Review Article

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Urban aquaponics farming and cities- a systematic literature review

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Abstract: An aquaponic system is considered to be a sustainable food production solution that follows circular economy principles and the biomimetic natural system to reduce input and waste. It is the combination of two mainly productive systems, a recirculating aquaculture system consists of fish and crustaceans farmed in a tank and hydroponic cultivation consists of vegetable cultured in medium other than soil. Both these systems are well-known around the globe by their performance of production, quality, and verified food safety. An aquaponic system is an industrious mechanism which incorporates impeccably with sustainable growth of intensive agriculture. The existing literature regarding the aquaponic production covers different species of vegetables and fish, a variety of layouts of system, and climate conditions. However, there is a lack of knowledge that can systematically present the existing state-of-the-artwork in a systematic manner. So to overcome this limitation, the proposed research presents a systematic literature review in the field of urban aquaponics. This systematic literature review will help practitioners to take help from the existing literature and propose new solutions based on the available evidence in urban aquaponics.

Keywords: aquaponic system; fish; food production; sustainable; urband aquaponic; vegetable.

Introduction

Aquaponic system is considered to be a sustainable food production solution that follows circular economy principles and the biomimetic natural system to reduce input and waste. It is an industrious mechanism which incorporate impeccably with sustainable growth of intensive agriculture [1–3]. Aquaponics is the combination of two mainly productive systems, a recirculating aquaculture system consists of fish and crustaceans farmed in a tank and hydroponic cultivation consists of vegetable cultured in medium other than soil. Both these systems are well-known around the globe by their performance of production, quality and verified food safety [4]. Aquaponics system makes aquacultural water to irrigate vegitable and use of nutrient rich in a hydroponic plant culture unit. An aquaponics system is an incorporated production system for cultivating vegetable and fish, it use natural synergy with the help of nitrifying a bacteria population [5].

From environmental perspectives, aquaponic systems prevent the outflow of aquaculture effluent, and considerably reduce utilization of water [6]. The water become obviously well-off in nutrients by asset of the occurrence of bacterial population that can convert the waste of fish into exploitable nutrients for plants [7]. From the perspectives of economic, aquaponic systems require a considerable investment required to integrate two productive systems. After that, there is lower management cost and combined returns, deriving from fish and vegitable sales, whose profitability benefits from synergy of these costs and returns [4, 8, 9]. The social perspective of aquaponic system is that it facilitates access to secure agrifood products which are cultivated locally. This can improve the quality of life of local community and contribute to their economy [4, 10]. An acquaponic system is preserved with at least amount of electrical energy, supplying the pumps of water and air blowers [4]. In developed countries, the aquaponic system can be carried out in peri-urban and urban areas where land is unavailable for cultivation.

The existing literature regarding the aquaponic production covers different species of vegetable and fish, a variety of layouts of system, and climate conditions. However, there is lack of knowledge which can systematically present the existing work in

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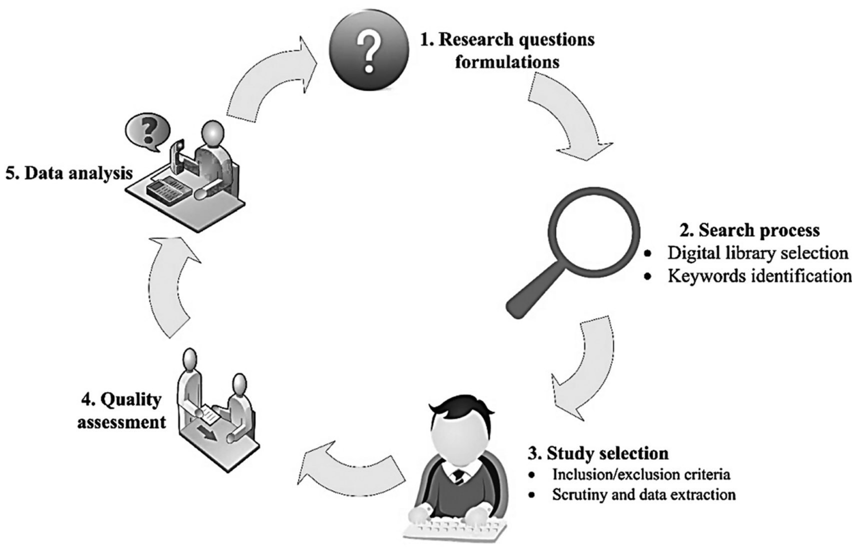

Figure 1: Protocol followed the proposed research process.

systematic manner. So to overcome this limitation, the proposed research presents a systematic literature review (SLR) in the field of urban aquaponics. The following are the main contributions of the proposed research:

- To analyse the study regarding urban aquaponic system
- To study the applications of aquaponic system in urban areas
- The study the techniques used for urban aquaponic
- To analyse the existing published materials on urban aquaponic and their presentation

The rest of the paper is organize as follow; section Research method presents the proposed methodology for conducting systematic literature review process for urban aquaponic. Section Results and discussions explains the overall research process based on the guidelines provided by Kitchenham et al. [11]. The results and discussions are given briefly in section Results and discussions. The paper concludes in section Conclusion.

Research method

SLR is an organized way of formulating research questions, defining keywords, and organizing the published research in a systematic way other than informal way. It objectively analyse a specific problem and is alternate way to explore the problem with in depth analysis. Several research work has been reported in the literature in different domains using the protocol of SLR [12]. The activities of the proposed research are categorised into three major classes including; design of protocol, conducting the SLR, and the reporting the existing evidences for research. The following sub-sections briefly show the research process for the proposed study.

Research plan and process

The proposed research follows the guidelines provided by Kitchenham [11]. Figure 1 shows the steps followed for

Table 1: Inclusion/exclusion criteria of the relevant articles.

Inclusion
– The paper published in the years ranging from 2011 to 2020
– Contents of the paper provide satisfactory details for the selected topics?
– Language of the article should be English
– Select only the primary studies from the relevant duplicate studies
– The selected articles provides a sound knowledge from the research questions formulated
– The article must from the selected digital repositories
Exclusion
– The papers not in the range of January 2011–2020
– Very short paper of about less than 3 pages
– Grey papers
– Duplicate versions
– Provides no information for the research questions selected
– Written in other than English language

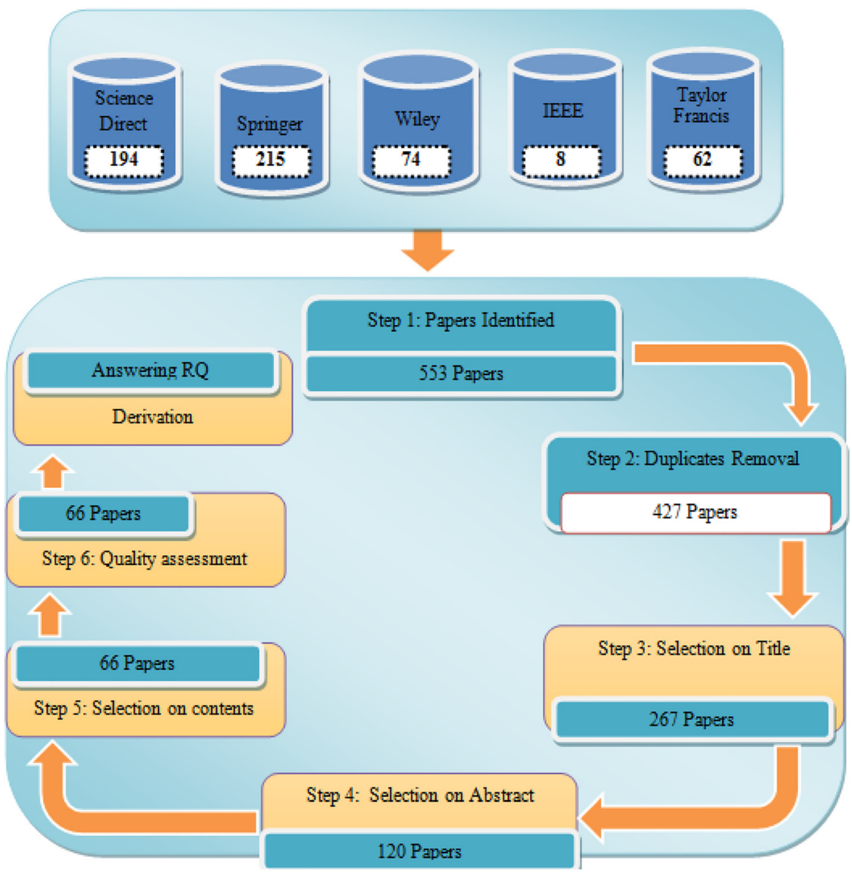

Figure 2: Overall process of the proposed protocol for conducting the research.

Table 2: Search results, and filtering process.

Library	Initial	title	Abstract	Content
IEEE	8	8	8	7
ScienceDirect	194	67	41	22
Taylor & Francis	62	37	19	7
Springer	215	107	33	24
Wiley online library	74	48	19	6

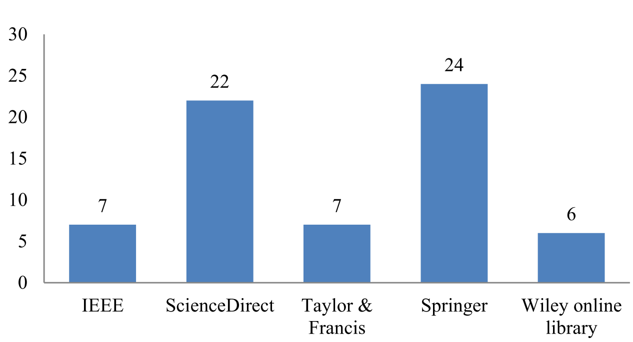

Figure 3: Final list of selected papers.

conducting the proposed research. In the figure, the first step is the formulation of research questions for the proposed study, the selection of suitable keywords for the process of search, criteria for exclusion and inclusion, quality assessment of the papers, and the analysis of the data extracted from the selected papers.

Research questions

Following are the research questions defined for the proposed study:

- R.Q.1. To study the research regarding urban aquaponic system
- R.Q.2. To study the applications of aquaponic system in urban areas
- R.Q.3. The study the techniques used for urban aquaponic
- R.Q.4. To analyse the existing published materials on urban aquaponic and their presentation

Table 3: Selected papers (S_1,S_2, …. S_{66}), along with the type and year of publication.

S.No	References	Type	Year
S1	[13]	Journal	2020
S2	[14]	Journal	2020
S3	[15]	Journal	2020
S4	[16]	Journal	2020
S5	[17]	Journal	2020
S6	[18]	Journal	2020
S7	[19]	Journal	2020
S8	[20]	Journal	2020
S9	[21]	Journal	2020
S10	[22]	Conference	2019
S11	[23]	Conference	2019
S12	[24]	Conference	2019
S13	[25]	Conference	2019
S14	[26]	Book/Book section	2019
S15	[27]	Book/Book section	2019
S16	[28]	Book/Book section	2019
S17	[29]	Book/Book section	2019
S18	[30]	Book/Book section	2019
S19	[31]	Book/Book section	2019
S20	[32]	Book/Book section	2019
S21	[33]	Book/Book section	2019
S22	[34]	Book/Book section	2019
S23	[35]	Book/Book section	2019
S24	[36]	Book/Book section	2019
S25	[37]	Book/Book section	2019
S26	[38]	Book/Book section	2019
S27	[39]	Book/Book section	2019
S28	[40]	Journal	2019
S29	[41]	Journal	2019
S30	[42]	Journal	2019
S31	[43]	Journal	2019
S32	[44]	Journal	2019
S33	[45]	Journal	2019
S34	[46]	Journal	2019
S35	[47]	Journal	2019
S36	[48]	Journal	2019
S37	[49]	Journal	2019
S38	[50]	Journal	2019
S39	[51]	Conference	2018
S40	[52]	Journal	2018
S41	[53]	Journal	2018
S42	[54]	Journal	2018
S43	[55]	Journal	2018
S44	[56]	Journal	2018
S45	[57]	Journal	2018
S46	[58]	Journal	2018
S47	[59]	Journal	2018
S48	[60]	Conference	2017
S49	[61]	Conference	2017
S50	[62]	Journal	2017
S51	[63]	Journal	2017
S52	[64]	Journal	2017
S53	[65]	Journal	2017
S54	[66]	Journal	2017
S55	[67]	Conference	2016
S56	[68]	Book/Book section	2016
S57	[69]	Journal	2016
S58	[70]	Journal	2016
S59	[71]	Journal	2016
S60	[72]	Journal	2016
S61	[73]	Journal	2016
S62	[74]	Journal	2015
S63	[75]	Journal	2015
S64	[76]	Report	2013
S65	[77]	Journal	2013
S66	[78]	Report	2012

Search process

The process of search was performed on the selected libraries to take out most associated papers to the research formulated research questions. The keywords ("Urban" OR "town") AND ("aquaponics") AND ("farming" OR "agriculture") were defined by the authors based on the nature of the research. These keywords were searched in the mentioned libraries. The authors decided to adopt the following exclusion and inclusion criteria for the inclusion of the papers in the final list of pool:

- The papers provide knowledge of the urban aquaponics
- The papers provide comprehensible details and context need to cover and answers the research questions defined in the proposed research.

The following is the list of libraries selected for the proposed research:

i. IEEE
ii. ScienceDirect
iii. Springer
iv. Tailor and Francis
v. Wiley Online Library

Study selection process

The relevant study selection was a complex process and the authors were uncertain about this process that relevant paper should not be missed. For selecting the relevant papers, the process was divided into three steps based on the inclusion and exclusion criteria: (i). the articles were checked based on the titles and the papers not relevant were excluded,

Table 4: Year wise list of selected papers.

2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
[13–21]	[22–50]	[51–59]	[60–66]	[67–73]	[74, 75]		[76, 77]	[78]	

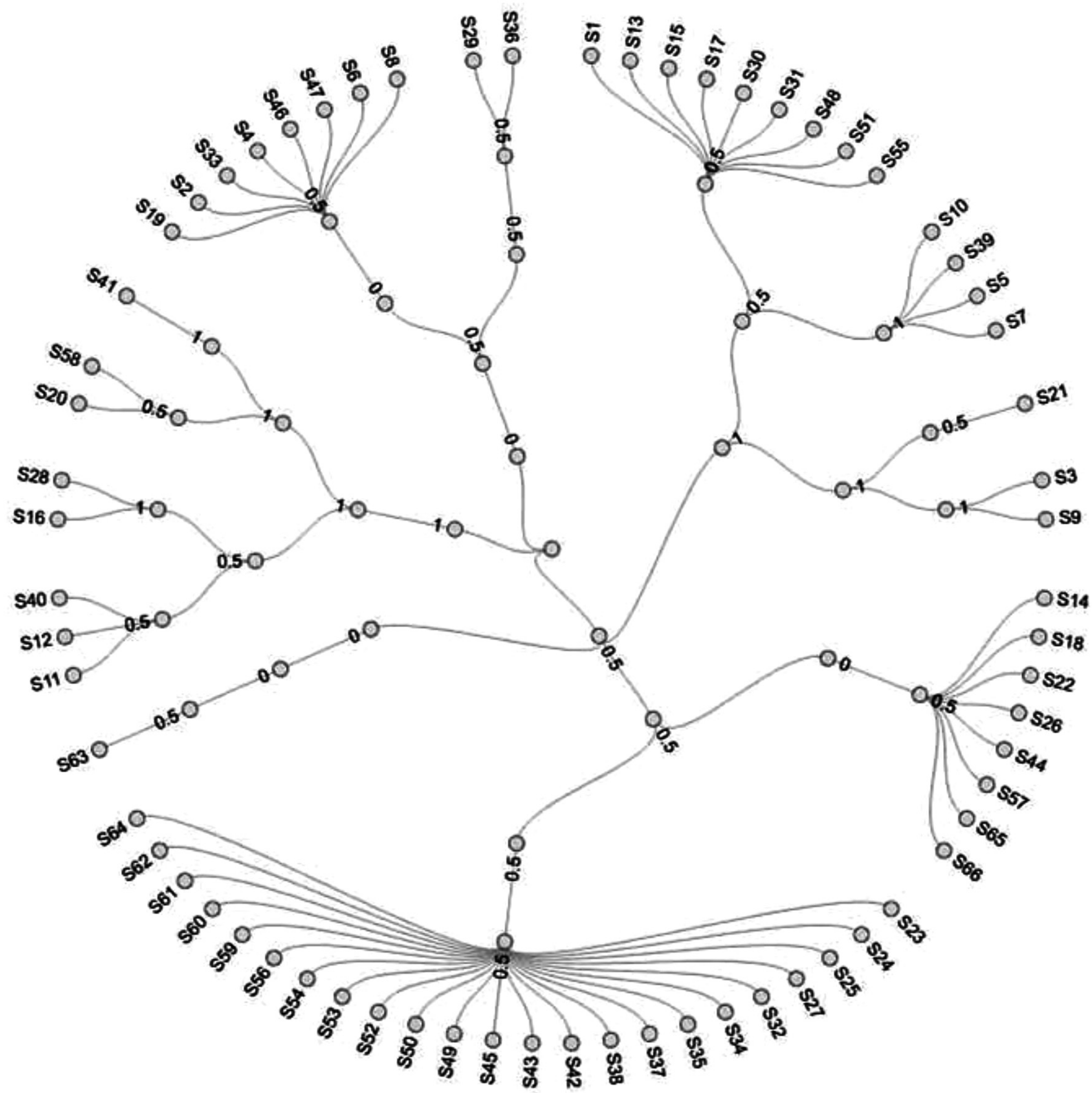

Figure 4: Overall quality assessment of the selected studies based on the defined research questions.

(ii). In this step, abstracts of the papers were checked and the papers not relevant were excluded, and (iii). the papers were checked by contents, all the irrelevant papers were excluded and only the relevant papers were included. After this process, duplicates in some of the papers were raised. For removing the duplicates, the latest articles were included while the old versions of the papers were excluded. This duplicate was mostly for the papers published in conference while their updated version is published in journal. The inclusion and exclusion criteria are shown in Table 1.

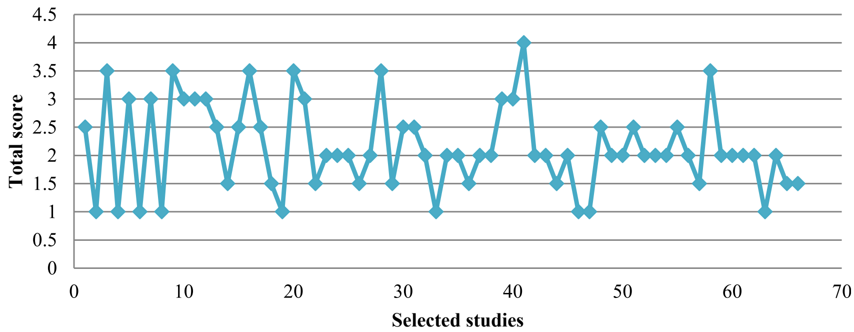

Figure 5: Selected studies along with the total score.

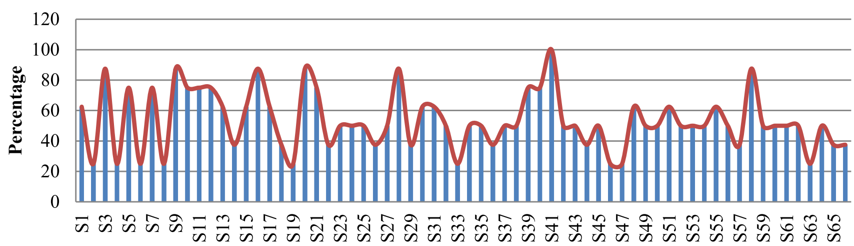

Figure 6: Percentage of each selected studies.

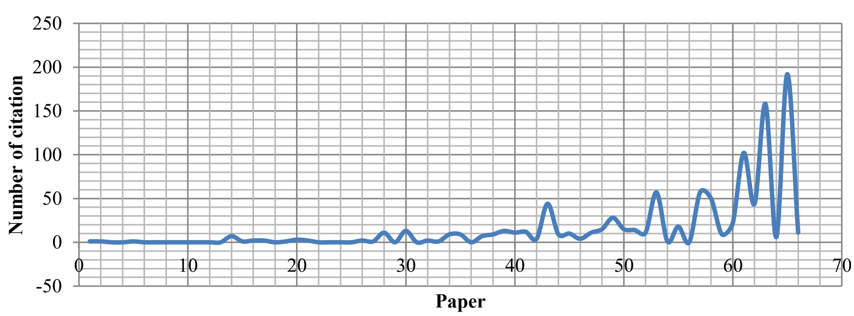

Figure 7: Selected papers along with number of citation.

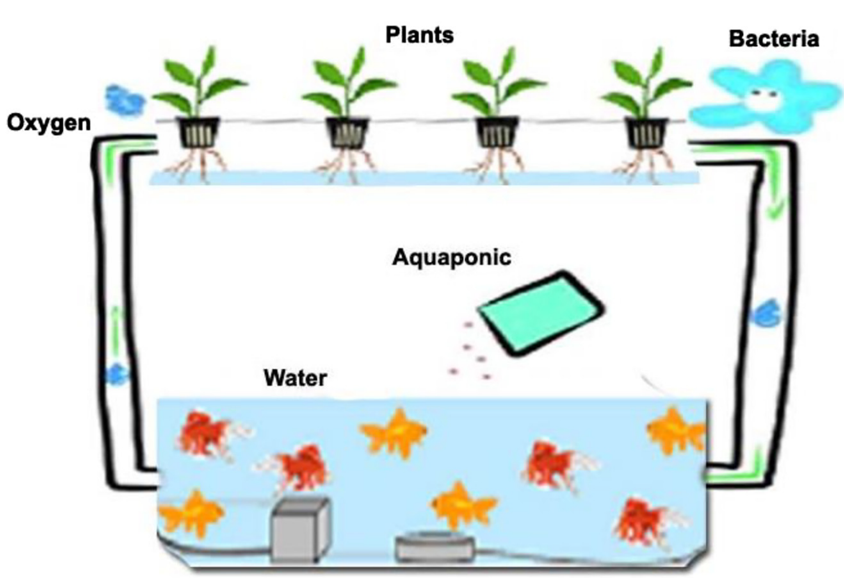

Figure 8: Aquaponic system.

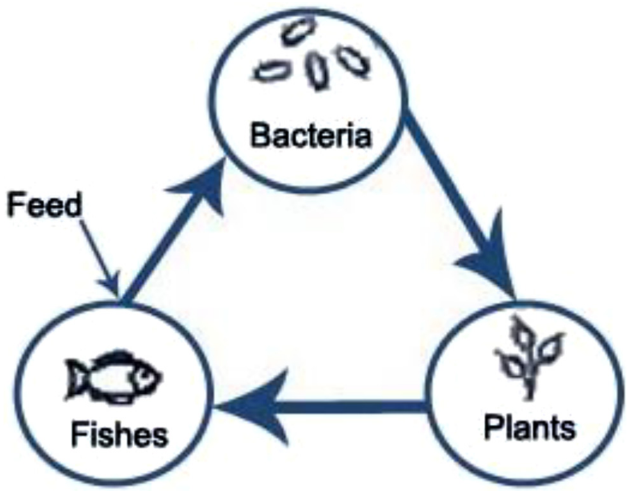

Figure 9: Coupled aquaponic system.

Figure 2 shows the overall process of the protocol followed for the proposed research.

The process of selection of papers in systematic literature review is very critical task, as at every stage one will say that this article is relevant while the other will say that this not relevant. So, ambiguity is raised in the selection of final paper. To overcome this limitation, the SLR is formally analysing each paper based on the defined keywords and research questions. Total of 553 papers in the form of journal, conference, book, book chapter and other materials were found. These papers were initially checked based on the relevance of the research questions and the titles of the paper were thoroughly studied. So, after this process, the papers were filtered and a total of 267 papers were obtained. These papers were then filtered by abstract and total of 120 research papers were obtained. It was decide to further filter the papers based on their contents to only obtain the most relevant papers. The papers were thoroughly checked by its contents and a total of 66 papers were obtained. All this process is done manually by the authors. Table 2 shows the initial search, by title, by abstract, and by contents filtering process of the papers.

Figure 3 show the representation of selected papers in the given libraries, where more papers were obtained in the Springer library, followed by ScienceDirect and others.

The selected papers were based on the exclusion, and inclusion criteria defined by the authors. These selected papers were than categorized into their publication type such as journal, conference, book, and any other type. The year of publication was also mentioned. Table 3 shows the selected papers, their publication type, and year of publication.

The selected papers were further categorized yearly wise to show that how much papers are published in a particular year. Table 4 shows the list of papers published in a particular year.

Quality assessment

Quality assessment of the selected studies was done based on the defined criteria. Each paper was assessed for the defined questions and relevant score were given. The score “1” was given for the paper mostly relevant to the research question, “0.5” for the paper partially relevant to the research question, and “0” was given to the paper not fulfilling the research question. Figure 4 shows the quality assessment of the selected studies based on the defined research questions.

The selected studies along with the total score of research questions is shown in Figure 5.

Figure 6 shows the percentage of each selected paper score.

All the selected papers titles were searched in the Googlescholar to check the citation of each paper that how much individual selected paper is cited. Figure 7 shows the selected papers along with the total number of citation.

Results and discussions

Aquaponics system is considered to be a sustainable food production way that follows circular economy principles and the biomimetic natural system to reduce input and waste. Aquaponic produce is thought to contain added value to the environment and consumer. Community gardens and urban farms have both pros and cons, like reduce or increase of energy consumption, beautify neighbourhood, and improve water infiltration. Figure 8 shows the aquaponics system.

Coupled aquaponics system integrates three classes of organism including bacteria, aquatic organism, and plants. Figure 9 shows the coupled aquaponic system with bacteria, aquatic organism, and plants in a closed recirculation of water [29].

The following subsections briefly shows the results and discussion section of the paper.

Table 5: Research work on urban aquaponic.

References	Description
	The following papers are discussed in Table 7, while rest of the details is given in this table: [19], [20], [21], [22], [23], [24], [25], [27], [28], [29], [30], [35], [36], [39], [45], [48], [49], [52], [53], [57], [63], [66], [70], [71]
[15]	The study evaluated the performance of a catfish-pumpkin aquaponic system in comparision with static aquaculture system for fish performance and recirculatory as well as non-irrigated and irrigated systems.
[17]	The study presented an econometric tool for analysing willingness to get through aquaponic produce at different price level in Australia and Israel. Cluster analysis was used for group defining or potential consumers. The results show that population of about 17–30% of both Australia and Israel prefer to get through aquaponic produce
[31]	The study presented focus on three experiential studies below: – Education opportunity at school – Feasibility study among teachers – The educational Growing Blue and Green The derivations of the study was low cost aquaponic have substantial impending for helpful learning in elementary school
[32]	Basics of the aquaponic
[33]	The chapter presents the aquaponics alternative types and their approaches
[34]	The chapter describes the ugly duckling in organic regulation of aquaponics
[37]	The chapter discusses the aquaponics for the Anthropocene
[38]	This chapter describes the aquaponics and challenges of global food
[40]	The study presented an overview of the published materials on the growing technology of aquaponic by the use of aquaculture effluent for growing plants
[41]	The authors presented a sustainable production of the seafood and vegetable with the help of aquaponics which is a possible opportunity in urban area
[42]	The review demonstrates breadth of new extraction that are suggestive for rational upcoming development including possibility for nutrient circulatory, open questions and sustainability regarding economic, development pathway, and logistics
[43]	Using small scale aquaponic system, three diverse species were tested to demonstrate for utilization of nitrate level in their leaves
[44]	The study demonstrates the agriculture effectiveness of ecotechnologies for the recovery and reuse of carbon and nutrients in the Baltic and boreo-temperate regions
[45]	The research presents the understanding nutrient throughput of operational RAS farm effluents to support semi-commercial aquaponics
[47]	The paper discusses the opportunity of applying aquaponic system as alternatives of conventional agriculture in Egypt.
[51]	Comparision has been done for the additive life cycles the production of traditional lettuce and tilapia with combined aquaponic agriculture to assess the methods based on their efficiency materials and related impact of environment
[54]	The study evaluated the production of aquaponic for two gamish species, scallion and parsley through effluents of pacu and red tilapia culture
[55]	The study presented a review of the commercial aquaponics in term of system, design, scale and nomenclature
[57]	Online questionnaire based study was conducted to collect information about the type of system used, the distribution, and management of aquaponics in South Africa. The commonly and dominant raised fish was tilapia (82%) and the plants were leafy vegetable (75%)
[58]	The study aimed to carry out the commercial scale economic assessment through model marine aquaponic production system with the halophyte Sarcocomia ambigua and shrimp *Litopenaeus vannamei* cultivated in nutrient film technology and biofloc technology
[61]	Smart aquaponics system is proposed for urban farming
[65]	Using two different aquaponic techniques for comparison through life cycle assessment
[68]	Aquaponics concept
[72]	The paper described the experience of building community based urban aquaponics enterprises for stakeholder to understand external and internal factors to impact their failure or success

Table 6: Applications of aquaponic in urban areas.

Reference	Description
	Detail of these studies is already available in Table 5, while the rest of papers are discussed in this table: [15], [17], [19], [20], [21], [22], [23], [24], [25], [25], [27], [28], [29], [30], [31], [32], [33], [34], [35], [36], [37], [38], [39], [40], [41], [42], [43], [44], [45], [47], [48], [49], [51], [52], [53], [54], [55], [56], [57], [58], [61], [63], [65], [66], [68], [71], [72]
[13]	The potential in term of food production, resource circulatory, and carbon footprint of the integrated food energy water waste system in comparison with the present food and waste management in cities and urban acquaponic system without integration with waste management was the aim of the research
[14]	The study demonstrated the transformation of urban nutrients, community food pedagogies, peri-urban landuse, and infrastructure of farmer.
[16]	Presented research agenda for the education of agriculture and extension studies
[19]	Viability of utilizing aquaponic technology was studied in culturing local fish
[46]	The study shows that, will the urban agricultural revolution be vertical and soilless? A case study of controlled agriculture environment in the City of New York
[50]	Review on the second green revolution
[59]	The research aims the following study areas – Study of the existing literature focussing the environmental, social and economic aspects of urban farming – Consultation exercise to inform and validate findings from the review consisting of semi structured interview from practitioners in the Netherland
[60]	Internet of Things based real time monitoring system for environmental parameters of aquaponics system is proposed in the research
[62]	Impacts of energy, nutrient, and water on California grown vegetable in comparison to the controlled environmental agriculture in Atlanta, GA
[64]	Used the approach of technology roadmap to propose a plan for the implementation of the technologies by investigating the barriers and actions to remove them
[67]	Application of industry 4.0 based architecture for distributed soil-less food production system
[69]	The study hypothesized societal acceptability and preferences of the projects of urban agriculture and products are ruling the failure or success of business in urban agriculture
[70]	The significance of theory of planned behaviour on aquaponics stakeholder process of decision making and the performance analysis in aquaponics system through parametric and non-parametric approaches as innovative method
[73]	The study presented social justice activism and urban agriculture in New York city
[74]	The study aimed to show the useful use of ICT in agriculture among the Kenya youth, evaluated the generally used tools, the challenges, and recommended ICT use in future
[75]	The paper presented a review on urban vegetable for food security in cities
[76]	The indoor farm
[77]	The research analysed and assessed the published materials along with the unpublished hand-on experience with rearing diverse species in RAS in the Nordic countries
[78]	Urban agriculture in Cuba and US

To study the research regarding urban aquaponic system

Several studies regarding aquaponic system is available in the literature. So far, the existing research is analysed in section To analyse the existing published materials on urban aquaponic and their presentation while the research regarding this section is presented in Table 5.

To study the applications of aquaponic system in urban areas

Table 6 shows the applications of aquaponic in urban areas.

To study the techniques used for urban aquaponic

Table 7 shows the techniques used for urban aquaponic.

To analyse the existing published materials on urban aquaponic and their presentation

The existing published materials were analysed based on the details given in this section. This was done to show the relevance of the existing literature with the proposed research. Different types of analysis were performed to show in depth detail of the existing

Table 7: Techniques used for urban aquaponic.

References	Description
[14]	The study demonstrated the transformation of urban nutrients, community food pedagogies, peri-urban landuse, and infrastructure of farmer.
[16]	Presented research agenda for the education of agriculture and extension studies
[18]	The study presented the analysis of learning outcome and level of user motivation to learn about aquaponic in an agritourism farm. The study was done on the students instructed through augmented reality and professor guidance and then compared with the students who were only instructed by the professor
[19]	Viability of utilizing aquaponic technology was studied in culturing local fish
[20]	The study analysed the economic performance and productivity of a double recirculation aquaponic system in Germany with area of 540 m^2
[21]	The study focussed the state of Qatar for the reason why aquaponic be element of solution in arid countries
[22]	The authors presented the transformation of commercial aquaponic system to urban area. The goal of the study was to keep self-sustaining
[23]	Outdoor aquaponic system was designed with automatic grow light and IoT
[24]	Aquaponic system with Iot is integrated for ensuring the yield maximization, reducing human error and preventive action be taken for impulsive hazard
[25]	Aquaponic system was built with the joint venture of soup kitchen and urban farm for insecurity of food and increase meal nutrition and produce yield
[27]	The chapter provides description of aquaponic regulatory framework and perspective policy of the European Union
[28]	The study has bridged the gap between available research on the rising system performance and urban metabolic flows by taking the built form of aquaponic farms
[29]	The study describes the historical development overview, system design in general, fish and plant choices, and issues of management of coupled aquaponic specifically in Europe
[30]	The study presented the latest plans taken by social enterprises using aquaponics
[35]	The chapter presents modelling of dynamic system of aquaponic, a theoretical perspective, is taken and elaborated to subsystems of the aquaponic including anaerobic digester, fish tank, and hydroponic greenhouse
[36]	The chapter describes the closing the cycle on limited water, land and nutrient resources of aquaponics
[39]	Form improvement of the flexibility and self-sufficiency of the microgrids the study proposed integrating neighbourhood microgrid with facility of urban agriculture that house a decoupled multi loop aquaponic facility. The system is called Smarthood in which Water-Energy-Food are circularly linked
[45]	The research presents the understanding nutrient throughput of operational RAS farm effluents to support semi-commercial aquaponics
[48]	The study objectives were to design and analyse a model of multi-loop decoupled aquaponic system with digester and use it to check performance of the system based on sustainability criteria
[49]	In this research, the economic, technical, and production data was collected from pilot aquaponic plant producing lettuce and Nile tilapia realized in urban context in Sicily.
[52]	With the help of Root floating and dynamic root floating the tilapia and pak choi culture was tested. Parameters of water, total ammonia nitrogen, nitrite nitrogen, phosphate, and nitrate nitrogen were measured
[53]	In the study, Google Trends data, multivariate analysis, and econometric models were used for nowcasting and forecasting insights about the significance, new trends, and role in aquaponics
[57]	The study identified the aspects of integrating the technology of living wall and vertical farming in aquaponics
[59]	The research aims the following study areas – Study of the existing literature focussing the environmental, social and economic aspects of urban farming – Consultation exercise to inform and validate findings from the review consisting of semi structured interview from practitioners in the Netherland
[60]	Internet of Things based real time monitoring system for environmental parameters of aquaponics system is proposed in the research
[61]	Smart aquaponics system is proposed for urban farming
[62]	Impacts of energy, nutrient, and water on California grown vegetable in comparison to the controlled environmental agriculture in Atlanta, GA
[63]	The study presented the effect of macro and micor-nutrient addition on performance of tilpia-pak choi aquaponics was identified
[66]	Encouragement of educators to follow aquaponics in the classroom
[67]	Application of industry 4.0 based architecture for distributed soil-less food production system
[69]	The study hypothesized societal acceptability and preferences of the projects of urban agriculture and products are ruling the failure or success of business in urban agriculture

Table 7: (continued)

References	Description
[70]	The significance of theory of planned behaviour on aquaponics stakeholder process of decision making and the performance analysis in aquaponics system through parametric and non-parametric approaches as innovative method
[71]	Inoculation effect of *Azospirillum brasilense* on basil grown under production of aquaponics system
[74]	The study aimed to show the useful use of ICT in agriculture among the Kenya youth, evaluated the generally used tools, the challenges, and recommended ICT use in future

published materials in the literature. Figure 10 shows the total number of papers published in a particular year. More papers are published in the year 2019 followed by 2020. It shows that there is increase in the number of research articles year wise.

Figure 11 shows the total number of papers published in the given years based on their publication type which include journal, conference, book, and others in the IEEE library.

Figure 12 shows the number of papers published in the given years based on their publication type which include

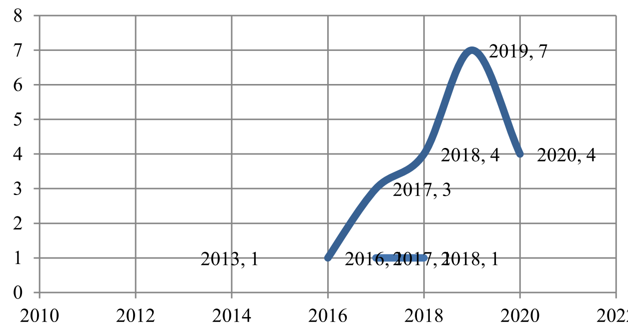

Figure 12: Distribution of papers by type and year for ScienceDirect.

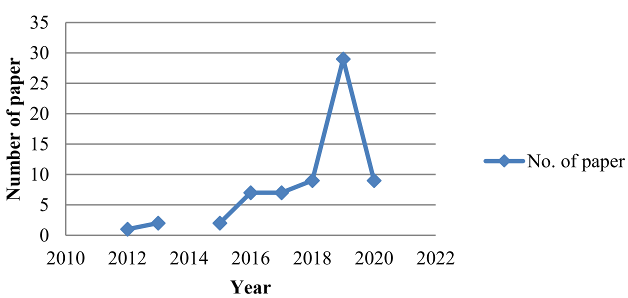

Figure 10: Total number of papers in the given year.

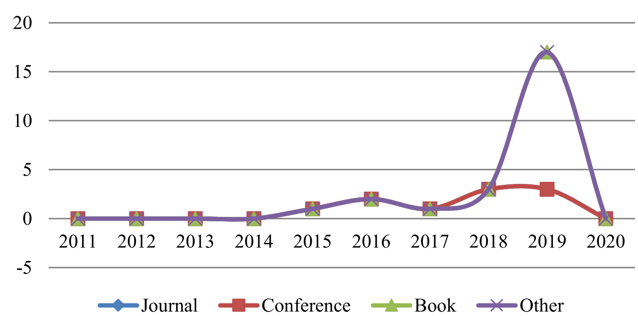

Figure 13: Distribution of papers by type and year for Springer.

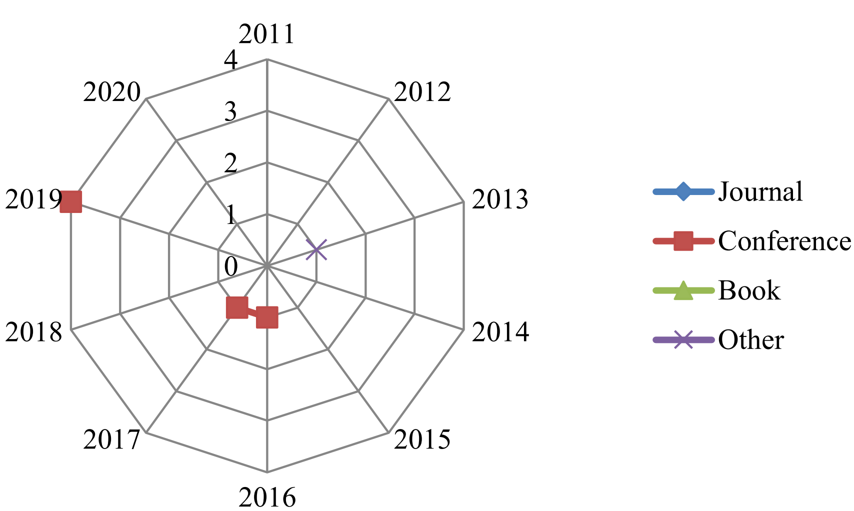

Figure 11: Distribution of papers by type and year for IEEE.

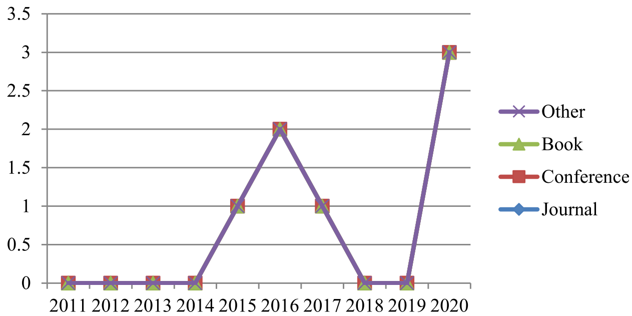

Figure 14: Distribution of papers by type and year for Taylor & Francis.

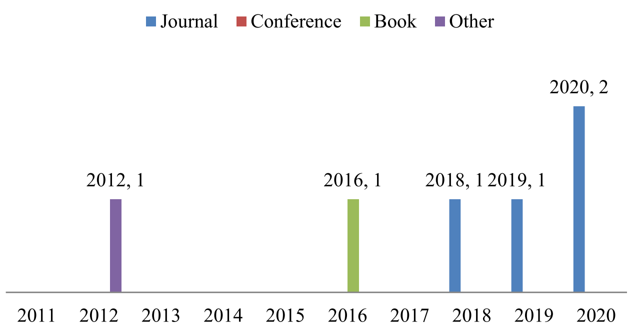

Figure 15: Distribution of papers by type and year for Wiley online library.

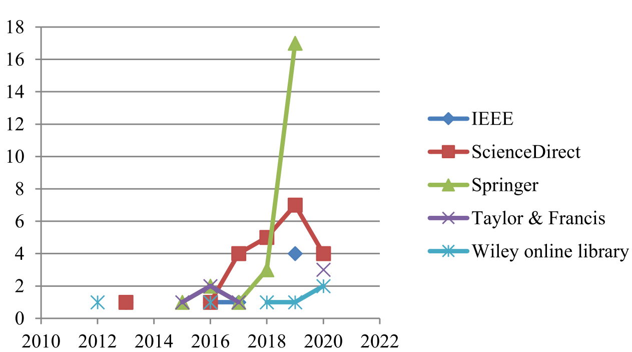

Figure 16: Number of Papers based on Library and year.

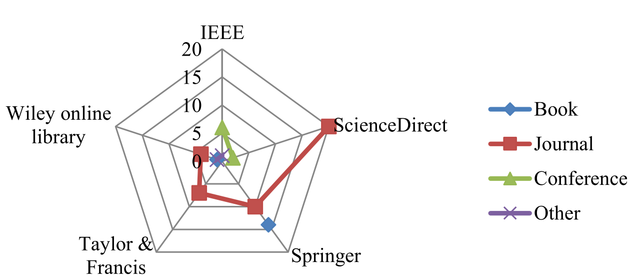

Figure 17: Number of papers based on library and type of paper.

journal, conference, book, and others in the ScienceDirect library.

Figure 13 represents total number of papers published in the given years based on their publication type in journal, conference, book, and others in the Springer library.

Figure 14 represents the total number of papers published in the given years based on publication type including journal, conference, book, and others in the Taylor & Francis library.

Figure 15 shows total number of articles published in the given years based on publication type including journal, conference, book, and others in the given years based on publication type including journal, conference, book, and others in the Taylor & Francis library.

Figure 16 show the overall total number of papers published in the given years based on their publication type including conference, journal, book, and others.

Figure 17 shows the number of papers published in the given libraries based on their publication type including book, journal, conference, and others.

Conclusions

Aquaponic system is the combination of two mainly productive systems, a recirculating aquaculture system consists of fish and crustaceans farmed in a tank and hydroponic cultivation consists of vegetable cultured in medium other than soil. Both these systems are well-known around the globe by their performance of production, quality and verified food safety. The existing literature regarding the aquaponic production covers different species of vegetable and fish, a variety of layouts of system, and climate conditions. However, there is lack of knowledge which can systematically present the existing state-of-the-art work in systematic way. The current research presents a systematic literature review to present the published materials in a systematic way. For selecting the papers, the process was divided into three steps based on the inclusion and exclusion criteria; the articles were checked based on the titles and the papers not relevant were excluded, in the second step, abstracts of the papers were checked and the papers not relevant were excluded, and in the third step the papers were checked by contents, all the irrelevant papers were excluded and only the relevant papers were included. After this process, duplicates in some of the papers were raised. For removing the duplicates, the latest articles were included while the old versions of the papers were excluded. This systematic literature review will help researchers and practitioners to take help from this study and propose new solutions based on the available evidence in urban acquaponic. The research community and practitioners will get benefits of it by studying the existing evidence.

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