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Urban Agriculture as a Community Resilience Strategy against Urban Food Insecurity

Anizah Mohd Salleh ^{1,2}, Nor Zalina Harun ¹, Sharina Abdul Halim ³

¹ Institut Alam dan Tamadun Melayu,

³ Institut Alam Sekitar dan Pembangunan,
Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia

² Fakulti Teknikal dan Vokasional,
Universiti Pendidikan Sultan Idris, 35900 Tanjong Malim, Perak, Malaysia

anizahthesis@gmail.com, nzalina@ukm.edu.my, sharinahalim@ukm.edu.my
Tel.: 0124614479

Abstract

Urban agriculture is an initiative in overcoming the impact of food insecurity. This study identifies the elements of food security and explores the strategy for community resilience from urban agriculture perspectives among the vulnerable urban group. This study employs a systematic literature review by three phases of identification, screening, and eligibility. A total of 15 articles are compiled and analyzed using thematic analysis. Four main themes emerged consist of food security, food production, food flow, and resilience strategy. The four themes produced a total of 14 sub-themes in detailing the element of food security and development strategy of urban agriculture programs for community resilience.

Keywords: urban agriculture; community resilience; food security; resilience strategy

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1.0 Introduction

Rapid urban land expansion is seen as a significant threat to human survival and well-being that leads to the incidence of urban poverty and incapability to afford basic human needs of food, clothes, and shelters (Mat and Othman, 2014; Siwar et al, 2016). The increase of land expansion caused half of the urban population to live in an improper settlement with a lack of access to water and sanitation, insufficient living areas, and inadequate amenities (Liddle, 2017). Such a situation has further contributed to the issues of urban food insecurity and insufficient access to safe and nutritious food supply among the vulnerable urban group (Begum et al., 2011; Islam and Siwar, 2012). In an interconnected issue between urban land expansion and its impact on urban food insecurity, urban agriculture acts as a center for the sustainable food system. Urban agriculture helps urban dwellers to improve and strengthen the economic, social, and environmental conditions.

Drawing on such issues, this study is, therefore, focusing on how urban food insecurity could be improved through urban agriculture practices as a program for community resilience. The aim of this study is set to understand the relationship between community resilience and urban agriculture program conducted by the agencies, institutional, or individual. The objectives are (i) to identify the elements of food security and (ii) to explore the strategy for community resilience from urban agriculture perspectives among the vulnerable urban group.

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2.0 Literature Review

2.1 The practice of urban agriculture among the vulnerable urban group

Urban agriculture, or also known as urban farming, represents agricultural activities within an urban setting. The agricultural activities involve planting, processing, and distributing the agricultural products of crop and livestock by using natural resources and applying waste management for the benefit of surrounding communities (Othman et al., 2017). Various agricultural systems may involve in urban agriculture practices include horticulture, floriculture, forestry, aquaculture, and livestock, but mostly dominated by horticulture products. It was mentioned by Mohd Hussain et al. (2018) who found edible species that are sustenance and survival plants such as lemongrass, turmeric, ginger, chili, and long bean are planted in the house garden as cooking herbs. This situation led to the idea that urban agriculture is considered as informal food supply system (Islam and Siwar, 2012), which can be practiced either in the backyard or kitchen garden, roadside cultivation, or open space cultivation (Kutiwa et al., 2010).

Excitingly, the emergence of a new agricultural approach contributes to the new forms of urban agriculture practices such as community-supported agriculture, community composting and gardening, guerrilla gardening and squat farming, urban food strategy, and market gardens (Trendov, 2018). It requires the integration of various farming techniques that involve medium to the high cost of machinery and maintenance (Mat and Othman, 2014) as well as continuous training to ensure the success of the urban agriculture practices (Buic et al., 2017). However, the idea of innovative agriculture practices is not the essential aspect of urban agriculture for the vulnerable urban group as their primary concern is on the socio-economic resolutions. The contribution of urban agriculture as the food supply is more vital than its potential as a paradigm for advanced agriculture practices. This phenomenon is subjected to the need to build community resilience, which is the capability and adaptability in practicing an alternative solution to urban food insecurity since food is one of the basic human needs.

2.2 The concept of community resilience in urban agriculture

Community resilience is the ability to adopt changes, recover risk, reduce impact, and improve conditions through survival, adaptability, evolution, and growth (Community and Regional Resilience Institute, 2013). The concept is often discussed in the context of local and community levels, which can be divided into five spatial scales of individual, local, regional, national, and global communities. This concept led to the systematic processes of community resilience by identifying, assessing, and analyzing the causal factors of the stress. The process is to reduce exposure on the pressure, lessen the vulnerability of the community, wise management of land, improve preparedness towards the pressure, and as an early warning to the community (International Strategy for Disaster Reduction, 2009). Hence, resilience has the role of adapting the urban food insecurity stresses by strengthening the livelihood and survival of the vulnerable urban group (Begum et al., 2011). It can be assessed by exploring the contribution of urban agriculture as part of community preparedness, response, and recovery in short and long-term impacts. The contribution is yet has a close relationship with the assessment of community resilience.

For this reason, the importance of resilience in the urban agriculture perspective varies considerably between food sovereignty, environmental sustainability, and community building. Urban agriculture has offered resilience capacity through food diversification to the household level, which further can be developed for the local and global food market in support of economic stability (Begum et al., 2011; Hashim et al., 2018). There is also some evidence that urban agriculture can improve ecological resilience, particularly in the creation of an urban ecosystem to generate ecosystem services of provisioning, regulating, supporting, and cultural services (Wu and Chang, 2018). Simultaneously, it promotes social resilience through enhancement of socio-cultural ecosystem services, for instance, empower young adults to understand and aware of the role and contribution of urban agriculture to the urban communities and environment (Abdullah Ayeop et al., 2018). These could be conceptualized as a significant driver for sustainability and resiliency for urban communities, which can exist at multiple scales with the diverse function of urban agriculture.

3.0 Methodology

This study employs a qualitative approach through a systematic literature review that consists of three phases consisting of a detail description of each procedure:

3.1 Identification

The first phase is the retrieval of documents that includes comprehensive searching of available and relevant documents using the database Web of Science, one of the leading indexing system (Samsuddin et al., 2020). An advanced search query was further performed by using phrase searching and the Boolean operator that works as a search string to filter all documents related to the study scope. In doing so, a set of keywords on urban agriculture, urban farming, food insecurity, community resilience, and urban poor are identified. The term "urban agriculture" or "urban farming" was entered in every search string to retrieve specific topics in various document types, such as article, proceedings paper, review, editorial material, book chapter, and book.

3.2 Screening

The second phase consisted of screening processes that encompass double counting and screening criteria. Double counting of documents was avoided as the possibility to have similar documents is due to the usage of the same keywords during the identification process (Meijer and Bolivar 2016). In the interim, screening criteria involve the inclusion and exclusion of the article that has been

determined through its criteria with the assistance of the searching tool in the database (Samsuddin et al., 2020). The criteria are used to identify suitable articles to be selected and analyzed in the systematic review process, as shown in Table 1.

Table 1. The inclusion and exclusion criteria

Criterion	Inclusion	Exclusion
Timeline	Between 2010 and 2019	< 2010
Document types	Open access article (research articles)	Non-open access proceedings paper, review, editorial material, book chapter, book
Language	English	Non-English

(Source: Author)

3.3 Eligibility

The third phase consisted of thorough manual checking of the right keywords and reading of the abstract and introduction of the articles. This phase involved the selection of only relevant articles to the aim of the study. Those articles of specific sciences articles without examining any of the domains analyzed in the articles were eliminated from the sample, and only social sciences articles were reviewed to ensure eligibility.

3.4 Research limitation

The limit of the systematic literature review on community resilience has been implemented on the general understanding and its practices from agricultural perspectives. First, the meaning of community resilience in this study refers to the ability of the community to implement urban agriculture subjected to the related issues on food insecurity among the vulnerable urban group. Second, types of urban agriculture practices limit the range of house garden, community garden, and allotment garden, on condition of land availability owned by the vulnerable urban group and their community engagement to acknowledge their resiliency.

4.0 Findings

A systematic review process has resulted in a sample of 176 documents during the identification process. Subsequently, those documents were screened and refined for its double counting and screening criteria, which resulted in 132 documents are removed from the sample. Out of the 176 included materials, only 44 articles apply to the scope of the study. These articles are thoroughly reviewed by excluding any articles that did not meet the criteria on the contribution of urban agriculture for community resilience. As a result, in total, 15 articles were collected and analyzed as a sample of the urban agriculture practices that considered as a program for community resilience (Table 2). The analyses include the investigation on the relationship between urban agriculture and the concept of community resilience and its association with social protection.

Table 2. The systematic literature review process of three phases

Search string		Phase		Eligibility
		Identification	Screening	
Phase searching and the Boolean operator	"Urban Agriculture" AND Food Insecurity	87	16	5
	"Urban Farming" AND Food Insecurity	14	5	1
	"Urban Agriculture" AND Food Insecurity AND Urban Poor	24	4	2
	"Urban Farming" AND Food Insecurity AND Urban Poor	6	2	2
	"Urban Agriculture" AND Community Resilience	42	14	4
	"Urban Farming" AND Community Resilience	3	3	1
Total		176	44	15

(Source: Author)

Over a total of 15 articles, the result produced a comprehensive analysis of the current urban agri-resilience strategy for the vulnerable urban group in adapting to the urban food insecurity crisis. The review resulted in 4 main themes and 14 sub-themes on the process of identifying the element of food security and development strategy of urban agriculture programs for community resilience (Table 3). The four main themes are food security (4 sub-themes), food production (3 sub-themes), food flow (4 sub-themes), and resilience strategy (3 sub-themes).

From this point, urban agriculture demonstrates multifunctional internal and external impacts that underpin the logic of urban agriculture for building a community resilience that aimed at the element of food security. The impacts are commonly found to fall into three main categories known as food i) availability, ii) accessibility, and iii) utilization. Remarkably, this study discovered an emphasis on another category as food stability that rarely identified before. The discovery suggests that it should also be embraced as the element of food security on the household and community level (Figure 1).

Apart from that, the fulfillment of these elements thus highlighted the capability of urban agriculture as an initiative for building community resilience. In this way, the number of documents on the urban agriculture that contribute to the resilience strategy on social assistance, safety nets, and survival strategy is equally developed, which are depending on the food production and food flow of the urban agriculture practices (Table 3).

Table 3. Table of findings

Author	Farming types/area	Food security				Food production				Food flow			Resilience strategy		
		FA	FC	FU	FS	SF	FR	CC	SC	FE	LM	DT	SA	SN	SS
Kutiwa et al. (2010)	BY, RS	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Talukder et al. (2010)	HG	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Shillington (2012)	HG	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Meenar & Hoover (2012)	CG	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Pulliat (2015)	BY, AG	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Specht et al. (2016)	AG	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Gasperi et al. (2016)	AA	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Bussell et al. (2017)	CG	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Martin & Vold (2018)	HG	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Ramaloo et al. (2018)	HG	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Moucheraud et al. (2019)	HG	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Calvet-Mir & March (2019)	AG	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Khumalo & Sibanda (2019)	HG	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Ulug & Horlings (2019)	CG	/	/	/	/	/	/	/	/	/	/	/	/	/	/
Diehl et al. (2019)	HG	/	/	/	/	/	/	/	/	/	/	/	/	/	/
	Total	15	11	12	6	4	14	10	15	2	11	4	9	7	8
Backyard (BY)	Allotment Garden (AG)	Food Utilization (FU)				Food Routine (FR)				Food Exchange (FE)			Social Assistance (SA)		
Roadside (RS)	Abandoned Area (AA)	Food Stability (FS)				Culinary Culture (CC)				Local Market (LM)			Safety Nets (SN)		
House Garden (HG)	Food Availability (FA)	Staple Food (SF)				Self-Consumption (SC)				Donation (DT)			Survival Strategy (SS)		
Community Garden (CG)	Food Accessibility (FC)														

(Source: Author)

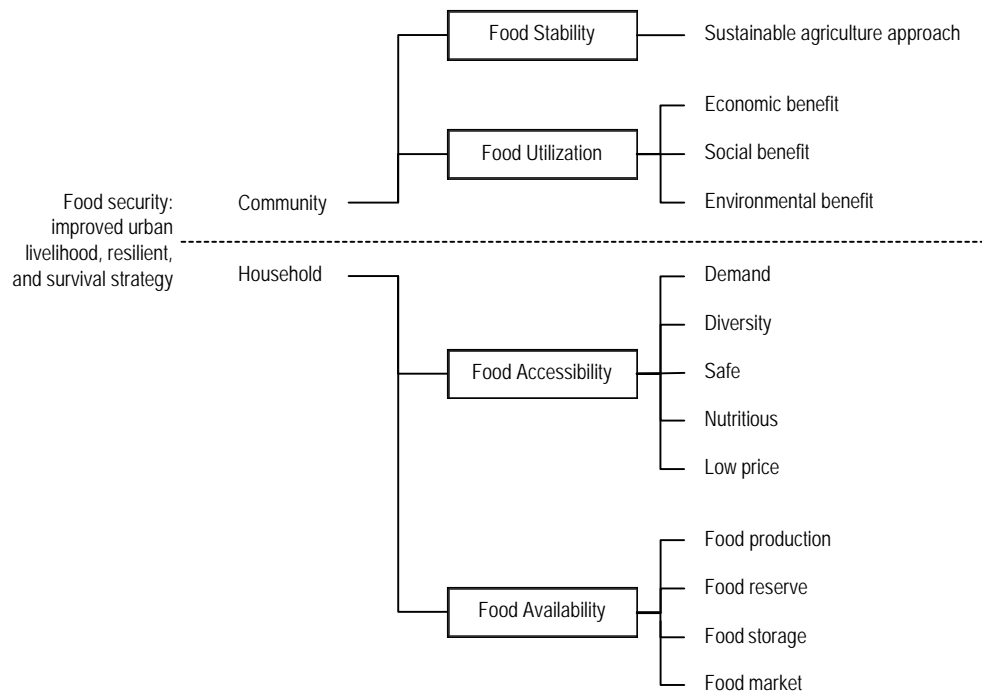


Fig. 1: Elements that intertwined between urban agriculture and community resilience for food security (Source: Author)

5.0 Discussion

5.1 Element of food security in urban agriculture practices

5.1.1 Food availability

Food availability refers to the sufficient quantity and appropriate quality of food that are available upon food production, distribution, and marketing. It also related to the availability and usage of natural, human, and economic resources. This element becomes more concern at the condition where natural resource is limited and needed for an alternative to overcome that situation. For this reason, the provision of food availability, particularly among vulnerable urban groups, consists of a food market, food storage, food reserve, and food production. These indicators are significant for balanced food supply and demand among the household and community of the vulnerable

urban group. The high availability of food items is further offering a sufficient and variety of food supply within the community, which can be found at the local markets or street vendors.

5.1.2 Food accessibility

Food accessibility explains on the ability to access for food with a manageable distance using affordable and convenient transportation. It is influenced by the purchasing power (low price, nutritious, and safe) and food allocation (diversity and demand). This condition contributes to a variety of healthy food and reduces the intake of unhealthy food that can easily be accessed by the community. This condition also could facilitate the urban dwellers with their food preference, specifically a healthy diet for an active life. The diversity, safe, and nutritious food sources which can be gained for self-consumption or traded with low price delivers sufficient food demand for the whole family of the household.

5.1.3 Food utilization

Something similar can be stated for food utilization that often used interchangeably with environmental, social, and economic benefits of urban agriculture, which is capable of the improvement of community development such as healthy lifestyle, social interaction, and economic stability. There is little doubt that the spectrum of urban agriculture as part of a sustainable development strategy simultaneously be able to overcome the urban food insecurity crisis. It is subjected to the focus of food utilization that emphasizes the proper use of food, proper food processing, proper storage techniques, as well as adequate knowledge on the food application.

5.1.4 Food stability

Food stability is depending on the agricultural practices itself either employs good or bad agricultural practices through sustainable or unsustainable agriculture approach, respectively. This approach further portrays the urban agriculture system to be either short or long-term non-emergency responses depending on the needs of the situation. The capability of urban agriculture to adapt and recover from any possible adverse conditions such as climatic, economic, social, and political factors can show its positive stability.

5.2 Development strategy of urban agriculture programs for community resilience

5.2.1 Social strategy: urban agriculture as a medium for survival livelihood

The efforts made by the urban dwellers through urban agriculture are contributing to the enhancement of social well-being from the struggle reduction on urban food insecurity. Social well-being in this context refers to the continuous practice and sustain of urban agriculture, which offers a more resiliency as an informal food supply system. Accordingly, low-income households in Harare, Zimbabwe, practice various farming systems despite urban legislation for their survival (Kutiwa et al., 2010). Urban agriculture is being practiced either in the backyard or kitchen area, roadside, or even abandoned area (Gasperi et al., 2016; Kutiwa et al., 2010; Pulliat, 2015). As such, resiliency can be gained through agricultural innovation of various farming techniques with low cost of machinery and maintenance either introduced by the government, non-government, or association. The purpose is to diversify the agricultural product, thus improve their social well-being.

From a social protection perspective, the informal food supply system of urban agriculture plays its role as a survival strategy through the food banks. It portrays a close relationship with food availability by presenting the continuous existence of food production, food reserves, food storages, and food markets. For example, the survival of poor urban communities can be seen through the primary crop production, which is a staple food of maize (Khumalo and Sibanda, 2019; Kutiwa et al., 2010; Moucheraud et al., 2019; Pulliat, 2015). It is usually planted for present self-consumption, not for domestic or store for future use. This practice is subjected to the location and size of the urban agriculture area, which is implemented in any possible area that could be used as a farming plot. Besides, poor urban communities in Hanoi, Vietnam, resorted to urban agriculture as a coping strategy to overcome food insecurity by being able to fulfill the needs of basic food requirements or food reserves (Pulliat, 2015). It becomes a significant source of fresh food as it contributes to food production and food reserve as well as for human health in terms of dietary diversity.

5.2.2 Economic strategy: urban agriculture as a medium for social safety nets

Social protection through social safety nets is encouraging the adoption of innovative urban agriculture activities that could empower the vulnerable urban group. The activities should be able to relieve their urban food insecurity by reducing food expenditure and diverse food production of agro-based products. This condition is further providing an opportunity for the urban dwellers to improve their economy through small enterprise. For instance, vegetables such as morning glory, tomatoes, cucumber, and pumpkin are the most popular food product planted by urban communities in Hanoi (Pulliat, 2015). Meanwhile, the allotment garden in the Philippines focused on the food production of vegetables and fruits such as banana, papaya, and pineapple (Holmer and Drescher, 2005). Even though the price for those vegetables and fruits is low, the availability of the product could reduce the food expenditure as the products are consumed daily.

Consequently, the cooperation from public or private organizations enhances agricultural production with diverse food of agro-based products. It became a platform as well as safety nets for the vulnerable urban group as a promotion of entrepreneurship through the engagement of economic activity with the industrial sector for the development of small enterprises. Furthermore, diversifying the enterprises of the low-income household could support the resilience strategy of this vulnerable urban group. For instance, the initiatives are done by Berlin metropolitan via direct marketing or regular retailer, community-supported agriculture, and 'pick your own' program (Specht et al., 2016). These programs are implemented along the urban fringe in which consumers allowed to experience the on-site buy and sold activities by choosing the food producers themselves. From another study conducted by Meenar and Hoover (2012), Pulliat

(2015), and Khumalo and Sibanda (2019), individual farmers tend to farm and sold agricultural products of fruits and chicken for small enterprises. This is because both products are considered as expensive foodstuffs that have great potential to create additional income that can be sold in the local market.

5.2.3 Environmental strategy: urban agriculture as a medium for sustainable agriculture support

The environmental strategy, particularly on sustainable agriculture approach, can be achieved through social assistance. Social assistance is a set of programs targeted to the poor community through a community-based strategy. It consists of governmental and non-governmental support, individual and community cooperation, continuous workshop from institution and organization, hands-on training from the volunteer and association, and sponsorship on agricultural tools for the development of suitable urban agriculture practices. The focus is an invention of the food aid program, mainly to improve the condition of the vulnerable urban group as both for short and long-term non-emergency responses. The program is conducted through the adoption of urban agriculture on waste management and organic farming by referring to a sustainable agriculture approach.

The environmental strategy of social assistance in waste management provides an indirect impact on the environmental aspect. It engages the collaboration of the communities, neighborhood association, and municipal administration to provide an adequate amount of stable food for the poor urban communities. In a study conducted by Holmer and Drescher (2005), the development of allotment gardens in Cagayan de Oro, Philippines is developed by the UN-Habitat Sustainable Cities Programme and supported by the city district as well as institutional agency in addressing the challenges of urban environmental management and food insecurity. The urban agriculture development consists of composting management from the household waste of the neighboring area that will be used in their urban agriculture practices. The process of converting organic waste into compost products, therefore, involves the segregation of biodegradable waste from the neighborhoods. It is similar to the study of Ramaloo et al. (2018) initiated by the Penang state government in Malaysia. The idea of producing safe and nutritious food is practiced through the sustainable agriculture approach of organic farming techniques. The Penang Department of Agriculture is not encouraging the urban farmers to use any pesticide or chemical fertilizer in their food products, which are regularly supervised by the government officers. As a result, the Urban Farming Project of Taman Desa Damai is acknowledged as the first area in Malaysia to obtain the Malaysian Organic Scheme Certificate in 2013.

6.0 Conclusion and Recommendations

This paper presents an exploratory review of urban agriculture and its relation to community resilience in combating food insecurity, revealing a remarkable addition of food stability as another element other than food availability, accessibility, and utilization. This paper also provides detail insights into what happens in practices. The tremendous impact of urban food insecurity could, therefore, possibly influence the urban food system in terms of its evolution, management, and performance. This is subjected to the condition that food insecurity is tackled by the sustainable use of natural resources to meet human needs.

As a recommendation, the findings show how consideration of sustainable development strategy plays a vital role in uplifting resiliency among the vulnerable urban group and part of an emergency or non-emergency response. The response can be categorized into short and long-term responses through the identification of the economic, social, and environmental impact of the resilience strategy or program.

- The short-term responses are evaluated through the socio-economic impact of urban agriculture. The urban food system of urban agriculture practices capable of guaranteeing the accessibility and affordability by producing continuous food products to a low-income household. The availability of fresh food product that is safe and nutritious is encouraging for a healthy lifestyle as well as viable for small enterprises, thus creating an additional source of income at critical conditions.
- The long-term response can be seen through the potential of urban agriculture as a platform for community engagement and sustainable livelihood. This strategy is emphasizing the importance of green spaces in a residential area. It could be considered as a viable social support system that is underlining the interaction between economic, social, and environment.

Therefore, possible suggestions for future research is to facilitate the process of building a resilient community in a changing environment by strengthening the coordination among individual, community, and organization. In this case, all parties could play their role in bringing up the vulnerable urban group to work together on urban agriculture practices as an initial exposure such as community project, competition, and knowledge or skills sharing sessions. The exposure should be actively presented to the public on the social media platform of social networking, photo sharing, and video sharing. It further improves the knowledge and skills of the local food systems, specifically as the preparation for the unexpected food crisis through a sustainable agriculture approach. The realization of the importance of sustainable agriculture can be shared during the workshop and training as well as giving continuous consultation on the recent approach in sustainable agriculture by the government and non-government agencies. Furthermore, it can be emphasized by providing a land area within a residential area, specifically for urban agriculture activities through proper legislation. Hence, the availability of land area could be a motivational factor on the desire among the vulnerable urban group to develop their urban agricultural area in facing the issues of food insecurity.

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