

## MINI-REVIEW PAPER

# A review on social resilience models in the family farming system (Emphasis on increasing production in the face of climate change)

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## Highlights

- Farmers' performance is affected by the effects and consequences of climate change, including the family farming system.
- Strengthening the spirit of social resilience can increase farmers' ability to withstand crises and natural disasters.
- The results of studies conducted by researchers around the world have led to the emergence of models for measuring social resilience.
- The results showed that the S5 is the most comprehensive model for measuring this type of resilience.

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## Graphical Abstract



## Abstract

In recent years, one of the most important issues that many researchers have addressed is resilience to climate change. Today, most of the products and consumer goods of urban communities come from villages. These products are also produced by farmers, i.e. farming systems, so the farming system and especially the family farming system, which is the most common form of farming system, are of particular importance. Climate change is more focused on productive communities, i.e. villagers and farmers, and consequently the impacts of these climate changes are also felt in urban communities. Therefore, promoting resilience among all productive communities is crucial to improve the capacity of communities to cope with shocks and tensions in times of crisis and natural disasters. Among the various dimensions of resilience, the social dimension encompasses many other dimensions. In this paper, social resilience, climate change, family farming system, and resilience assessment models were studied using documentation methods. The results indicate that among the proposed frameworks and models, the S5 model is the most appropriate to measure social resilience because all dimensions of social resilience, including social structure, social capital, social mechanisms, social justice, and social beliefs, were carefully assessed in this model. Adaptability and compatibility with a particular context is a characteristic that has made the S5 model superior to other models.

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## 1. Introduction

Climate change has various effects on different communities. Including our country, rural communities are one of the main productive communities in developing countries. The slightest change in the amount of their production will cause many problems for them. Therefore, rural communities will be more affected by natural disasters than urban communities; meanwhile, the rural economic system has a higher level of vulnerability than other economic systems affected by climate change. Most rural activities are mainly agricultural work that is exposed to damage such as pests and natural disasters (Berkes and Ross, 2013). In addition, the agricultural sector, due to its very close relationship with natural resources and climatic conditions, accepts many effects of climate change (Denton, 2002). This connection of the agricultural sector with natural resources will lead to the greater vulnerability of rural communities, especially farmers, so that with the smallest changes in production and income, they will face many economic problems. Therefore, this phenomenon has a direct impact on land use systems (Swapan and Gavin, 2011). In many other countries of the world, including Zimbabwe, the family farming system is the dominant system of land farming in agriculture. In these countries, government seek to increase the awareness of traditional farmers about climate change and its effects on agricultural practice. Because they also believe that the weather conditions have a great impact on the livelihood of farmers and cause problems in society such as poverty and food insecurity, etc., so the humanitarian agencies have annual food aid programs for them. They intended. climate education and capital investment is needed to change traditional farmer perceptions about climate change impacts on the farming practices. Increased climate awareness initiatives, establishment of village-based weather stations and the marrying of traditional farming climate knowledge to modern practices are highly recommended to enhance resilience to climate.

Researchers believe that element of resilience in communities should be identified instead of emphasizing on reduction of vulnerability. Social resilience is a dynamic and multidimensional concept that refers to the ability of societies to cope with shocks and tensions in times of crisis and natural disasters, which leads individuals and societies to resistant against problems and difficulties and to build their capacity for adaptation which individuals and communities can return to their original state in the shortest possible time after absorbing problems (Maguire and Hagan, 2007; Adger et al., 2005). Resilience can be considered as the main factor in the sustainability of societies, and the sustainability of societies is one of the basic principles of sustainable development. Because the knowledge and understanding of societies about the element of resilience increase their awareness of climatic phenomena and other unexpected events and causes them to face the least disturbance and confusion when these phenomena occur. According to the above, societies should have the element of resilience, and social resilience is very important among the various dimensions of resilience, so that it can even be considered as a background and can be included other dimensions of resilience. Another issue that arises here is which land-use systems can be most affected by climate change? The results of various researches show that family farming systems are one of the most common farming systems in Iran and the Kermanshah province. The family farming system is a socio-economic unit that is owned by a single-family and most of the required labor force is provided by the exploiting family. Also, the management of the farming unit is completely or at least an important part of it, are the responsibility of the head of the family and more than other farming systems are affected by climate change. Therefore, this study tries to provide the most appropriate model for measuring social resilience among the studied system by examining different models and frameworks.

## 2. Investigating the concept of resilience and social resilience against climate change

The word resilience is used to mean "going backward", which is derived from the Latin root Resilio meaning "jumping or rising backward" (Klein et al., 2003). The term social resilience was first coined by Edger et al (Adger et al., 2005). Since the advent of this concept, various definitions have been offered. The results of studies showed that social resilience is a dynamic and multidimensional concept that refers to the ability of communities to cope with shocks and tensions in times of crisis and natural disasters, which leads individuals

and communities to the resistant against problems and hardships and creates adaptive capacity among them so that individuals and communities can return to their original state in the shortest possible time after absorbing problems (Maguire and Hagan, 2007; Adger et al., 2005). The keyword resilience is the best and the most widely used term among the concepts presented in the field of resilience. Ecologists use resilience to describe ecosystems as: Habitats that continue to function in the face of adversity, problems, and crises. Today, one of these crises in the world is the issue of climate change. Climate change was first raised in 1980 in scientific circles following the increase in the concentration of greenhouse gases. Mayunga (2007), was the first person who introduced resilience in the field of natural hazards and disasters such as climatic phenomena (Mayunga, 2007). It was also in the 1980s that the engineering community first measured resilience from a catastrophic point of view, regarding physical infrastructure, and associated it with the concept of the ability to absorb and recover from horrific and dangerous events.

### 3. Relationship between climatic phenomena and family farming system

Villagers, whose main source of their income is agriculture, are more vulnerable to climate change and external tensions due to their dependence on natural resources and agricultural products (Maguire and Hagan, 2007). Since the agricultural sector of any society is based on the farming systems, these systems have played a significant role in agricultural development for a long time and always they are considered for the proper use of water and soil resources as one of the fundamental issues for Iran's agriculture. Therefore, the most damage is for the land use system, which can be defined as a dynamic and interconnected system of humans and the environment, and have been formed based on organic relationships, social structures, historical events, natural disasters, economic relations, indigenous knowledge and mutual coexistence. The main result of these climate changes, in addition to the impact on agricultural production in rural communities, also reduces food security for all communities. Because phenomena such as drought, floods, hail, dust, etc. have caused the destruction and reduction of agricultural production in rural areas, which has reduced the product supply or has increased the prices to the consumer market. Since our country is one of the developing countries that are constantly exposed to climate phenomena, planners at the national level should present a program to farmers who are food producers in the country, because the country's rural communities, with having many values and capabilities as the most important national investment, have been affected by ruthlessness and mismanagement in the country's multi-year planning system (Pashnezhad Sielab et al., 2017). In other words, ecosystems or resilient communities must-have characteristics such as the ability to withstand shocks, external shocks, and disturbances, and if necessary, they must have to adapt to these changes. This means that they can cover and control all the stages before, during and after events and phenomena. Social and environmental vulnerabilities to natural disasters are affected by the development or erosion of resilience before and after a disaster (Adger et al., 2005). Pashnezhad Sielab et al., 2017 in his research concluded that Iran's agricultural sector has the highest potential for job creation and the lowest cost of job creation among other sectors of the economy (Pashnezhad Sielab et al., 2017). Also, according to the country's sanctions, the agricultural sector should be the center of the country's growth, especially in providing food security and maintaining national security. The country also depends on agricultural products, especially self-sufficiency in the production of strategic products. To increase food security among people in a growing society, the need to produce more high-consumption food has intensified to pave the way for sustainable development, which is the goal of many countries (Cutter et al., 2008).

### 4. Models and frameworks for measuring social resilience against natural disasters

In the following, the frameworks will be analyzed for measuring social resilience and finally a comprehensive framework will be presented for measuring resilience. Capital-based model/approach; which examines resilience based on the types of capital: economic, social, physical, natural and human (Mayunga, 2007). Sustainable livelihood framework; in this model, the concept of resilience and stability are considered as

synonymous. It also measures the social, economic, institutional, and infrastructural components. The problem of this model is that the household livelihood is affected by political, social and physical conditions and the government and public institutions helps is ignored (Burton, 2012). Haitian Resilience Assessment Model; includes seven dimensions of resilience and relies more on humanitarian assistance (Boon et al., 2012). Davis linear-temporal model; increases the amount of resilience during the three stages before the accident, during and after the accident and finally the necessary changes in society to create resilience. The problem with this model is to consider special conditions along with the time factor (Boxer and Sloan-Power, 2013). Spatial model; Resilience is considered as a dynamic process that examines the relationship between resilience and vulnerability at the community and local level, and it improves the comparative assessment of resilience to disaster, and one of the disadvantages of this model is that it depends on the past conditions, the severity of the disaster, and the time of the occurrence of the dangerous incident, and is also influenced by external factors. Model S5: Paying attention to social resilience as a multidimensional concept, has the ability to adapt to any particular field, also covers the dimensions of social structure, social capital, social mechanism, social justice/diversity and socio-cultural beliefs which all the dimensions and indicators are listed in the following Fig. 1 (Islam and Khan, 2018).

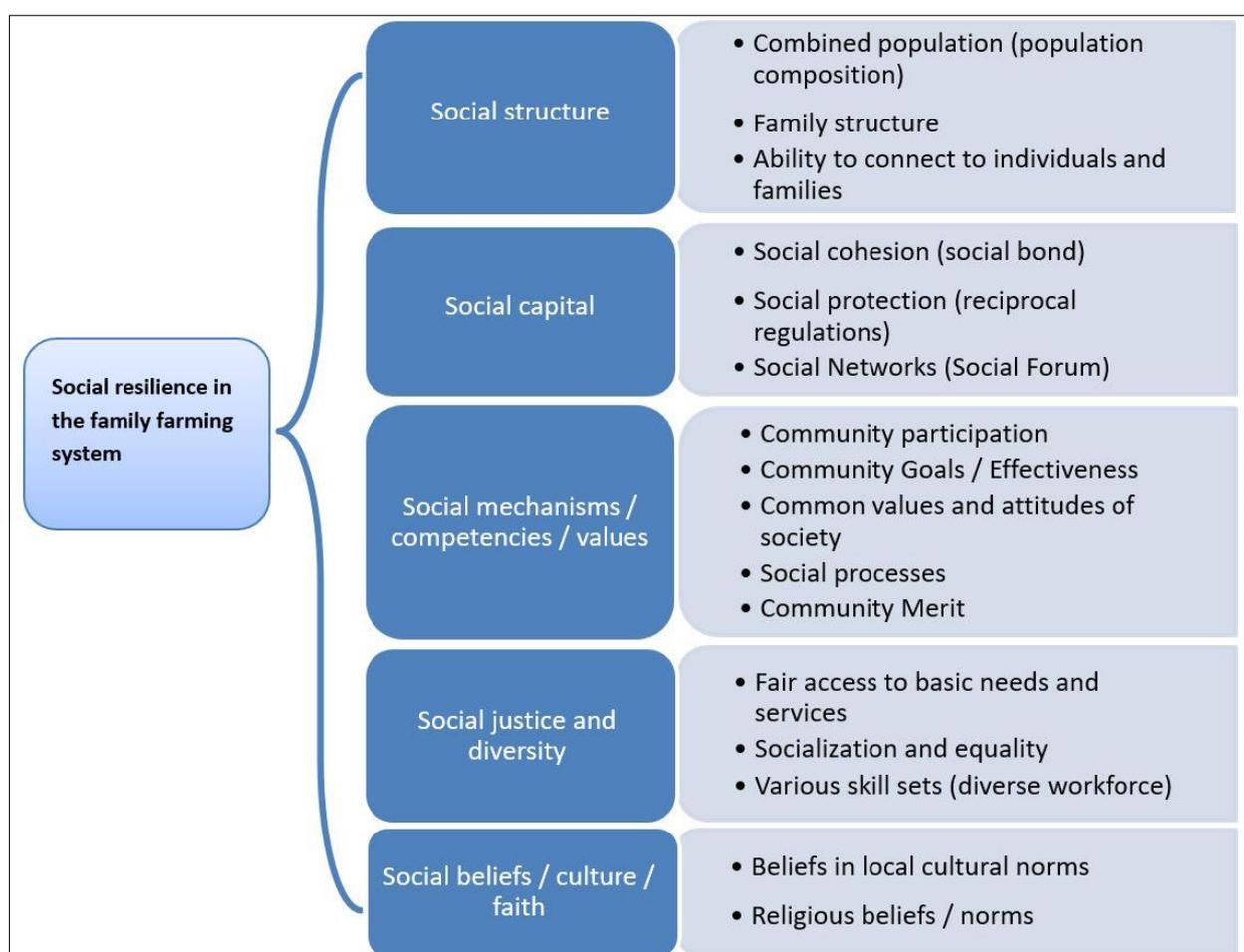


Fig. 1. Theoretical framework of research model S5 (Islam and Khan, 2018).

## 5. Conclusion

Therefore, according to the proposed models and frameworks, we conclude that the S5 model is the most suitable model for measuring social resilience; because it examines all aspects of social resilience, including social structure, social capital, social mechanisms, social justice and social belief. By measuring each of the indicators in different dimensions against natural disasters, we can get an overview of how much a system has the ability to withstand natural disasters, which the purpose of our research is to identify these dimensions and

these important indicators. In addition, this model has the ability to adapt to any particular context. If we apply this model to farmers in rural communities, farmers will learn the details of their resilience in each dimension and context against climate change, and will be better able to plan ways to increase their resilience in various dimensions.

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