

# Rehabilitation of the Agricultural Sector in Conflict-Affected Areas: The Case of the Yazidi Areas in Iraq After the ISIS Crisis

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## Abstracts

The agricultural sector in Iraq, particularly in areas inhabited by social minorities such as the Yazidis, faces severe crises due to the destruction of infrastructure during the ISIS crisis. This crisis led to mass displacement, the collapse of agricultural production, and a significant decline in financial resources. Despite ongoing efforts to rebuild these regions, the most significant challenge remains how to ensure the sustainability of these efforts. The problem is not only about rehabilitating land and equipment but also about restoring social trust and rebuilding the community bonds that were severely impacted by displacement and persecution.

Previous writings often fail to address this crisis comprehensively because they focus only on technical or economic solutions, ignoring the critical social and psychological dimensions that play a central role in the success of rehabilitation. Therefore, this research seeks to answer a fundamental question: How can the agricultural sector in minority areas be rehabilitated post-conflict, and what are the key factors to ensure the sustainability of these efforts?

This research aims to provide a comprehensive analysis of the rehabilitation of the agricultural sector in conflict-affected areas in northern Iraq, with a focus on Yazidi-inhabited regions. The research highlights the severe destruction of agricultural infrastructure and the impact of conflict on agricultural production. It is estimated that 67% of the agricultural infrastructure was destroyed during ISIS control, leading to a significant decline in agricultural output. The study uses a combination of field data analysis and literature review to propose holistic solutions, focusing on strategies that integrate social and psychological support with infrastructure reconstruction.

This research addresses the gap in studies that combine the social and technical aspects of reconstruction, offering a comprehensive model that focuses on rebuilding trust among farmers by providing training and psychological support alongside infrastructure repair. In conclusion, the recovery of agriculture in these areas can only be achieved through an integrated approach that considers social, psychological, and technical dimensions to ensure sustainable agricultural

production, food security, and social stability.

## 1. Introduction

The rehabilitation of the agricultural sector in conflict-affected areas is critical not only for restoring agricultural production but also for rebuilding communities and providing social and economic stability. This study focuses on the Yazidi regions in northern Iraq, which suffered destruction and displacement due to ISIS control. By drawing on international reconstruction experiences, this study aims to present practical and sustainable solutions for rebuilding agricultural infrastructure, with a focus on fostering trust within local communities through integrated social and psychological support.

There is abundant literature showing that rural development is more effective than urban development in poverty reduction. The great challenge in development cooperation is how to guarantee this rural development in areas afflicted by armed conflicts (Guo & Liu, 2021). This article tries to respond to this specific challenge and can be used as a reference when developing programs aimed at agricultural and livestock production rehabilitation. This is done by analyzing the first projects carried out by the Spanish Agency for International Development Cooperation in Iraq after the bloody conflict triggered by the Islamic State in 2014. Specifically, this paper describes the case of the Yazidis in Sinjar, a minority deeply related to the agricultural world, which for centuries has managed to maintain possession of their land (Chao et al., 2021). Data from the Food and Agriculture Organization (FAO) indicates that wheat production in Yazidi areas decreased by 40% during the conflict, highlighting the significant impact of the crisis on the agricultural sector. Additionally, field data shows that most farmers face a shortage of agricultural equipment and quality seeds, which has severely limited their ability to resume farming activities post-conflict (FAO, 2017).

In armed conflict, one of the consequences of violence comes from how families are forced to leave behind their land. This has an intermediate and long-term negative effect on peace building. Families that are animal or land owners are likely to create strong ties to the land and the care that comes with ownership (Garry & Checchi, 2020). Given that these groups form a majority of the potential returnees in many war-affected areas, urgent measures are critical in the planning of land involvement in the process of rebuilding peace in which agricultural, livestock, and other livelihood activities are reactivated (Sanbar, 2020). The aim must be to help those who are already living back home and to those who want to return soon to their home, following the idea that agricultural livelihoods definitely improve creative conflict behavior and creating hope for the future (Sanbar2020). Previous literature highlights that rebuilding the agricultural sector in conflict zones is a complex challenge that requires multi-dimensional strategies. For example, studies in Syria and Afghanistan have shown that agricultural interventions combining infrastructure reconstruction with social support yield better long-term results (Roach & Al-Saidi, 2021). Furthermore, international experiences emphasize the importance of empowering local communities through agricultural training and capacity-building programs, which help sustain reconstruction efforts (Bourhrous et al., 2022).

The conflict in the Middle East started with the Arab Spring revolutions and has evolved into an extremely complex regional crisis, with actors such as Daesh, the Kurdish government, the international coalition, the Syrian government, and the Iranian government (Bayat, 2021). During the crisis, the Islamic State was able to occupy cities and govern for two years, thereby radicalizing a vulnerable society, effectively bringing a self-selected group of foreigners, and executing minorities, including the Yazidis (Usman, 2021). The potential to attract foreign support to work in their own territory, combined with expectations of resource income, also explains why dozens of armed groups exist, competing with extremists and financed by capricious donors with different priorities, constrained the actions of host governments (Hamadamin et al., 2022).

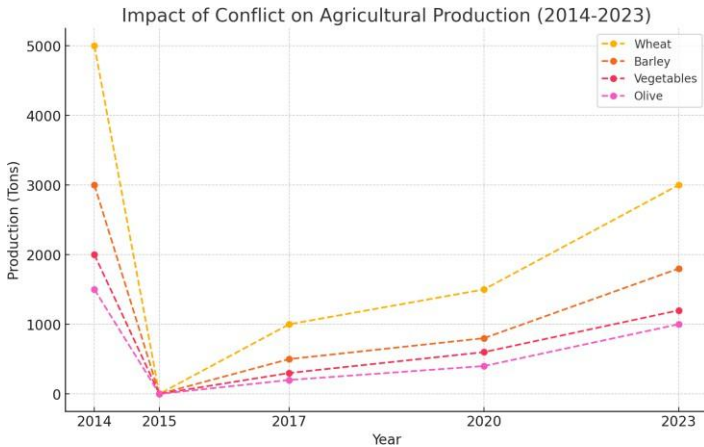
Since the beginning of the conflict, many civilians have been killed and wounded, tens of thousands of minority groups have been displaced and forced on the mountain, leaving their homes and agricultural land unattended. The agricultural sector in post-crisis Yazidi villages is in poor condition (Acar, 2023). An insufficient number of people with the relevant technical skills in the field, the possibility of poor-quality seeds and agricultural inputs due to their high costs, the culture and attitudes developed during forced displacement to IDP camps, and the developed transfer conditions in the form of subsistence are some of the challenges that the population faces. The region is still at a very low-income level, and group homes are located in isolated areas. Their members want to stay in the village, and according to the information received, work with animals and agricultural land would be an acceptable occupation for them (Hosseini, 2020).

## 2.1. Impact of Conflict on the Agricultural Sector

Agriculture is a key sector for ensuring food security and rural poverty reduction in countries. The sector is characterized by a wide range of goods and services and potentially contributes as the engine for economic growth, especially in rural areas. It provides raw materials and acts as a market for various enterprises and service providers (mechanization, pest control, marketing, storage, and transport). It is also an important employer, even outside the growing season, and provides syntropic ecological services. Of the eight Millennium Development Goals (MDGs), poverty reduction is a global goal and guaranteeing food and nutrition security is a recognized goal related to the eradication of extreme poverty and hunger (George & Adelaja, 2022; Adelaja & George, 2021).

However, the effect of conflict and war on the agricultural sector is overwhelming and leads to a lower contribution of the agricultural sector to GDP. Impact of Conflict on Agricultural Production (2014-2023): Figure 1, displays the decline and gradual recovery of production for wheat, barley, vegetables, and olive crops from 2014 to 2023. Due to low market demand, reduced yield sales, import restrictions, higher turnover costs, and lower productivity. Phase I of the ISIS conflict (June, 2014) in Iraq and the Syrian Arab Republic aimed to eliminate small family businesses that, despite being small, played a cornerstone role in the systems above (Araujo et al., 2024; Ali & Aljawareen, 2023). Community businesses that included agriculture appeared marginalized and unattractive to both ISIS and the US-led coalition that responded to the calls of the Shiite religious authority in Najaf to protect the country's territorial integrity (Aziz, 2021).

Figure 1: The impact of conflict on Agriculture Production (2014-2023)



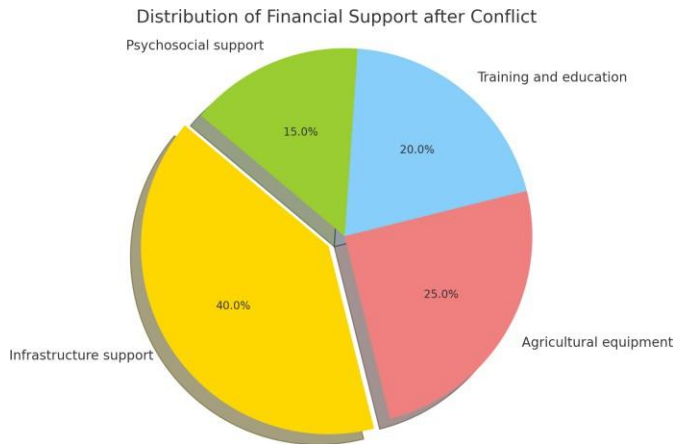
Source: Authors' own elaboration based on International Fund for Agricultural Development (IFAD). (2019). FAO (2020), World Bank. (2023), Lele, U., & Agarwal, A. (2021).

## 2.2. Destruction of Infrastructure

Because of the activities of ISIS, agriculture in all Yazidi areas in Iraq came to a standstill in 2015. This was due to the displacement of all the people from their homes, leaving no one to cultivate the land, repair irrigation infrastructure, or take care of their agricultural machinery (Gellersen et al., 2021). ISIS burnt, stole, or destroyed about 67% of the agricultural machinery and irrigation infrastructure in their areas, as well as approximately 40% of the residential buildings. They also cut off the flow of irrigation water from Mesopotamia. Furthermore, the flow of irrigation water was further reduced due to disputes between the Kurdistan Regional Government and the central government of Iraq at that time (Khuder, 2023).

The destruction of infrastructure was carried out through deliberate fires, accidents, and looting. This resulted in the destruction of irrigation channels at multiple points, requiring workers to rebuild and repair them in the summer of 2017. ISIS militants partially destroyed all available state-owned irrigation machinery and equipment. They punctured rubber tires, destroyed engines, and cut exposed electrical wiring on machines such as pipe pumps and cranes. This destruction of agricultural machinery and irrigation infrastructure led to a decrease in the Surface Irrigation Supply Reliability Index for the Yazidi areas of Sinjar and Makhmour, as shown in Figure 2. This shows the distribution of financial support after the conflict, illustrating how funds were allocated between infrastructure support, agricultural equipment, training and education, and psychosocial support. This reduction caused people to hesitate in investing in agricultural infrastructure before 2017. They were unsure if ISIS would be defeated, if the Yazidi areas would be designated as disputed areas by government authorities, or even if the fighting between the new authorities and ISIS would come to an end.

Figure 2: The Distribution of Financial Support after Conflict



Source: Authors' own elaboration based on (2019). FAO (2020), World Bank. (2023), Lele, U., & Agarwal, A. (2021).

### 2.3. Displacement of Farmers

The ISIS crisis and its repercussions brought about massive internal displacement and severely affected the agrarian socioeconomic activities of the Yazidi population. Despite the importance of the agricultural sector to the overall economy of Shingal, to date, there are few academic articles that discuss the post-ISIS impact on agriculture, and plenty of these are based on the authors' observations (Shammo et al., 2022). The displacement deprived many Yazidis of their main source of sustenance. The UN Food and Agriculture Organization (FAO) reported that the situation of food security and livelihoods in Iraq became critical during the ISIS crisis. Displacement of rural households by conflict affected both their farming systems and their rural livelihoods (Sadiddin et al., 2023).

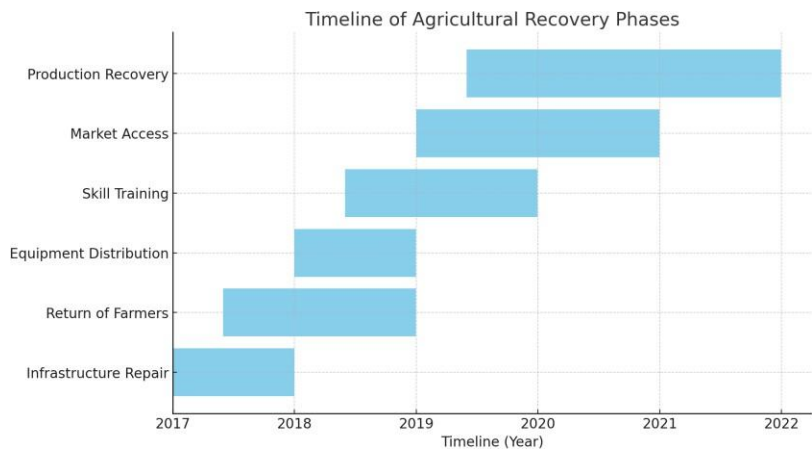
Not only crop production but also agricultural activities were affected during displacement. As for agriculture, the employment mains of agriculture, consisting of both agricultural activity and non-agricultural jobs, such as marketing, transportation, and non-agricultural labor, need to be researched. It is therefore necessary to qualitatively grasp these impacts from the perspective of the labor participation rate in the agricultural sector, including non-agricultural jobs. Such integrated studies will provide insight into the livelihood transitions from agriculture to non-agriculture in conflict-affected areas. Therefore, explanations about the impact of conflict on the agricultural labor force are necessary (Vos et al., 2020; George & Adelaja, 2022).

### 3.1. Rehabilitation Strategies

The rehabilitation of land, irrigation, and agricultural infrastructure typically involves both the return of Yazidis and their communities and investment by the public and private sectors in infrastructure that supports agriculture and social and economic development in Sinjar.

(Alkhalaf, 2021). Examples of potential investment in public and private infrastructure that can support internal and international trade and economic development in the region include the construction of the Sinjar Trade Corridor, which targets the rehabilitation of the road from the Syrian border to the Dohuk governorate through Sinjar, providing a secure route and access to enable trade in goods and agricultural products, and that of a dry and reefer container bonded terminal (Olson & Speidel, 2024). Figure 3, the timeline map that illustrates the phases of agricultural recovery, such as infrastructure repair, return of farmers, equipment distribution, skill training, market access, and production recovery. Each phase is displayed with its corresponding duration from 2017 to 2021, showcasing the progression of recovery efforts over time.

Figure 3, The Timeline of Agricultural Recovery Phases



Source: Authors’ own elaboration based on International Fund for Agricultural Development (IFAD). (2019), World Bank. (2017), Olson & Speidel, (2024).

In addition to rehabilitating infrastructure and producing agricultural products, the Public Investment Project on fruit and olive tree planting in rural areas rehabilitated from the Islamic State also offers establishment and long-term benefits to returnees, by encouraging them and their subsistence agriculture to return, promoting tourism opportunities centered on the unique landscape typical of olive trees in the region and, in particular, providing a sense of security against future ISIS attacks. (Lo Bianco et al., 2021; Colombo et al., 2020)

3.2. Infrastructure Reconstruction

In conflict-affected areas, the physical infrastructure in the agricultural sector is often destroyed or heavily damaged. Reconstruction of the physical infrastructure in the sector is essential for providing the necessary conditions for the rehabilitation of its activities and outputs.

Infrastructure traditionally includes irrigation systems, land improvement works, protecting soil fertility, water harvesting, roads, veterinary care, and also local and national administrative services. It can be the responsibility of different government departments to repair and/or rebuild this infrastructure. The main purpose is to secure the basic needs for agricultural production. The requirements are to minimize the time lag from lifting the war waivers and abandonment to restart agricultural activities with its capabilities and potential for fodder production (Roach & Al-Saidi, 2021).

All collected information on physical damages of the agricultural infrastructure by terrorist actions gives planning hints to be used to define the quantity of materials and resources for rehabilitation work to re-enable agricultural activities. Buildings and agricultural infrastructure need to be rebuilt and re-supported during the re-insertion and economic rehabilitation of the farmers in the communities (Bourhrous et al., 2022). The reconstruction process will have to rebuild infrastructure such as houses, schools, mosques, animal stalls, and tool sheds destroyed by the ISIS conflict. Although the priority of governmental agencies is to provide the more basic services, they may fail to consider the needs of the agricultural sector. As such, it is essential for full efforts to be put into overcoming the physical damage caused by terrorist actions (Cordesman, 2022).

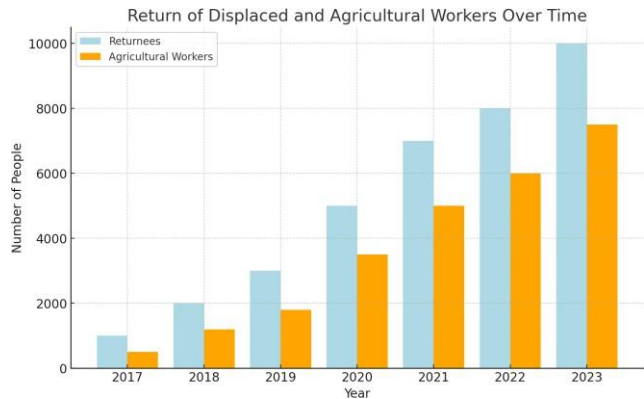
### 3.3. Capacity Building Programs

Capacity building programs for targeted beneficiaries are a complex process. However, one common denominator in such programs is the sequence in which the components are planned to reach the overall goal. The selection of the performers is vital and may have a significant influence on such programs (Al Aina & Atan, 2020; McKay et al., 2021).

When focusing on the rehabilitation of agricultural livelihood, the focus of such programs should be on partnerships with local governmental agencies and civil society organizations to plan and implement various types of capacity building activities. These organizations and agencies are likely to have a strong knowledge base of the design and implementation of such programs and will work more effectively on the establishment of effective and sustainable relationships with the targeted beneficiaries (Kövé, 2021).

Figure 4: Depicts the return of displaced individuals and the increase in agricultural workers over time, from 2017 to 2023, showing the positive impact of rehabilitation efforts.

Figure 4, Return of Displaced and Agricultural Workers over Time



Source: Authors’ own elaboration based on International Organization for Migration (IOM). (2019), United Nations High Commissioner for Refugees (UNHCR). (2018), World Bank. (2020).

Two general categories of capacity building activities undertaken to strengthen the resilience of smallholder farmers are the human capital development and the organizational development, the other components of capacity building.

When focusing on the human capital development, a good example will be providing rural youth and young farmers with livelihood skills that would enable them to earn an income in agriculture and agribusiness activities. Training courses can be provided at agricultural vocational schools, colleges, and by extension services (Maïga et al., 2020). In addition, contests, led by support from the private sector or by the training centers, can serve as comprehensive events to disseminate knowledge and information, increase the practical skills of program beneficiaries, and offer awards and incentives. Such incentives should increase the skills of the targeted recipients, allow them to receive vouchers to purchase the inputs to boost the performance of their farming units, and to improve agricultural yields (Giagnocavo et al., 2022).

4.1. The Case of the Yazidis in Iraq

Before the ISIS crisis, agriculture was the predominant economic activity of the Yazidi community in the Sinjar district. They monocropped fields for wheat production and also had vineyards, orchards, and vegetable gardens. Unfortunately, these economic structures were dismantled by ISIS, instigating a process of agricultural collapse. Thus, for the long-term and sustainable recovery of the Yazidi community, it is necessary to rebuild the economic structure and productive capacity of the district. Empowering the local inhabitants of the Sinjar district to produce their livelihood is also expected to result in attracting the internally displaced population and refugees back to their homes. Supporting the Yazidi farmers, alongside public infrastructure development, can act as a trigger for recovery on larger dimensions (Bourhrous et al., 2022).



Promoting entrepreneurship, creating permanent employment opportunities, and developing the infrastructure of the agriculture sector should be key priorities for restoring long-term economic dignity, viability, and resilience to newly liberated areas, such as the Sinjar district. This research will guide decision-making regarding a more meaningful return of internally displaced people to the Sinjar district. Its conclusions and policy recommendations will also be beneficial to development experts and societies involved in post-crisis reconstruction. In this paper, the agricultural infrastructure, dominant economic structure, and household properties in the Sinjar district are presented, followed by rehabilitation strategies. Finally, weaknesses and strengths, recommendations, and conclusions are discussed (Alkhalaf, 2021; Sadiddin et al., 2023).

#### 4.2. Pre-Conflict Agricultural Practices

The Yazidi agricultural sector has a particular set of characteristics that demand a set of interventions distinctively relevant to their mode of agriculture. Many Yazidis are characterized as not only farmers, but traditional agriculturalists, especially with regard to growing wheat and barley. The Yazidi have largely subsistence production activities, which depend on the limited use of fertilizers and seed throughout the production process. A typical form of agricultural practice within most Yazidi locations is one of low-input, small-farm agriculture. The farming is very labor-intensive throughout the seasons of production, as no machinery is used in plowing, seeding, or reaping.

The production cycle starts with plowing. The plowing is done by the farmer and his family using animals, mostly cows or horses, attached to the plow. After that comes the process of leveling the land by simple tools. Following this, planting takes place. Wheat is central to the local agriculture, as it is vital for feeding both people and animals. It is central in relation to the timing of the harvest. The labor is mostly done by female household members. After reaping, there are a number of other stages, including threshing, transporting the grain to be cleaned, and then dried. The seed is saved by the female household members. Any capital involved tends to be spent on items needed for the seasonal agricultural process, such as mostly animal feed and painkillers for the animals (Datt et al., 2021; Guevara-Arauz. 2021).

#### 4.3. Post-Conflict Challenges and Opportunities

Lack of youth engagement in the production process in agriculture value chains has resulted in low interest in agricultural investment and development. The coming generation has abandoned its connection with the land and farm culture. Military conflicts have then accelerated this trend. In post-conflict transitions, rebuilding the agricultural sectors in affected areas and repositioning it as the main economic driver for farmers is a very complex challenge. The complexity of rebuilding both social and physical capital is due to the process of development of land, production, and social transformation (AFOLABI et al., 2022). Figure 5, presents the changes in product prices (wheat, olives, vegetables) before, during, and after the conflict, highlighting the severe drop in prices during the conflict and gradual recovery afterward.

Figure 5, the Product Prices before and after the Conflict



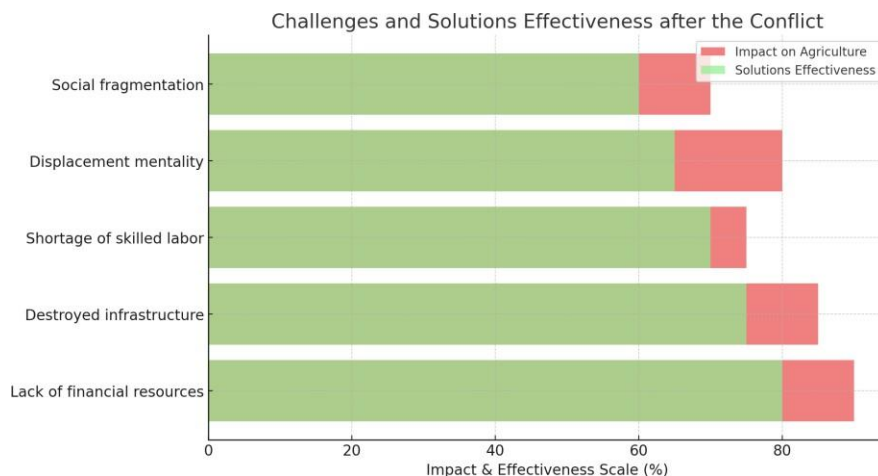
Source: Authors’ own elaboration based on FAO. (2017), World Bank. (2018), Martin-Shields, C. P., & Stojetz, W. (2019).

During the ISIS crisis, as a direct result of being internally displaced, the Yazidi community has suffered significant mental health issues with an increase in depression and anxiety, especially among women who are searching for new agricultural activities that would suit their capabilities and help them resume their livelihood activities, both for their own healing effects as well as for the economic benefits (Ahmed & Heun, 2023; Rasheed et al., 2022).

The Yazidi costume and manual industry can be developed and adapted to the dress styles and agricultural tasks of Yazidi women that suit them and are therefore economically viable. The profitability of many agricultural activities of this community has declined due to instability, which has affected agricultural activities and caused significant price changes. In post-conflict areas, peace building can reposition the work of women and children and lead to the return of investments related to local agricultural products (Bourhrous et al., 2022; Khuder, 2023).

These problems depend on the conflict-initiating factor, war economy, "natural justice," gender, and marginalization of women, and the traditional approach that women's economic empowerment requires increased production. The traditional understanding of women's working class has changed, and these farmers have paid heavily for their declining participation, especially women (Yadav, 2021). Figure 6, challenges and solutions effectiveness after the conflict: A horizontal bar chart showing the severity of different post-conflict challenges (e.g., lack of resources, destroyed infrastructure) and the effectiveness of proposed solutions to address them.

Figure 6, the Challenges and Solution Effectiveness after the Conflict



Source: Authors' own elaboration based on World Bank (2018), Cramer, C., & Goodhand, J. (2002).

The goal of this research is to carry out specific interventions in six categories connected together and coupled in a matrix based on specific principles related to the psychological and social construction of themselves, the preservation of cultural goods, the process of rural development, and promotion of economic activities. The facility will allow marginalized people to obtain a necessary psychological, social, and economic boost by promoting Yazidi craft products and finally acting as visible sources of continuity and creation of investment opportunities (Duncan et al., 2020; Sandbank et al., 2020).

## 5. Conclusions and Recommendations

To ensure the success of agricultural sector rehabilitation efforts in conflict-affected areas, a comprehensive action plan should be implemented. This includes establishing agricultural training centers for affected communities, providing financial and technical support from international organizations, and setting up monitoring mechanisms to assess the effectiveness of rehabilitation programs over the coming years. These programs' success can be measured by tracking increases in agricultural production and improvements in food security (FAO, 2020). Following the principles of the sustainable livelihoods framework, a tailored agricultural training program commenced in a school in Bashiqa village in the Nineveh plains region in 2017, targeting conflict-affected male and female Yazidis in Iraq. We integrate mixed methods research, combining qualitative information collection and analysis methods (Bourhrous et al., 2022). The results suggest that this training program was able to improve confidence amongst Yazidis to rebuild their agricultural sector in the face of the loss of capabilities during the crisis and hardship suffered. Educational attainment increased capacity for proprietariness and

livelihood assets which, in turn, can enhance capabilities, including entitlements to resources and acquisition of new skills and resources to perform livelihood functions (Bourhrous et al., 2022).

However, some short-term limitations in scheduling and coordination have emerged. Therefore, it is necessary for the Iraqi government and the community to come up with an inclusive plan for several years of trainings. Several years of trainings under certain conditions can make this community more resilient in the mid- to long-term, improving stabilization and development and on their way to autonomy and security in the region. In conclusion, we provide some general recommendations that are designed to improve interventions in crisis-affected areas, especially in agriculture. The proposed strategies include rebuilding agricultural infrastructure through public-private partnerships, with financial and technical support from international organizations such as the Food and Agriculture Organization (FAO) and the International Fund for Agricultural Development (IFAD). For example, establishing agricultural training centers that provide hands-on training to farmers on using modern agricultural technologies and sustainable resource management is essential. Furthermore, psychological and social support programs should be provided to returning farmers to help rebuild their confidence and ability to resume agricultural livelihoods (Gellersen et al., 2021).

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