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## **WEB VISIBILITY OF CO-OPERATIVE RESEARCH IN TANZANIA: A CASE OF MOSHI CO-OPERATIVE UNIVERSITY**

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### **ABSTRACT**

*This study was carried out to map the web visibility of co-operative research in Tanzania for the period between 2004 and 2020. Visibility was measured by determining the distribution of publications by type, growth pattern of publications, collaborative patterns among researchers, distribution of publications by subjects and the scholarly impact of scholars. Publish or Perish program was employed to collect data for 193 scholars. Data were compiled, sorted and analysed using MS Excel. A total of 438 publications were recorded with 74% of these being journal articles. The recorded mean Relative Growth Rate (RGR) and Doubling Time (Dt) were 1.71 and 0.41 respectively. Most (74.67%) publications were multiple-authored with 32.88% of these being jointly contributed by two authors. The degree of collaboration was as high as 0.75. The maximum number of citations received in a single publication was 84. The findings show nearly similar distribution of publications on socio-economic impact of co-operatives (9.13%), agricultural co-operatives (8.68%), gender and co-operatives (7.99%) as well as agricultural production (7.99%). Generally, there was a gradual growth of publications in the field of co-operative. The level of collaboration among scholars was generally low with most publications shared by two or three authors. Although scholars showed variation in their productivity and impact, the average performance metrics were generally low. Similarly, citation counts for individual publications were generally minimal. Recommendations are made based on the study findings.*

**Keywords:** web visibility, cooperative, research, Moshi Co-operative University, Tanzania

### **1.0 INTRODUCTION**

Co-operative research remains one of the most important support services to co-operative development worldwide. Research that publishes positive and negative co-operative practices including how to improve the efficiency of co-operatives, extending benefits to society, and improving partnership among co-operatives and between the co-operative movement and other organisations forms a basis for co-operative development (UN, 2003). Publishing co-operative research for the purpose of increasing its visibility allows co-operative researchers and other stakeholders to view and share co-operative research information for policy formulation, decision-making and other co-operative development activities. This is essential because publishing research outputs is an integral part of any research process and that any research is incomplete unless published. Apart from spreading and disseminating scientific findings, researchers are also obliged to publish their works in order to protect their intellectual properties, gain fame and justify their existence as researchers.

Assessment of the amount of research (i.e. research productivity) in a particular discipline is an essential step to understand the strength of research activities, identify priority areas and uncover those areas that are less researched. Usually, indicators of research productivity are the number of publications produced in a given time period and citation counts i.e. how many times the publications are cited by other authors or a combination of several indicators (Aksnes *et al.*, 2019). In recent years, visibility has become an



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important aspect in the evaluation of research productivity. Research visibility defines the level of dissemination and accessibility of research output. It shows that research outputs can be discovered because they are traceable through abstracting and indexing databases, library collections and through web-based publishing (Abrahams *et al.*, 2010). The latter is particularly important because of the current spectacular developments in the web technology.

Just like research productivity, visibility can be measured through bibliometrics. This is an application of mathematical and statistical methods for the systematic analysis of books, articles and other types of publications. The word bibliometrics comes from the Greek words “biblion” which means a book and “metrikos” which means measurement (Pritchard, 1969). Data sources for measuring research productivity in order to determine the web visibility include databases of the Web of Science, Scopus and the Publish or Perish (PoP). The PoP program uses Google Scholar to obtain the number of publications and sources which cite them. Google Scholar has the advantage that it allows for the inclusion of the author’s entire body of published work rather than a selected list of publications (Harzing, 2008). PoP produces descriptive statistics for individual authors including the total number of papers, total number of citations, years since first publication, average number of citations per year, total citations per paper, total citations per author and total papers per author. PoP also calculates several indices including the h-index, g-index, Hc-index and HI-norm index. According to Martín-Martín *et al.* (2018), PoP retrieves more publications and citations compared to Web of Science and Scopus. Table 1 summarizes some of the PoP metrics.

**Table 1: PoP Citation Metrics**

<b>Metrics</b>	<b>Explanation</b>
Total number of papers	This is the most basic indicator that measures the productivity of a scholar. It does not measure importance nor impact of publications.
Total number of citations	This measures the total impact of the publications.
Cites per paper	Calculated by dividing the total number of citations by that of papers. It measures the average number of citations a paper receives.
Cites per year	Calculated by dividing the total number of citations by the total number of years the author has published. This assesses the yearly impact of an author.
Cites per author	Calculated by dividing the citation counts for each paper by the number of authors for that paper. It gives a good picture of author’s individual impact.
h-index	An author has index h if h of his/her N papers have at least h citations each. It aims to measure the cumulative impact of a researcher’s output.
g-index	If a set of articles is arranged in a decreasing order of their citations counts, the g-index is the largest number such that the top g-articles received at least $g^2$ citations. Improves the h-index by giving more weight to highly-cited articles.
Hc-index	Adds an age-related weighting to each cited article, giving less weight to older articles. It improves on the h-index by giving more weight to recent articles, thus rewarding those who maintain a steady level of activity.
HI-norm	Calculated by normalising the number of citations to each article by dividing the number of citations received by an article with the number of authors of the article. It adjusts the citation totals for multiple-authorship.

Source: Hirsch (2005); Egghe (2006); Sidiropoulos *et al.*, (2006); Harzing and Wal (2008)

Notwithstanding the growing use of bibliometric studies to map research productivity around the globe, such studies are still few in Tanzania. The few available bibliometric studies in the country include those on traditional medicine (Lwoga and Sife, 2013), library science (Sife and Lwoga, 2014), forestry (Sife *et al.*, 2013), veterinary science (Sife and Kipanyula, 2016) and pharmacy (Lwoga *et al.*, 2017). In the



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discipline of co-operatives, research has been conducted over years mainly on co-operative development (e.g. Nindi, 1977; Hyden, 1974; Rwekaza and Muhihi, 2016), the role of co-operatives in development and poverty reduction (e.g. Mporogomyi, 1988; Sizya, 2001; Sumelius *et al.*, 2013), SACCOS (e.g. Kashuliza, 1992; Chambo, 2004; Magali, 2013; Qin and Ndiege, 2013; Ndiege *et al.*, 2016), accounts of co-operatives (e.g. Westergaard, 1974) as well as problems facing the co-operative sector (e.g. Mapunda, 1996; Nditi, 1990). No bibliometric studies have been conducted in the country to show the status of co-operative research.

Being the only co-operative university in the country, MoCU has been producing many publications through its various academic units mainly the Faculty of Co-operative and Community Development, Faculty of Business and Information Sciences, Institute of Continuing Co-operative Education, Directorate of Co-operative Library and Archives and the Kizumbi Institute of Co-operative and Business Education. Research is also conducted by students especially those at postgraduate levels. However, as alluded to earlier, no mapping has been conducted to establish the level of research visibility on the discipline of co-operative. This study therefore determined the web visibility of co-operative research produced at MoCU between the year 2004 (when the then Co-operative College Moshi became a university college) and the year 2020. For the purpose of this study, most scholarly publications produced by MoCU staff are regarded as having co-operative nature. Specifically, this study was conducted to determine the web visibility in terms of the distribution of publications by type; the growth pattern of scholarly publications; collaborative patterns among researchers; the distribution of publications by subjects; and the productivity and scholarly impact of scholars in the field of co-operatives.

Understanding the web visibility of co-operative research in Tanzania helps to establish strategies for improving the productivity and impact of research in this field. The results also aid to identify research gaps that co-operative studies could focus on in future. The findings can also inform decisions on research policies, priority research areas, training needs and resource allocations in this discipline. This study also contributes to the scarce literature on bibliometric studies in Tanzania.

## **2.0 MEANING AND HISTORY OF CO-OPERATIVES**

Co-operatives are autonomous associations of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through jointly-owned and democratically-controlled enterprises. Co-operatives have a dual nature - as business organisations and as social movement because they strive for the economic and social advancements of their members. Different types of co-operatives operate in various sectors of the global economy and members engage in co-operative businesses as service users, producers, independent business owners, consumers and workers. Co-operatives operate according to seven core principles namely; voluntary and open membership; democratic member control; member economic participation; autonomy and independence; education, training, and information; co-operation among co-operatives; and concern for community (ICA, 1966; ICA, 1995).

For many years, co-operatives have been an effective way of improving the living and working conditions of people through control over their economic livelihoods. They provide mechanisms for marketing agricultural and other produce, help the poor to save and obtain credits and enable creation of jobs and payment of local taxes. They increase the bargaining power of their members providing them, among others benefits, higher income and social protection. Co-operatives are also being considered useful



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mechanisms to manage risk for members and keep markets efficient. Co-operative businesses stabilise communities because they are community-based business anchors; and distribute, recycle, and multiply local expertise and capital within a community (Henehan, 1997; Gibson, 2005). Generally, co-operatives provide an economic boost to the community.

Although the concept of co-operation is as old as the history of mankind, modern co-operatives as form of business organisation originated in England among the industrial workers in 1844. In Tanzania, the history of co-operatives dates back to 1925 when the Kilimanjaro Native Planters Association was formed. The first Co-operative legislation was passed in 1932 when the Co-operatives Ordinance (Cap. 211) was enacted. The colonial administration promoted the establishment of agricultural-based co-operatives for the purpose of obtaining agricultural raw material to feed the metropolitan industries. After independence in 1961, co-operatives were regarded as a driving tool for development as well as implementation of socialism and self-reliance. The Co-operative Bank of Tanganyika was launched in 1962 and was replaced by the National Co-operative Bank (NCB) in 1964. By 1968, Tanganyika had the largest co-operative movement in Africa and the third largest in the world in terms of percentage of the market share of agricultural exports. Unfortunately, co-operative unions were banned in 1975 and all primary co-operatives were abolished in 1976. Their crop marketing functions were taken over by communal villages and parastatal crop authorities. On the other hand, Savings and Credit Co-operative Societies (SACCOS) were introduced in Tanzania in the 1960s by the catholic priest Cardinal Laurean Rugambwa who borrowed the idea from USA when attending pastoral studies. SACCOS have grown rapidly since the 1980s and they have generally remained more stable than crop marketing co-operatives (Coulson, 1981; Mruma, 2014; Seimu, 2015).

Crops Marketing Co-operatives were reintroduced in 1982 but they generally performed poorly. In 2000, a Presidential Committee was formed to look into the constraining factors and advise the government accordingly. Among other things, the Committee recommended the formulation of a co-operative development policy and a new Co-operative Societies Act. Consequently, the Co-operative Societies Act was enacted in 2003. In the same year, a Declaration Order was signed by the President of the United Republic of Tanzania to transform the then Co-operative College Moshi into the Moshi University College of Co-operatives and Business Studies (MUCCoBS). This was later in 2014 transformed into a full-fledged university (i.e. Moshi Co-operative University – MoCU) (Mporogomyi, 1988).

Since its inception, MoCU (then Co-operative College Moshi and MUCCoBS) has been active in undertaking teaching, research and consultancy services. Previously in 1970s, the Co-operative College Moshi established a department to regulate and coordinate researches for both students and staff. Multiple research projects were undertaken covering areas of management in co-operatives, marketing, and related areas. Under MUCCoBS, all research undertakings were carried out under the regulation and coordination of the Directorate of Research and Consultancy Services. Currently, research activities are coordinated by the Directorate of Research and Postgraduate Studies. As for many other fields, research in co-operatives is important because it adds to existing knowledge about co-operatives, improves co-operative practice and business, informs policy debates and decision making, leads to new types of co-operatives and innovative services and it provides solutions to problems hindering co-operative development.



### **3.0 METHODS**

This study employed bibliometrics method, which is a quantitative technique for studying the structure and process of scholarly communication. Bibliometrics is concerned with the growth, structure, interrelationship and productivity of scientific disciplines (Hood and Wilson 2001). According to Pritchard (1969), bibliometric deal with the application of mathematical and statistical methods to analyse quantitative and qualitative aspects of publications. It is used to analyse research or publication productivity of individuals, institutions or disciplines, describing collaboration patterns, determining the impact of specific authors or publications and in discovering research anomalies.

The population of this study was all researchers at MoCU (and the then MUCCoBS) for the period between 2004 and 2020. This means apart from members of academic staff (researchers) currently available at MoCU, efforts were made to obtain the names of academic members of staff who worked with MoCU (and the then MUCCoBS) for different periods between 2004 and 2020 but had left for various reasons. In total there were 246 academic staff who worked at MoCU between 2004 and 2020. However, 53 names were removed from the list for various reasons. First, 51 names of tutorial assistants were removed because they are not expected to publish scholarly articles at this level. Second, two names of associate professors were removed from the list because they joined the University in the last three years and majority of their publications were obtained prior to joining MoCU. The remaining population therefore had 193 names of academic staff. Since the aim of this study was to obtain a complete picture of publications that are visible online, no sampling was done. The whole study population was involved in the study.

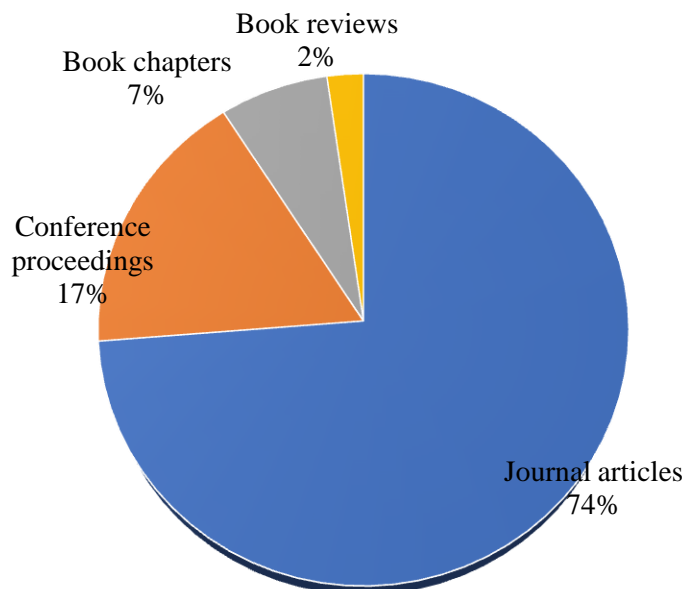
Data retrieval for all 193 researchers was conducted between 1<sup>st</sup> and 5<sup>th</sup> September 2020 using the PoP program. In this kind of research, retrieval of online publications must be done in a short period of time because citations keep on accumulating rapidly. As pointed out earlier, this study retrieved data on publications and citations that were publicly available on the web; meaning that, those publications and citations which were not available on the web could not be retrieved. PoP was used because it retrieves data through Google Scholar which has broader coverage than other databases such as Scopus (Harzing, 2013). A search strategy was developed that includes all authors' names and their possible variants. Each name of individual author (i.e. a name of academic member of staff) was entered into PoP to retrieve his/her publications and associated individual statistics. Search results were carefully refined to ensure that only works of intended persons are captured and duplicates are removed. Publications from homonym authors were identified and removed. In this study, the types of publications considered were journal articles, books, book chapters, conference papers and book reviews. For each scholar, the retrieved statistics were the total number of publications, total citation counts, average citations per paper, and average citations per year, h-index, g-index and the HI-norm. The retrieved data were compiled, sorted and descriptively analysed using MS Excel. Data were sorted by years of publications in order to obtain the year-wise distribution. The limitation of this study is that it focused on publications and citations that were available online. Considering that some senior scholars had previously published their articles in print journals or their articles are cited in print publications, it means that such publications were not retrieved.



#### 4.0 FINDINGS AND DISCUSSIONS

##### 4.1 Types of Publications in Co-operative Research

A total of 438 publications were retrieved covering the period between 2004 and September 2020. Nearly three quarters (323; 74%) of these publications were journal articles followed at a distant by conference proceedings (74; 17%) (Fig. 1). This number of publications is based on the “normal counting method” whereby each author receives a full count for joint publications. According to Egghe (1993), three methods of counting the number of publications are the “total or normal counting method” that involves assigning every author a weight for each of the publications; the “straight counting” in which only the first author is assigned a weight for each publication; and the “fractional counting” in which every author is assigned a weight  $1/n$  in an  $n$ -authored paper. Journal articles comprise the great majority of publications because peer reviewed journals are the major communication channels for research findings. These 438 publications which were visible online were either published in online journals (e-journals) or they were retrieved as bibliographic information of print publications cited by online publications. The average number of publications per year was 26 with the year 2014 being the most (71; 16.2%) productive (Table 2).



**Figure 1: Types of publications retrieved**

##### 4.2 Growth Pattern of Publications in Co-operative Research

The growth of publications was analysed on the basis of the Relative Growth Rate (RGR). This analysis was done using the formula  $RGR = (\ln N_2 - \ln N_1) / (t_2 - t_1)$  where  $N_2$  and  $N_1$  are the cumulative number of publications in the years  $t_2$  and  $t_1$ . RGR is the increase in the number of publications per unit of time (Mahapatra, 1994). The findings indicate that RGR had increased from 0.00 (2004) to 2.42(2020) with some fluctuations in the years in-between. The mean RGR for the block periods of five years increased



from 1.32 (2004 – 2008) to 2.28 (2019 - 2020). Doubling Time (Dt) which is the period of time required for publications to double was calculated using the formula  $Dt = 0.693/RGR$ . Dt is related to RGR in that if the number of articles double then the difference between the logarithms of numbers at the beginning and end of that period is 693 (Mahapatra, 1994). In this study, Dt decreased from 0.57 (2005) to 0.29 (2020) with some fluctuations in-between. Likewise, the mean Dt for the block periods of five years decreased from 0.41 (2004 – 2008) to 0.31 (2019 - 2020). The whole study period recorded the mean RGR and Dt of 1.71 and 0.41 respectively (Table 2). Generally, these findings indicate that the publication productivity at MoCU had increased gradually over the period of 17 years. This increase may be attributed to many factors including increased number of researchers as the institution grows as well as increased visibility of publications following developments in the web technology.

**Table 2: Publications Productivity of Co-operative Research**

Year	No of publications	Cumulative publications	$\ln N_1$	$\ln N_2$	RGR	Mean RGR	Dt	Mean Dt
2004	12	12	2.48	2.48	0.00	1.32	0.00	0.41
2005	5	17	1.61	2.83	1.22		0.57	
2006	13	30	2.56	3.40	0.84		0.83	
2007	8	38	2.08	3.64	1.56		0.44	
2008	2	40	0.69	3.69	3.00		0.23	
2009	17	57	2.83	4.04	1.21	1.53	0.57	0.47
2010	13	70	2.56	4.25	1.69		0.41	
2011	14	84	2.64	4.43	1.79		0.39	
2012	19	103	2.94	4.63	1.69		0.41	
2013	40	143	3.69	4.96	1.27		0.55	
2014	71	214	4.26	5.37	1.11	2.03	0.62	0.38
2015	42	256	3.74	5.55	1.81		0.38	
2016	31	287	3.43	5.66	2.23		0.31	
2017	14	301	2.63	5.71	3.08		0.23	
2018	51	352	3.93	5.86	1.93		0.36	
2019	47	399	3.85	5.99	2.14	2.28	0.32	0.31
2020	39	438	3.66	6.08	2.42		0.29	
<b>Total</b>	<b>438</b>				<b>1.71</b>		<b>0.41</b>	

### 4.3 Collaboration Patterns among Co-operative Scholars

The study findings show a domination of multiple authorships (327; 74.67%) in co-operative research at MoCU. Nearly one third (144; 32.88%) of the publications was jointly contributed by two authors followed by those contributed by three authors (120; 27.40%). A quarter (111; 25.34%) of the publications had single authorship. Generally, 85.62% of the publication had a maximum of three authors (Table 3). This shows that the ratio of team work to that of sole work was 2.9:1. The average degree of collaboration computed as the ratio of collaborative publications (i.e. publications with multiple authors) to the total number of publications (Subramanyan, 1983) was 0.75. However, the year 2006 recorded a maximum collaboration coefficient of 0.92. These findings indicate a relatively low level of collaboration in co-operative research. Nevertheless, this collaborative pattern is normal in social sciences as reported in previous studies (e.g. Onyancha, 2007; Ocholla *et al.*, 2012; Lwoga and Sife, 2014). In natural sciences, similar studies have recorded even higher collaboration patterns (Al-Qallaf, 2009; Anwar, 2006; Fu *et al.*, 2012). Collaboration in research is necessary because it enables researchers to share skills and techniques, bring about cross-fertilization of ideas and plugging researchers into a wider scientific network (Katz and Martin, 1997).



**Table 3: Collaboration Patterns among Co-operative Scholars**

Year	Number of publications by number of authors						Total	Collaboration coefficient
	Single author	Two authors	Three authors	Four authors	Five authors	Six or more authors		
2004	8	4	0	0	0	0	12	0.33
2005	1	2	1	0	1	0	5	0.80
2006	1	6	6	0	0	0	13	0.92
2007	3	0	0	0	1	4	8	0.63
2008	1	0	1	0	0	0	2	0.50
2009	9	5	1	2	0	0	17	0.47
2010	3	6	2	2	0	0	13	0.77
2011	3	8	3	0	0	0	14	0.79
2012	1	11	3	2	1	1	19	0.95
2013	10	8	12	5	3	2	40	0.75
2014	15	15	26	9	3	3	71	0.79
2015	14	14	12	1	1	0	42	0.67
2016	5	14	5	4	2	1	31	0.84
2017	5	6	1	1	0	1	14	0.64
2018	18	18	12	2	1	0	51	0.65
2019	8	13	21	5	0	0	47	0.83
2020	6	14	14	5	0	0	39	0.85
<b>Total</b>	<b>111</b>	<b>144</b>	<b>120</b>	<b>38</b>	<b>13</b>	<b>12</b>	<b>438</b>	<b>0.75</b>
<b>Percent</b>	<b>25.34</b>	<b>32.88</b>	<b>27.40</b>	<b>8.68</b>	<b>2.97</b>	<b>2.74</b>	<b>100</b>	

#### 4.4 Productivity and Scholarly Impact of Scholars

The study findings in Table 4 indicate various performance metrics of scholars whose 10 or more publications were visible online (These are ranked according to the number of publications). These had together contributed over one third (164; 37.4%) of all publications giving an average of 16 publications per scholar. These findings support the Lotka's (1926) Law of scientific work that many authors tend to publish relatively small number of articles, with the large proportion of publications being made by few individuals. These 10 scholars also showed variation in their productivity and impact since no single scholar maintained the same rank in all metrics. For instance, the most prolific author (25 publications) had ranked the third in terms of number of citation (94 citations), second in yearly impact (11.75 cites per year) and fifth in cites per paper (3.03 cites per paper). He also had the third highest h-index (5) as well as second highest g-index (8) and HI-norm index (3). The fourth ranked author in terms of the number of publications (19 publications) had the highest number of citations (229 citations), highest yearly impact (15.27 citations per year), citations per paper (14.31 cites per paper) as well as h-index (7), g-index (15) and HI-norm index (6). It can therefore be argued that research productivity and impact cannot easily be determined using a single indicator. The average performance metrics shown in Table 4 are generally low when compared to similar studies conducted elsewhere. This might be because MoCU is a relatively young university as pointed out earlier. It should be emphasised again that ranking of researchers in this study was based on publications and citations that were available online covering the period of 2004 - 2020. It is possible that some senior scholars could rank differently if their work was evaluated based on their carrier life or if their offline scholarly works were obtained.





**Table 4: Productivity and scholarly impact of individual scholars**

Author	No. of publications	No. of citations	Cites/year	Cites/paper	H-index	G-index	HI-norm
1	25	94	11.75	3.03	5	8	3
2	22	86	7.82	3.44	5	8	4
3	21	174	10.88	8.29	5	12	5
4	19	229	15.27	14.31	7	15	6
5	19	63	10.50	3.32	5	7	3
6	16	65	4.64	4.64	4	7	4
7	12	27	2.45	2.08	3	4	2
8	10	27	3.38	2.7	3	5	3
9	10	81	11.57	9.00	6	9	3
10	10	24	3.00	2.18	3	4	2
<b>Average</b>	<b>16.4</b>	<b>87</b>	<b>8.126</b>	<b>5.299</b>	<b>4.6</b>	<b>7.9</b>	<b>3.5</b>

#### 4.5 Highly Cited Publications

The top four most cited publications from MoCU had received an average of 55.5 citations each. The top cited paper was “Agricultural co-operatives: Role in food security and rural development authored by S. A. Chambo. This article was published in 2009 and receives 7.6 citations/year. An article titled “Determinants of rural youth’s participation in agricultural activities: the case of Kahe East ward in Moshi rural district, Tanzania” which is jointly co-authored by P. J. Kimaro and N. N. Towo receives the highest citations/year (i.e. 8.2 citations/year) (Table 5). Generally, these citation counts for individual publications are low compared to similar studies elsewhere. It was observed that four of these top five papers are having multiple authors supporting the fact that citation counts of publications depend on many factors including the number of authors, accessibility of journals where articles are published, the age of the publication, the quality of the publication, the size of the scientific community and the topic which ones publishes (Bornmann and Daniel, 2008).

**Table 5: Highly cited publications**

Title of article	Citations	Cites/year
Chambo, S. A. (2009). Agricultural co-operatives: Role in food security and rural development. <i>Presented to Expert Group Meeting on Co-operatives on 28th to 30th April 2009.</i>	84	7.6
Kimaro, P. J. and Towo, N. N. (2015). Determinants of rural youth’s participation in agricultural activities: the case of Kahe East ward in Moshi rural district, Tanzania. <i>International Journal of Economics, Commerce and Management</i> , 3(2), 33.	41	8.2
Magigi, W. and Majani, B. B. K. (2006). Community involvement in land regularization for informal settlements in Tanzania: A strategy for enhancing security of tenure in residential neighborhoods. <i>Habitat international</i> , 30(4), 1066-1081.	58	4.1
Schmidt, S., Magigi, W. and Godfrey, B. (2015). The organization of urban agriculture: Farmer associations and urbanization in Tanzania. <i>Cities</i> , 42, 153-159.	39	7.8

#### 4.6 Subject-wise Distribution of Publications

The subject-wise breakup of 438 publications based on broad subject categories show nearly similar distribution of research on socio-economic impact of co-operatives (9.13%), agricultural co-operatives (8.68%), gender and co-operatives (7.99%) as well as agricultural production (7.99%) (Table 6). The “other” subject category comprised 14.16% of all publications. Generally, most publications were on sub-fields within co-operatives indicating that the University has not gone out of its core field in research.



**Table 6: Subject-wise Distribution of Publications**

<b>Subject</b>	<b>No of articles</b>	<b>Percentages</b>
Agricultural co-operatives	38	8.68
Savings and Credit Co-operative Society	26	5.94
Socio-economic impact of co-operatives	40	9.13
Co-operative education	15	3.42
Co-operative development	23	5.25
Co-operative governance	26	5.94
Entrepreneurship	22	5.02
Microfinance/financial services	34	7.76
Insurance	6	1.37
Gender and co-operatives	35	7.99
Agricultural production	35	7.99
Self-help groups	15	3.42
Information and communication technology applications	20	4.57
Small and medium enterprises	21	4.79
Procurement procedures	20	4.57
Others	62	14.16
<b>Total</b>	<b>438</b>	<b>100</b>

## 5.0 CONCLUSION AND RECOMMENDATIONS

This study was carried out to map the online visibility of co-operative research in Tanzania for the period between 2004 and 2020, taking the Moshi Co-operative University (MoCU) as a case study. The study findings indicate that a total of 438 publications were visible online either as published articles or as bibliographic information of print publications cited by online articles. There was a gradual growth of publications in the field of co-operative since 2004 with journal articles being the most dominant type of publications. The average number of publications per year was 26 with the year 2018 being the most productive. Although most publications had multiple authors, the level of collaboration among scholars was generally low with most publications shared by two or three authors. Scholars showed variation in their productivity and impact since no single scholar maintained the same rank in all metrics and the average performance metrics were generally low. Similarly, citation counts for individual publications were generally low. The findings show nearly similar distribution of research on various subject categories in the field of co-operative.

Based on the study findings, it is recommended that the University should enhance the capacity of her members of academic staff in terms of writing and conducting research as well as writing and publishing scholarly publications particularly in the co-operative related subfields. Scholars should be trained and sensitized to publish their papers in journals that can be accessed easily in order to increase the impact of their researches. These include online journals particularly those following the open access model. Since there is a relatively low level of collaboration among scholars, it is important to consider policies that give each author a full credit for each publication irrespective of their position in the by-line. The University should also consider various metrics when evaluating the research productivity of individuals instead of the number of publications alone.



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