Open Access Library Journal
2025, Volume 12, e13834
ISSN Online: 2333-9721
ISSN Print: 2333-9705

The Role of Market Efficiency on Spices Production: A Systematic Literature Review

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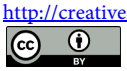
How to cite this paper: Kwesigabo, E., Mohamed, S. and Sassi, A. (2025) The Role of Market Efficiency on Spices Production: A Systematic Literature Review. *Open Access Library Journal*, **12**: e13834.
https://doi.org/10.4236/oalib.1113834

Received: June 25, 2025
Accepted: July 25, 2025
Published: July 28, 2025



Abstract

The objective guiding this systematic literature review was to assess the role of market efficiency in spices production. The study reviewed 44 international publications from ScienceDirect published from 2010 to 2023 that address the effect of access to market information on spices production, guided by PRISMA-2020 framework. Results from this systematic review suggest that market efficiency has a substantial influence on spice production; access to perfect market information has a significant and positive influence on spice production in majority of smallholder farmers. However, the impact of access to market information has varying magnitude among producers depending on geographical location; in this regard, various types of producers require different consideration with respect to this parameter. We therefore recommended dedicated support from relevant authorities to create a conducive infrastructure to enhance rapid access to market information by smallholder farmers.

Subject Areas

Economics

Keywords

Market Efficiency, Market Information, Spices, Production, Smallholder Farmers

1. Introduction

The global market share for spices is expected to grow from about 79 billion United States dollars ($) in 2022 to reach beyond $126 billion by the end of 2030 [1]-[3].

Other similar report shows that the global spices market was valued at $7.896 billion in 2019, and is expected to grow at a Compound Annual Growth Rate (CAGR) ranging from 3% to 4.62% between 2020 and 2025, reaching a value of $9.511 billion [4].

A market is said to be efficient when every participant has instant access to information, and does what is good according to his/her personal choices; on the other hand, it is a market with transparency and rapid dissemination of information [5]. [6] and [7] reported that an efficient market leads to transparent and fair price discovery of commodity markets, thus enhancing production competitiveness. Scholars such as [8] and [9] also recommended that research in spice market efficiency is crucial to promote increased production effects since an efficient market increases market prices by lowering marketing costs leading to market expansion.

Likewise, [10] revealed that limited access to market information negatively influences spices production in majority of farmers; however, other scholars declared that there is a positive correlation between access to market information and higher spice yield [11]. Previous studies suggest that limited access to market information, lack of clear marketing systems and channels have been associated with declining production, limiting farmers to acquire significant inputs for production [12] [13]. [14] and [15] made similar suggestions, highlighting that smallholder spice farmers face significant market challenges due to limited access to timely and accurate market information on supply, demand, prices, and quality requirements. To address this issue, scholars have recommended improving market efficiency as a means to boost production, as proposed by [16].

Unlike a majority of previous studies which focused collectively on multiple components of market efficiency affecting spices production [17] [18]. This review's objective lies in its focus on the role of market efficiency in spice production pinpointing the impact of access to market information on spice production. We also focused on the possible measures to promote market information infrastructure which could improve efficient and perfect dissemination of market information among parties involved in spice sector to promote spice yield.

2. Methodology

This study was structured according to the provided guidelines by [19] of Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020. Reporting of PRISMA 2020 items facilitates replication and review updates so that reviewers can leverage the work that is already done and decrease research waste [19]. This method has been widely applied by a number of scholars [20]-[22]; it is therefore an effective method in depicting the overview of the area of interest.

As per the guidelines outlined in the PRISMA 2020 statement, the research title should clearly indicate that the study is a Systematic Literature Review (SLR). The abstract should outline the study's aim, main objectives, methodology, and key findings [19]. With regard to this study the key elements of the PRISMA 2020 state-

ment have been taken into account.

2.1. Searching Strategy

The search keywords identified were: "Market efficiency" AND "Spice" AND "Production". The words were used to search information from ScienceDirect one of the credible databases according to [23] [24] retrieving published data from 2010 to 2023. This time limit was considered optimal as the global spice market was valued at several billion USD in mid 2010s with projections indicating continued growth potentially reaching over USD 15 - 20 billion by 2025 [3] [25].

[24] recommended that ScienceDirect provide features that can track the citation of a particular publication, advanced search capabilities, comprehensive indexing including export and integration options which are important features in developing SLRs. [26] adds that ScienceDirect is among open access databases that can be recommended for evidence syntheses without adding substantial caveats. Figure 1 provides a detailed search strategy with keywords related to market efficiency measures and a complete list of search keywords used in this review.

At the first phase of identification "Market" AND "Efficiency" AND "Spices" AND "Production" were used to search for similar or related studies; a total of 6888 articles were retrieved. In the second phase the search was narrowed down using the keywords "Market information" AND "Spices" AND "Production", and the duration was set to capture articles published from 2010-2023; In this phase, 107 results appeared.

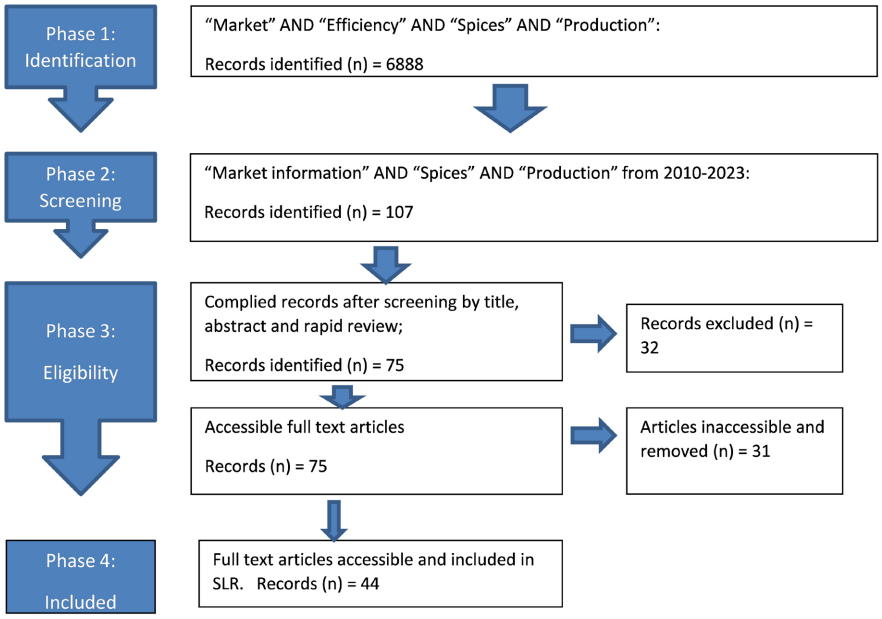


Figure 1. Search flow—PRISMA 2020 diagram.

Following PRISMA framework, there was a brief title and abstract evaluation of the retained records to determine their relevance in relation to this review. After evaluation, the papers that did not satisfy the eligibility criterion, omitting dupli-

cates and inaccessible records, articles numbered 6844 were excluded. A total of 44 articles were found to be relevant and therefore included in the study (**Appendix A**).

2.2. Eligibility Criteria

[27] suggested that, the key characteristics of a systematic review include an explicit, reproducible methodology; a systematic search that attempts to identify all studies that would meet the eligibility criteria involving identifying as many relevant studies as possible [28]. This study reviewed published research and articles reporting on the role of market efficiency in spices production specifically, studies assessing the influence of market information on spices production. **Table 1** highlights the eligibility criteria used.

Table 1. Eligibility criteria.

Criterion	Eligibility
Literature type	Published article
Language	English
Study area	Market efficiency and spices production, market information and spices production
Time limit	2010-2023

2.3. Inclusion and Exclusion Criteria

The criteria for inclusion involved the study language, whereby only studies that have used English language were included. Stage of publication: only final publications and articles in the press were included and methodology; only studies that have followed some assessment criteria and or have applied research methods that can justify the presented findings were also included in the study. Studies that did not meet these criteria were excluded. **Table 2** depicts the list of inclusion and exclusion criteria.

Table 2. Inclusion and exclusion criteria for literature selection.

Inclusion Criteria	Exclusion Criteria
Text in English (other language papers with English abstracts were considered)	Text in languages other than English
Publication type is article, review, book chapter, and report or conference paper.	Publication type other than article, review, book chapter, report, or conference paper
Focus on spice production sector.	Focus on sectors other than spice production
Focus on market efficiency role in spices production	Focus on roles other than market efficiency roles on spices production
Focus on the role of market information in Spices production	Focus on other types of information other than market information

2.4. Quality Assessment

The study complied with the earmarked eligibility criteria but also maintained

consistency on targeted studies in relation to research objectives, such that studies that did not relate to review objectives were not included. All of the reviewed articles came from reputable and top-ranked journals in their respective fields.

3. Analysis and Findings

3.1. Year-Based Publications

The year-based publications assessment revealed that most of the records were published in 2016, 2017, 2019, 2020, 2021, 2022 and 2023. Among the reviewed publications, seven of them were conducted in 2022, five studies were conducted in 2021, four studies in 2020, two studies in 2019, three in 2017, four studies were conducted in 2016, six studies were conducted in 2023 similarly a total of 12 studies were conducted in varying times from 2010 to 2015 as presented in Figure 2.

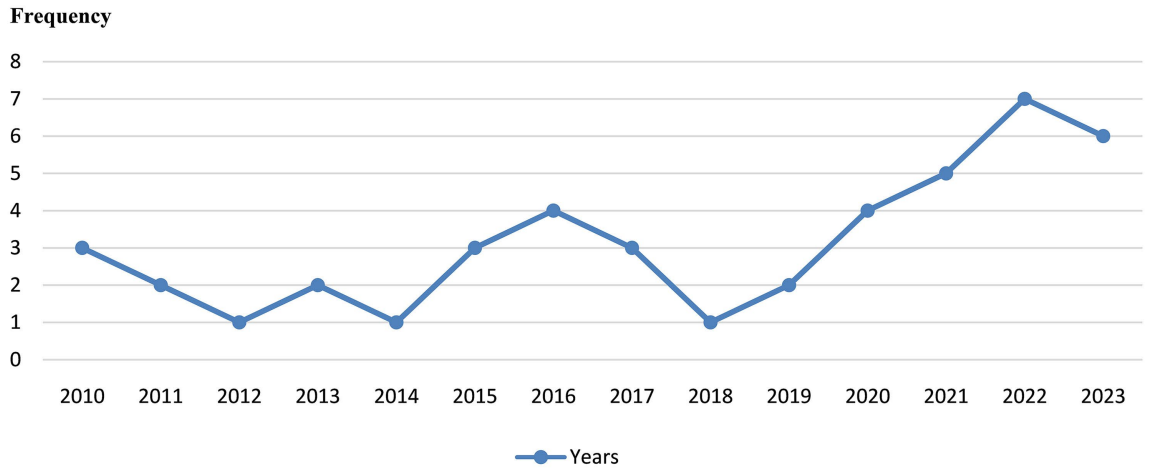


Figure 2. Year-based publications.

3.2. Count of Document Types

The study involved 38 journal articles and 6 book chapters as indicated in Figure 3.

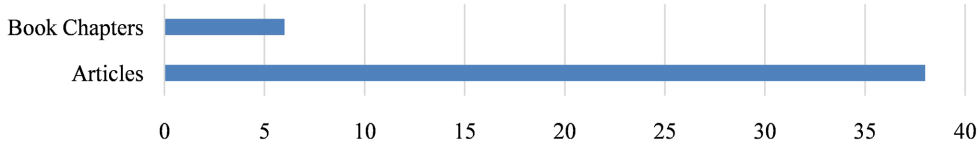


Figure 3. Count of document type.

3.3. Count of Publication Stage

All of the reviewed documents were final reviewed and editorially processed published articles and book chapters available online through ScienceDirect. As suggested by [29] citing published manuscripts ensures study credibility by making certain that the articles involved are those that have gone through the review pro-

cess. Figure 4 gives an overview of the publication stage of the reviewed documents.

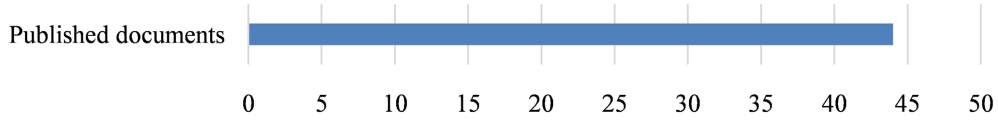


Figure 4. Count of publication stage.

3.4. Synthesis

Based on [30] recommendations, the studies in question were examined and important themes were pinpointed. The process involved being acquainted with the studies and careful review of the findings, creating initial codes based on the assessment of the findings, and identifying and refining key themes through repeated readings of the records. The key themes were organized and displayed in the same order as they were presented in the studies.

4. Discussion

It was found that over 70% of the reviewed studies were conducted from 2016 onwards however, from 2020 records show that scholars including [31] were interested in studying the market-related factors influencing spices production as within the same phase the world witnessed a rapid rise in demand and market for spices. Besides, its demand is expected to grow rapidly between 2020 and 2030 [2] [3] [25]. Based on these grounds the sector has attracted a number of scholars to carry out research for the same.

[32] suggested that transactions in an efficient market are mutually beneficial and the market achieves the optimal outcome as a result of information symmetry. Scholars such as [7] [33] [34] argued that market efficiency leads to transparent and fair price discovery of commodity markets, thus enhancing the value chain for competitive benefits. Studies from different spice hot spot areas [35]-[38] suggest an association between the market structure and the level of agricultural output. Studies conducted in India between 2014 and 2023 suggest that low level of information infrastructure patterns in spice sub sector has a significant impact of low farming output, probably increase in production can be induced by strengthening information and communication infrastructural facilities to take prudent public investment through understanding the relative importance of market enhancing factors [39]-[41].

Findings from Bangladesh, Indonesia, Malaysia, Vanuatu and Nepal claim barriers for attracting investment in spice sector are limited and untimely access to market information leading to lack of viable markets for spice commodities [42]-[44]. Lack of information among market participants, poor market intelligence, lack of information regarding production costs and others were among the constraints impeding spice development [45]-[47]. [48] supported that farmers need information regarding market signals such as quality requirements, prices, duties,

taxes, demand and supply patterns which equip farmers with superior bargaining power over supply chain intermediaries with immediate effect on yield.

According to [49], the vast majority of households in Ethiopia live in rural areas and spice production is their main economic activity and rarely produce for the market [50]. Generally, full access to market information can assist farmers in responding to price differences in markets [51] and enhance the ability to serve the entire market, which was among the benefits of instant access to market information among spice smallholder farmers in Ethiopia [52].

Other comparable study in Ethiopia suggest more or less similar findings; [53] identified market related factors hindering spice sub sector to include; poor market access and imperfect market information, mismatch between demand and supply, poor market infrastructure, low bargaining power of producers, limited ability of producers to enter new markets, lack of skills and resources due to lack of perfect and adequate information; were some of the factors affecting spice marketing in Ethiopia [54]. These findings are concurrent with those of [43] [49] [55] supporting the need to create reliable market information platform, strong extension intervention and giving training to farmers on marketing information [56]. Elsewhere, [45] [57] in Sri Lanka, Indonesia, Bangladesh and Vietnam also obtained more or less related results outlining the primary impediments in spices marketing, including inability to receive marketing information including other market signals such as demand leading to price instability. However, the findings assisted in establishing a dynamic policy framework that gave assurance in information abundance and rapidly addressed market mishaps to ensure sustainability.

Similarly, [58] [59] identified some constraints of pepper producers in Nigeria among others to include the lack of instant access to the market to enable farmers to make important decisions. A similar survey in Ethiopia by [60] reinforced that growth and development of the spices sector depend upon a market-oriented production system and good marketing infrastructure supported by instant access to market information. In India, [61]-[63] suggested related findings including limited awareness of market demand and supply forces resulting in market saturation with the implication of lowering aggregate production as farmers opt for off-farm activities [64] [65]. Yet other studies by [66]-[68] witnessed inconsistency in growth rate in most of the spices to be linked with uneven access to market information thus affecting growth and stability of spices in India and Nepal. Furthermore, lack of awareness of prevailing market signals increases the uncertainty faced by the farmers in their planting decisions thus affecting production [69] [70].

According to [33], [56], [64] and [71] the declining coordination of information among stakeholders in the spice sector adversely affects farmers both emotionally and financially, leading to reduced production. Information on prediction of market prices may help farmers in making necessary decisions in minimizing the risk of price fluctuations and declining rates. Results from Bangladesh [72] [73] indicated that production is proportional to the level of information attained by farmers; limited information has a significant negative influence on production, how-

ever, it was recommended to establish an efficient marketing organization which could be a solution in effective management of spices production.

Similar findings by [74] show a correlation between the continual availability of information on saffron market price predictions over time which has led to raised saffron yield in Iran. Moreover, [75] outlines the limitations of agricultural societies, including immature agricultural markets.

5. Conclusion and Recommendations

The review assessed the market efficiency factor predominantly access to market information that influences spices production in top-ranked spices-producing countries worldwide. The available literature does not suggest that it is conclusive however much has been written on access to market information and spices production although rigorous research is needed on ways to foster instant and perfect information access among smallholder farmers.

The present findings from the review appear to have more or less common results. Our review provides an overview of what we currently know, what might be done and what might be valuable in terms of future research. First, literature has demonstrated the necessity of having a well-established framework which will equip the parties involved in spice sector with perfect and efficient up-to-date market information with all necessary market signals to enable the parties principally producers to make wise decisions regarding production inputs, prices, taxes, quality requirements, etc.

Second, it can be stated that a majority of other factors affecting spice sub-sector are to some extent attributed to a lack of access to market information such as a lack of awareness of better marketplaces, a lack of bargaining power among producers, unawareness of standard quality requirements, etc. Since the demand for spices is expected to grow gradually there is a need for more studies on mitigation measures to enhance rapid access of market information for producers which will motivate the growth of the sector. Likewise, relevant authorities should encourage formation of terminal markets with efficient information dissemination mechanisms. It is also important to organize training programs to raise awareness among farmers on information acquisition, marketing and business management.

Similarly, plans should be strengthened to make sure that spice sub-sector is more research-oriented to prevent it from market-related challenges with creation and development of efficient marketplaces where supply chain intermediaries could participate with minimum restriction. In addition, it is recommended that regional Governments should develop policies that reduce oligopolistic tendency of market structure so as to create competitive spice market environment for all actors in the market. As a result, farmers will be able to produce more for domestic consumption as well as export market.

Third, the review noted that the impact of access to market information has varying magnitude among producers depending on geographical places. In a few places, access to market information did not have a significant impact on produc-

tion and therefore various types of producers require different consideration with regard to this parameter.

Last but not least, we outline some potential research propositions that can help further understanding of how access to market information can advance spice subsector. To some extent the conclusion is limited although the review included a wide range of journals; Spice market efficiency studies are not only published in ScienceDirect however there are other databases publishing the same area of interest, we recommend that syntheses be carried out in the future to explore the studies published in other databases to grasp wide understanding of the matter. Likewise, meta-analysis could also be done to quantify the effect of access to market information as more studies become available.

Conflicts of Interest

The authors declare no conflict of interest.

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Appendix A. Studies Included in the Review

S. No	Author(s)	Year
1.	Kim Tai-Yoo, Almas Heshmati, Jihyoun Park	2010
2.	Ozdal Koksal, Erdogan Gunes, O. Orkan Ozer & Mustafa Ozden	2010
3.	Amjad Masood Husaini	2010
4.	Nair Prabhakaran K.P.	2011
5.	Geta Endrias & Kifle Asfaw	2011
6.	Marco Ferroni & Yuan Zhou	2012
7.	Nair Prabhakaran K.P.	2013
8.	Olukunle Oni Timothy	2013
9.	Roy A., Dkhar D.S., Tripathi A.K., Uttam Singh N., Kumar D., Das S.K. & Amit Debnath	2014
10.	Joshi D. & Singh H. P.	2015
11.	Bhavani Devi I., Srikala M., & Ananda T.	2015
12.	Gebreazgaabher & Negash	2015
13.	Rahmana Syed Ajijur, Terry Sunderland, Mrigesh Kshatriyac, James M. Roshetkoe, Tim Pagellab & John R. Healey	2016
14.	Rajeev, P. and Lijo Thomas	2016
15.	Bhatt Ashish & Valasan Jency	2016
16.	Thakur Bhattarai	2016
17.	Patrick Legros & Andrew F. Newman	2017
18.	Vinod Naik & Hosamani S.B.	2017
19.	Hasan M.K. and Uddin M.K.	2017
20.	Adaigho Dennis & Tibi Kentus	2018
21.	Sahu P. K., Soumik Dey, Kanchan Sinha, Herojit Singh, L. Narsimaiaha	2019
22.	Tadie Mirie Abate, Abebe Birara Dessie & Taye Melese Mekie	2019
23.	Kiran M. Sabu & T. K. Manoj Kumar	2020
24.	Shahnoushi Naser, Leili Abolhassani, Vida Kavakebi, Michael Reed, Sayed Saghaian	2020
25.	Cariappa Adeeth A.G. & Chandel B.S.	2020
26.	Sachu Sara Sabu, Anil Kuruvila and S.P. Subash	2020
27.	Holmelin Nina Bergan	2021
28.	Neharika Sobti	2021
29.	Tsegaye Shimelis	2021
30.	Benyam Tadesse, Yaregal Tilahun, Tilahun Bekele & Getachew Mekonen	2021
31.	Budiawati Supangkat Iskandar, Johan Iskandar, Dede Mulyanto, Rahman Latif Alfian & Suroso	2021
32.	Muhie Seid Hussen	2022
33.	Zhang M, Han Y, Li D, Xu S &Huang Y.	2022
34.	Asidawati, Yetty Oktarina & Fifian Permata Sari	2022
35.	Banchamlak Hegena & Seble Tigistu	2022

Continued

36.	Gizachew Wosene & Wubalem Gobie	2022
37.	John M. Crespi & James M. MacDonald	2022
38.	Chand Uttam & Anoop M	2022
39.	Vineeta, Bisleshna Tamang, Gopal Shukla, Sumit Chakravarty	2023
40.	Pramoth Kumar S., Muthulakshmi K.& Rengaraju R.	2023
41.	Lijo Thomas, Anees K & Muhammed Nissar V A	2023
42.	Niharika Borbaruah & Barman R. N	2023
43.	Helian Xu, Do Trong Nghia & Nguyen Hoang Nam	2023
44.	Vega Dora Carias, Tony Page & Liz Ota	2023