human factors) appears to be a common research approach as many researchers opted on researching either of the two aspects which ends the manuscript into either a more natural or social science journal, thus escaping an explicit placement of the research into specific OR Journals.

Apart from the natural verses social science dilemma of OR as contextual factor that need to be considered in research, there is a geographical factor that equally or highly influences the research paradigms used, the research results, and research applications. Kemp and Yousef [9] supported by White *et al.* [18] squarely indicate the historical and geographical contextual factors to have a strong impact on research outputs thus calling for research particularly within OR to undertake studies addressing such factors. Of interest in this study is the developmental context in OR research; conceptually, it is clearly indicated that OR in less developed countries including those in Africa offers different solutions compared to more developed countries [10, 15]. Using Ravn and Vidal's [12] argument for the significant role of OR in supporting development initiatives in less developed countries, it can be assumed that OR in developing countries is much needed to develop such countries compared to the most developed countries that need OR to sustain their development. Thus it is relatable (pertinent) to appraise research in OR like those which have been undertaken in context that differs and/or share common contextual factors like levels of development as a means to garner the research trends.

Despite the presence of many OR studies undertaken to appraise the research trends in different regions particularly in the developing countries [4, 15, 18, 20], to the author's

knowledge none have specifically considered studies in the ORSEA Journal of the Eastern Africa that represent a fast economic and socially growing region in Africa.

3. Methodology

As jotted above, the aim of the study was to appraise the theoretical, contextual, and methodological contents of the ORSEA Journal, it was logical to focus on that single Journal. All the articles both hard and soft copies of the journal from the first issue (2011) to the by then current (2017) were collected. A three phase of review was undertaken as a means of ensuring validity and reliability of the data. The first round of review involved 10 review panellists who were either pursuing PhD in operations management or instructors in operations management. The first meeting of the all panellists involved discussions on the main research objectives as well as clarifying the methods to be used in the content analysis procedures to be used in the article appraisal. During the discussion, a matrix was developed with several columns capturing the main issues considered in the content analysis while the rows captured the specific articles. The task of appraising the articles was equally distributed among the panellists. Upon populating the matrix, the second round of appraisal involving three panellists (the authors of this paper) was undertaken where the panellists spent time to cross check the analysed contents of the articles done in the first round; this phase served in ensuring content validity. The discrepancies and tallies between the evaluation of the contents from the first and second round were noted by each of the three panellists in the second round that were thereafter discussed among the three authors to iron out the differences; this was under the third phase of the analysis.

The filled data matrix was used to perform descriptive quantitative analysis with frequencies for theoretical, methodological, and contextual articles being calculated. For the theoretical articles, the main theories and/or models used were indicated to appraise which theories or models are dominant in the journal. The research context was coded and counted depending on the geographical context and the sector or industry focus of the study. Furthermore, the quantified data were transposed to Microsoft Excel and later onto SPSS 20.0 in order to determine the trends and performance of Chi-square tests respectively.

4. Results and Discussions

The results as depicted in Table 1 indicates 48% of the articles in the ORSEA journal to be atheoretical while 26% to have a guiding model and the remaining to be theory based studies. The over dominance of quantitative methods is attested by the 76% of the studies being quantitative. More than 1/3 of the studies (34%) were done in Uganda while only 6% were geared towards comparing all or some of the East African countries on aspects related to OR or broader business or management issues. Substantial number of the

articles (48%) focused on service industries and 32% of the studies focused on government/public sectors while manufacturing and agricultural related studies accounted for 10% each in the studied sample. Though it was challenging to place the studies either into OR issues, it was resorted to use the generic topics under OR (ICT, resource planning, efficient, efficiency, and optimization) as well as the specific areas defined by ORSEA (programming, simulation, statistics, inventory analysis, decision making, game theory, networking, and application) that amounted to 44% of the studies. The Chi-square result (Table 1) indicates country, methods, and sectors to have statistical significant differences.

Table 1. Descriptive data for theoretical, methodological, and contextual contents.

Component	Sub-component	Frequency	%	Chi-square
Theoretical	Theoretical	24	48	4.840
	Atheoretical	13	26	
	Model based	13	26	
Methodology	Quantitative	38	76	41.080**
	Qualitative	5	10	
	Mixed methods	7	14	
Geographical context	Kenya	14	28	15.400**
	Tanzania	12	24	
	Uganda	17	34	
	East Africa	3	6	
	Others	4	8	
Sector/industry	Manufacturing	5	10	20.560**
	Service (Financial)	24 (11)	48	
	Agriculture	5	10	
	Government/public	16	32	
Related to OR	Yes	22	44	.720**
	No	28	52	

5. Conclusions and Implications

The study reported in this paper aimed at appraising the contents of the ORSEA Journal articles with respect to the theoretical, methodological, and contextual elements. The results indicate the dominance of theoretical and quantitative approaches in the articles that tended to focused on a single country in the region particularly focusing on the service sector. Among the studies, just below 50% (48%) of the studies can be said to be fully related to OR issues. Compared to previous studies that indicated the dominance of atheoretical stance in OR e.g. [17], findings from the current study indicates the prevalence of use of theories prior to data collection in guiding the studies. If model base studies are considered as theoretical as model are theories in making [8], the even further evidence points to the direction of studies in the ORSEA journal to be more theory based. Such a finding implies researchers in the East Africa, at least those who publish in the ORSEA journal to follow the positivism research paradigm relying on priori theories to inform their studies. Coupled with 24% of the articles making use of qualitative or mixed methods which are more of posterior and contextual studies, then the research endeavours in the region might imply that most research are theory testing rather than theory building.

The slightly dominance of articles placed under the category of non-related OR issues (52%) instead of really indicating issues related to OR, might reflect the interdisciplinary nature of OR [1]. Some of the issues that were categorized as non OR related include marketing communication, customer satisfaction, and micro-financing, which under the broader lens of the input-process-output process model which underlines most OR issues [3], then even these that are considered as non OR might qualify as OR issues. Nevertheless, in order to ensure OR factors more of the context validity [18] as well as growing as a strong discipline with own grown theories [14], then the field including its dispersed societies should dedicate research towards theory building specifically within the wall of OR.

Compared to findings obtained by Smith [15] in a similar African context, particularly West Africa that observed the dominance of agriculture as a context in OR research, the current study noted service to dominate the research contours of OR in East Africa. Despite most of the East African countries having a strong dominant agricultural based economy, the sector does not dominate the research landscape. A possible reason for this trend could be the economic changes in the region with the markets still evolving into free markets with services being embraced by both the public and private sector as a means towards a much liberalized market economy.

The fact that few (6%) of the ORSEA journal articles have compared at least two countries in the region implies that the journal and the society at large is facing a challenge in attaining their vision and mission of being an outlet and a body respectively to enhance OR in the region and for the region. The dominance of studies focusing on individual countries in the region do not offer much regional

comparative views that could serve in escalating and homogenising OR issues in the region and for the region. Thus, this study recommends the society to encourage more comparative studies in the region.

As speculated in the ORSEA journal scope with issues related to programming, simulation, statistics, inventory analysis, decision making, game theory, networking, and application to be the main concern, it is recommended the Society to opt for more generic elements that are focusing on the regional OR issues related to the generic OR model of Inputs-Process-Outputs. This will assist in disentangling techniques from the core OR issues in the region.

Like any other study, this study was limited in several ways that need to be acknowledge and thus cautioning generalization and misinterpretations of the findings as well as shedding light on future research areas. First, the study was limited to the East African countries and particularly those researches that are published in the ORSEA journal. As there is the possibility of researchers in the region to publish elsewhere, there might be articles focusing on the region that have been published in the other journal. Despite ORSEA being the main study focus, the results provide hints on what the Society should do to further propel their objectives. The use of document analysis prevented the study to appraise what the researchers are researching on within OR as well as being unable to capture their motives in researching or not researching in OR, the theories they use, the methods, and the context they research on. Nevertheless, the study finding provide a spring board for future research to consider these limitations of using documentary analysis; future studies can undertake survey based studies to capture the missed information in the study.

Appendix

Table 2. Envisaging Appraisal of ORSEA Journal, 2011 to 2017 (Partly shown).

Vol	Title	Context	Methodology	OR related?	Theories	Industry/sector	Remarks
1,1, 2011	Simulated annealing algorithm for the resource leveling problem	Tz	Exploratory (the use of simulated annealing)	Yes, optimization of Resources.	None. Purely mathematical modeling.	Manufacturing	The article is more of production management which reflects the I-P-O generic model of OR.
	An empirical investigation of students' satisfaction: evidences from makerere unive. Business school	Uganda	Causal	No, it is more of marketing.	No explicit theories, mere Model testing	Education	There is no theoretical contribution as there are no prior theories stated.
	Determinants of moral hazard in MF: empirical evidence from joint liability lending schemes in pride MF Ltd.	Mfis Uganda	Causal	No, more of Financing	Model, there is no explicit theories	SMEs lending	The theoretical contribution is limited as there are no theories used.
	The linear goal programming formulation of the food security planning problem in Tz a least income food deficiency DC	Tanzania	Quantitative	Yes, mathematical modeling	Models only	Food security but not production	No theoretical contribution.
	System dynamics model to assess the risk of mosquito-borne diseases and to evaluate control policies	Italy	?????	No, more of medicine/public health	Scenario based model	Public health	No theoretical contribution
	Critical success factors of industrial and commercial projects in Kenya	Kenya	Mixed methods	Yes, project management	No theories, even the literature review is scant	Construction projects	No theories used. Mere description and relationship testing.

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