

# The Role of Extension Workers in Managing Agricultural Indigenous Knowledge in the East Showa Zone of Oromia, Ethiopia

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**Submitted:** 2025, May 29; **Accepted:** 2025, Jun 30; **Published:** 2025, Jul 28

**Citation:** Gebru, W. T., Chagwiza, C. (2025). The Role of Extension Workers in Managing Agricultural Indigenous Knowledge in the East Showa Zone of Oromia, Ethiopia. *J Agri Horti Res*, 8(2), 01-08

## Abstract

The study aimed at assessing extension workers' role in managing agricultural indigenous knowledge (IK) in East Showa Zone of Oromia, Ethiopia. To do so, a concurrent survey design involving face to face semi-structured interviews and key informant interview were employed to collect data. A sample of 24 extension workers was selected through purposive sampling techniques to take part in semi-structured interview. Both quantitative and qualitative data analysis methods were employed. For quantitative data, descriptive statistics such as frequency, percentage and mean were used, while the qualitative data gathered through open-ended questions was organised, interpreted and analysed in the form of theme descriptions and tables. The result reveals that most extension workers are knowledgeable on different types of IK practices, not limited to clearing and preparing farm fields, controlling weeds and maintaining soil fertility. The study established that extension workers have been found to play a good role at preservation of IK and use a number of platforms to disseminate and promote IK utilisation among studied communities. However, most of these workers are not actively involved in the capturing and management of agricultural IK; and also, they are not making use of current extension advisor approach as a platform for sharing and learning of IK with smallholder farmers. Thus, the limited engagement of extension workers with IK could have negative policy impacts related to knowledge capturing and preservation, indigenous rights, and sustainable development. Special efforts are, therefore, needed to understand, document, disseminate and utilise agricultural IK for farming activities at the grassroots level. The study further recommends the need to revisit the roles and purposes of extension workers within the current extension model and then empower them to fully participate in the formal capturing, dissemination and preservation of agricultural IK.

**Keywords:** Indigenous Knowledge, Managing IK, Extension Workers, Ethiopia

## 1. Introduction

Agriculture is the mainstay of most African countries where its transformation from low to high yield production can improve the living standards of rural people. Needless to say that this cannot be achieved without having innovative mechanisms of generating, sharing and integrating farmers' traditional knowledge with other knowledge system. In the 1990s the government of Ethiopia has introduced a new and more participatory extension system which encouraged the smallholder farmers to take part in problem identification and development of agricultural technology through

and working within groups. In doing so, they are supposed to access new technologies and build upon their indigenous knowledge (IK) thereby turning the agricultural sector into an engine for national economic growth and development [3,2].

In that regard, trained extension workers are sent into the field to support the creation and sharing of new agricultural technology using Farmers Training Centers (FTCs) as a platform [4]. The main goal of extension program is to help different categories of farmers including the small-scale farmers to overcome their local

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problems through availing and encouraging the use of modern technologies as disseminated by extension workers [21,4]. Thus, strengthening the value of IK within the current extension model enabled the growth of smallholder agricultural productivity, where the extension worker can play a key role.

In Ethiopia, there is a wealth of indigenous knowledge which is useful in livestock and crop production, diseases and pest control, weed control, processing and storage of seeds, and a host of other farming activities [9,18,15]. Within such a diverse farming activity, IK serves as a primary source of information and knowledge for most smallholder farmers. However, IK remains overlooked by some modern communities in Ethiopia including grassroots level policy implementers and thus the strategies for capturing and managing IK is not well-understood among knowledge intermediaries including extension workers [22,4]. The conviction here is that more and more IK practices are being lost, and this in turn negatively affects the potential benefits of harnessing it for agricultural development.

In essence, extension workers, under their respective agricultural organisation can reduce the gap between the management of IK and dissemination of modern technologies. Muswazi asserts the need to harness a holistic KM approach that will pull together the efforts of Information and Library Science, Information and Communication Technologies (ICTs) and knowledge experts in the codification and documentation of IK [14,16]. There is, thus, a need to create enabling environment and local support groups who will act as a broker between available knowledge with individuals need for this knowledge [11]. IK is a communal resource which can be managed with a shared responsibility among the local actors in this context, extension workers take the leading role with smallholder farmers [14]. Through knowledge created and shared among these groups, the smallholder can hope to improve crop productivity and meets their household food needs.

This study argues that IK is represented in the library's archives in the same fashion extension worker play this role at the grassroots level because they are one of the building blocks of local information and knowledge sources. Therefore, this article was aimed to examine the efforts undertaken by extension workers in the management of agricultural IK in the study districts for its sustainability and enhanced accessibility. To this end, the objectives of this article were the following: (1) To identify the types of agriculture IK being known by extension workers (2) To explore whether the current extension advisory role enables or hinders them for managing agricultural indigenous knowledge and (3) To establish how the extension workers acquire, disseminate, and preserve agricultural IK, in the study districts of East Showa Zone of Oromia, Ethiopia.

## 2. Materials And Methods

### 2.1. Study Area

This study was conducted in the districts of East Showa Zone of Oromia, Ethiopia and particularly at the grassroots level. This zone has 10 districts and it extends 7° 33'50" North to 9°08'56" North

and 38° 24' 10" East to 40° 05' 34" East. It shares boundaries with Afar National Regional State in the Northeast, Amhara National Regional State in the North, Arsi Zone in the East and Southern Nations, Nationalities and Peoples of Ethiopia Regional State in the West and Northwest. The total population is estimated to be 1,964,540, of which 1,149,814 are rural and 814,726 are urban dwellers (East Showa Zone Agricultural Office, 2017).

The agro-climatic zone is dominated by sub-tropical (61.1 percent) and tropical (38.1 percent) with an altitude, ranging from less than 1000m to above 3000 meters below sea level. Its annual rainfall falls in between 650mm to 1200mm while the annual temperature ranges from 15°C to 28°C. The agriculture system is mixed, and it constitutes both crop and livestock production where farmers kept cattle to get oxen for tilling farmlands [5]. A subsistent oriented smallholder agriculture is the dominant crops production system in the zone during 'Meher' and 'Belg' season on the private land holdings although few commercial crops like sugar cane are produced around 'Wonji' and 'Metehara'. The area is also known for its excellent quality *Teff* grain, which is an important staple food grain in Ethiopia followed by wheat and pulses.

The article used a concurrent survey design involving both quantitative and qualitative data. This method was suitable for this article since it sought to examine the role of extension workers in managing agricultural IK in the districts of East Showa Zone of Oromia, Ethiopia. Posits that a mixed method is appropriate for study when we examine both quantitative and social phenomena [6]. Thus, it allowed the researcher to collect both qualitative and quantitative data by recording and taking brief notes on the topic under investigation.

### 2.2. Sampling Technique and Data Source

The target population for this article comprises all extension workers working in the four districts of East Showa Zone of Oromia, Ethiopia. There are about 96 extension workers distributed over these four districts namely: Adami-Tulu Jido Kombolcha, Dugda, Lume and Ada'a. A two-stage cluster sampling techniques involving random and purposive sampling techniques was employed in selecting extension workers. Following the selection of four districts mentioned above, two kebele administrations from each district were selected purposively based on their dominance on crop production. Thus, 24 extension workers were selected using purposive sampling technique. This method was used because their size is very small and manageable for the current study.

This article employed semi-structured interview items and FGDs to collect pertinent data from both participants. The primary data was collected through semi-structured interviews with the extension workers, who are carrying-out diffusion of modern knowledge and IK management in particular. Key informant interview involving mini-discussions was also held with smallholder farmers to explore their in-depth feelings and opinions on the topic under investigation. Pre-testing was conducted to ensure the validity of the tools prior to the actual field work. The data collected for

the article were sorted, organised, edited and analysed using the Statistical Package for Social Science (SPSS version 25). For quantitative data, description statistics such as frequency, percentage and mean were used while thematic analysis and tables used for qualitative data.

### 3. Results and Discussion

#### 3.1. Types of Ik Known to Extension Workers

Table 1 indicated that majority 19 (79.2 percent) of the participants had knowledge on the indigenous techniques and tools used for

clearing and preparing farm fields. This was followed by 16 (66.7 percent) on controlling weeds and 15 (62.5 percent) on maintaining soil fertility. For preparing farming fields, the oxen-driven ploughing supported with hoes are the dominant indigenous technologies being used and known to extension workers. However, most of these workers were advised smallholder farmers to use modern technologies like tractors and ploughing machines than the traditional ones. It agreed with the findings of who noted that most extension workers were advised to adopt modern technologies [4].

IK known to extension workers	Frequency	Percent	Remarks
Clearing & preparing farm fields	19	79.2	Oxen driven technology
Soil fertility	15	62.5	Animal manure and compost
Weed control	16	66.7	Hand weeding and tillage
Climate forecasting	9	37.5	Local indicators like birds
Crop diseases and pest control	7	30.4	Mixing of local herbals.
Processing and storage of seeds	6	25.0	'Gotera'/barn and 'dogogo'
Post-harvest techniques	4	16.7	Putting in a ventilated room.

Source: Own Survey Results, 2022

**Table 1: Distribution of Respondents on Types of Ik Known and its Importance (N=24)**

The results indicated that most extension workers knew and advised the indigenous techniques of burning of crop residues, tillage practices and animal manures in order to improve fertility and agricultural productivity. This concurs with the findings of that extension workers were familiar with indigenous techniques of maintaining soil fertility [22,20]. The extension workers further explained that burning crop residues and ploughing before the onset of first rain is important technique for controlling weed. However, most of these workers were promoted use of inorganic fertilisers such as NPS and UREA, and thus knowing IK alone has no value unless it can be opted for farming activities.

Table 1 indicated that IK on crop diseases and pest, processing and storing seeds, and post-harvest techniques were the least known ones by extension workers with 7 (29.2 percent), 6 (25 percent) and 4 (16.7 percent) respectively. The extension workers further stated that though they are familiar with some local techniques of controlling diseases and pest, it is not enough to manage such incidents. The data obtained from smallholders through FGDs also indicates that most of them faced challenges of managing diseases and pest even through modern chemicals due to lack of its know-how and poor extension support. This concurs with findings of reported that farmers faced difficulties of managing crop diseases and pest [8].

The analysis of data revealed that some of the extension workers could have good understanding of traditional climate condition and its implication on farming system. About 9 (37.5 percent) opined that they were familiar with climate forecasting method used by smallholder farmers. However, the data obtained from

smallholders showed that most of the extension workers focused on propagating meteorology than the local climate forecasting methods. This agreed with the findings of who noted that despite their familiarity with traditional calendar and climate forecasting, extension workers did not adequately advocated this technique [22].

However, most of the smallholder farmer's felt that extension workers did not consider their need for IK during extension service delivery. This is further supported by the data obtained through focus group discussion. It seemed that the value given to IK is still low vice-versa to its contribution to farming activities. This result was agreed with the findings of who found less priority is given for IK practices among some modern communities in Ethiopia [22,4]. A study conducted by in Uganda and in Tanzania also found that despite its importance for agricultural development, the attributes of IK did not get adequate recognition [10,13].

#### 3.2. Perceived Extension Advisory Roles and Ik Management

Table 2 indicated that only 9 (37.5 percent) of the extension workers felt that the current extension system has encouraged them to manage IK. However, the majority 15 (62.5 percent) of them mentioned in contrast to IK management and rather encouraged them to diffuse modern technologies such as variety seeds, chemicals, inorganic fertilisers, compost making and monocropping [22,4]. This result is similar to the data obtained from participants through key informant interviews. The participating smallholders clarified that in most cases these workers were advised them to adopt modern technologies using model farmers.

Questions	Additional comments
The current extension service delivery and IK management 9 (37.5 percent)	<p>Most of them focused on:</p> <ul style="list-style-type: none"> <li>• Dissemination of modern technologies,</li> <li>• Creating knowledge sharing forums,</li> <li>• Conducting some training and demonstration using FTCs.</li> <li>• Somewhat participative problem identification and decision making, and</li> <li>• Making frequent contacts with the model farmers.</li> </ul> <p>On the contrary, they were not well-organised and integrated IK in their extension service delivery. As a result, they</p> <ul style="list-style-type: none"> <li>• Less involved smallholder farmers to generate local solutions.</li> <li>• Poorly captured and preserved IK in a centralised repository.</li> <li>• Poorly suggested modern tools to be used for managing IK.</li> <li>• Inadequately harnessed FTCs for managing IK.</li> </ul>
<b>Sources: Own Survey Results, 2022</b>	

**Table 2: Summary of Extension Advisory Role and Ik Management (N=24)**

The study found that establishment of farmers-based organisation often encouraged them to acquire, share and apply various types of IK. However, the FGDs results revealed the weak roles played by extension workers in educating and training smallholder farmers to acquire and share localised innovation using FTCs as a hub in that regard. They complained that the structural set-up of farmers training centers and farmers groups which are arranged into ‘1 to 5’ and farmers development army, locally named as ‘*Tokko-Shane*’ and ‘*Garee Misooma*’ less favored them. This agreed with the findings of who found that in Ethiopia, the ruling government has high involvement in organising farmers groups and FTCs [4,7].

The study found that methods used to organise farmers into different groups did not sufficiently consider their social networks, rather they focused on ruling party-interest which favors model farmers and diffusion of modern technologies. On the top of that, the extension workers used FTCs based demonstration plots than

the farmer fields for testing these technologies. It found that most of these workers are not making use of current extension models as a platform for sharing and learning of IK with the farmers. The findings suggest that the extension system is not interactive and responsive to the smallholder farmers’ need for IK practices.

### 3.3. Methods and Tools used by Extension Workers in Managing Agricultural Ik

#### 3.3.1. Sources, Means and Types of Agricultural Ik Acquired

The results reveal that majorities 20 (83.3 percent) of the respondents acquired agricultural IK and only 4 (16.7 percent) did not acquire at all. Both formal and informal sources of knowledge were used by extension workers. Knowledge on preparing farm fields, maintaining soil fertility and crop husbandry were the dominant types IK acquired from these sources. These agreed with that of who noted that IK on soil fertility and crop husbandry are the most commonly acquired one by extension workers [22,20].

Extent of acquiring IK	Regularly		Sometimes		Never	
	Freq	Percent	Freq.	Percent	Freq.	Percent
	8	33.3	12	50	4	16.7
Sources of IK (n=20)	Freq	Percent	Type of IK acquired			
Own experiences	14	70	<ul style="list-style-type: none"> <li>• 19 (95 percent) preparing farm fields.</li> <li>• 18 (90 percent) crop husbandry</li> <li>• 17 (85percent) soil fertility</li> <li>• 14 (70 percent) weed control and 12 (60 percent) crop diseases and pests.</li> <li>• 9 (45percent) climate condition, 7 (35 percent) animal diseases, 6 (30 percent) post-harvest and storage.</li> </ul>			
Mass media (books, internet, TV and radio)	8	40				
Social gatherings	6	30				
Colleagues	12	50				
Village meetings	4	20				
Field days	9	45				
NGOs	5	25				
Farmers groups	7	35				
Observation & Demonstration	15	75				
<b>Sources: Own survey results, 2022</b>						
<b>NB: Due to Multiple Response Rates, Frequency Percentage Does not Add Up To 100</b>						

**Table 3: Extent and Sources of Acquiring Agricultural Ik by Extension Workers (N=24)**

Table 3 indicated that majority 15 (75 percent) of the respondents used observation and demonstration followed by 14 (70 percent) own experiences and 12 (50 percent) colleagues as sources of acquiring IK. Besides farmers field days 9 (45 percent), mass media 8 (40 percent), farmers groups 7 (30 percent) were among the sources of IK for extension workers. Though considered lesser, village meeting (rated by 20 percent), NGOs (rated by 25 percent) and social gatherings (rated by 30 percent) were used for obtaining agricultural IK. The results reveal that both local and external sources are used by extension workers in the studied districts. Similar observation was made in Zimbabwe [20].

The interview conducted confirmed that one's own experiences, demonstration plots and colleagues as the most preferred knowledge sources. The interviewees at Ada'a and Dugda districts reported that:

*“The interaction they made with smallholder farmers and colleagues enabled them to acquire of indigenous farming techniques and share their knowledge with them. The demonstration plots that are used for transferring new technologies enabled them to acquire local knowledge. During the demonstrations, most smallholder farmers were needed if they got to observe their farm fields and then take advice.” This gives them the opportunity to learn and share the smallholder farmer long-term experiences.*

The participating extension workers further explained that they acquired indigenous knowledge through education, consultations and from training they attended when the experts spoke about these technologies in meetings and workshops. It seemed that agricultural IK is acquired and communicated in the studied communities through interpersonal channels than the explicit formats. This concurs with the findings of who stated that own experiences, relatives, friends and meetings were among the local sources of IK being used by knowledge intermediaries including

extension workers [17,15].

The results reveal that extension workers did not show worth access to IK from mass media and institutional sources. Only few of them used radio, books, NGOs, internet and research centers to obtain agricultural IK. These agreed the findings of in Tanzania and in Ethiopia [12,4]. Their findings indicated that print and electronic media were less approached as sources of agricultural knowledge and IK in particular. Contrary to these, the findings of in Zimbabwe confirmed that books and workshops are dominant sources used by extension workers [20]. It can be deduced that own experiences, colleagues and demonstrations were among the numerous sources of agricultural IK for extension workers.

### 3.3.2. Methods Used for Sharing and Disseminating Ik

The result indicated that 16 (66.7 percent) of the respondents shared agricultural IK with smallholder farmers. This implies that not all of the extension workers are willing to share IK obtained from various sources. It found that poor infrastructures and transportation problems were limited their extent of sharing IK. This concurs with the findings of who noted that poor working condition and logistics were among the challenges faced by extension workers to address the farmers' needs for agricultural information [19].

Table 4 indicated that majority of the extension workers 10 (62.5 percent) disseminated agricultural IK to smallholder farmers through trainings, followed by 8 (50 percent) allowing to visit demonstration plots and 7 (43.8 percent) organising farmers field days. This signified that training and demonstration plots were used as methods for transferring agricultural IK by extension workers. These agreed with who found that field days and study tours as the old age KM tools used to disseminate agricultural knowledge in Ethiopia [9,4].

Do you share IK?	Yes	No	Remarks
	16 (66.7)	8 (33.3)	
Methods (n=16)	Frequency	Percent	<ul style="list-style-type: none"> <li>• Face-to-face interactions</li> <li>• Farmers training centers as a hub-for training and sharing knowledge.</li> <li>• Farmers groups, 1 to 5 and development groups.</li> </ul>
Through trainings	10	62.5	
Organising field days	7	43.8	
Demonstration plots	8	50.0	
Mobile phone	5	31.3	
Through print materials	4	25.0	
<b>Sources: Own Survey Eesults, 2022</b> <b>NB: Due to Multiple Response Rates, Frequency Percentage Does not Add Up To 100</b>			

**Table 4: Methods used for Sharing and Disseminating Ik by Extension Workers (N=24)**

The findings further showed that only 4 (25 percent) of respondents disseminated agricultural IK through print materials such as posters and pamphlets. This result revealed that the extension workers hardly used print materials although this medium was very crucial and offered the easiest method of transferring agricultural knowledge and IK in particular. This contradicts with the findings of in Zimbabwe who reported that most extension

workers used print media such as books and magazines both as sources and means of acquiring and sharing IK [20]. Hence, the difference between the two findings might be due to difference in accessibility and formativeness of these sources between the two study areas.

It was found that organising trainings, demonstration plots and field days were the three common methods used by extension workers in disseminating IK. This implied that agricultural IK was disseminated by these workers mainly through informal channels while only few of them used print and ICT based formats in that regard. Thus, extension workers should be encouraged to use diverse agricultural IK transferring methods or points other than the current ones such as market days, mobile phones, pamphlets and community radio, amongst others. In their study, emphasised the need to use both interpersonal and mass media channels to effectively communicate agricultural IK [12,20].

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### 3.3.3. Methods Used for Capturing and Preserving Ik

The respondents were asked whether they preserved IK or not, and methods used in preserving agricultural IK in their respective districts. The results indicated that majority 13 (54.2 percent) of the respondents did not preserve IK in formal documents. It signifies that most extension workers do not have active involvement in the management of agricultural IK. This result was similar with the findings of who reported that the weak roles played by extension workers in the documentation of IK [12,15].

In response to the preservation methods, about 6 (54.5 percent) of the respondents used print materials in the form of reports while 4 (36.4 percent) on audio-video recordings. The remaining 5 (45.5 percent) of the extension workers replied that they preserved agricultural IK using traditional tools. The results revealed that modern technologies such as computers, flash disk and tapes were hardly used for IK preservation. This was supported by who found that poor utilisation of ICTs for capturing and preserving IK in the local communities [15].

Did you preserve IK?	Yes	No
	11 (45.8)	13 (54.2)
Method and tools used (n=11)	Frequency	Percent
Traditional tools (storytelling, carving)	5	45.5
Print materials (reports, books)	6	54.5
ICT tools (audio and video recording)	4	36.4
<b>Source: Own Survey Result, 2022</b>		
<b>NB: Due to multiple response rates, frequency percentage does not add up to 100</b>		

**Table 5: Distribution of Responses on Ik Preservation Methods (N=24)**

During a comprehensive interview, the extension worker revealed how they recorded and captured IK using print and electronic media, including reports and audio-video tools. There was, however, little proof of how often they used these instruments to document and preserve this knowledge. It appeared that although extension agents are aware of the necessary steps to protect IK, they are not taking any novel approaches to its management. The primary causes they cited were, among other things, a lack of funding, a focus on contemporary technologies above all else, a lack of equipment, inadequate infrastructure, and a lack of a documented strategy. These results concurred with those of [15,20].

## 4. Conclusion and Policy Recommendations

This study assessed the role of extension workers in the management of agricultural IK in the study districts of East Showa Zone of Oromia, Ethiopia. The findings showed that extension workers knew various types of IK practices and its role in boosting crop productivity. These workers acquired IK mainly through informal sources and shared during discussions, trainings, meetings and on-farm visits. Thus, most of them did not show worth access to IK from institutional and mass media sources in the studied

districts. The result indicated that most extension workers less considered the smallholder farmers needs' for localised innovation or IK. There is also loss engagement between these workers and smallholders which has hindered systematic capturing, sharing and preservation of IK for farming activities.

Thus, it can be deduced that the extension workers are not actively involved in the management of agricultural IK. This suggests that IK is not only poorly managed by the smallholder farmers, but it is also less captured and preserved by the extension workers in the studied communities. Indeed, the limited engagement of extension workers with IK could have negative policy impacts related to knowledge capturing and preservation, indigenous rights, and sustainable development. Thus, integrating IK management into extension services is crucial for more inclusive and environmentally-sound policies and programs in the studied communities. It also recommends the need to strengthen cohesive social networking with trusting relationship among the extension workers and smallholder farmers to enhance the acquisition and sharing of IK for farming activities.

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## Acknowledgement

The authors would like to express their sincere gratitude to the extension workers and their immediate supervisors who served as key informants, providing valuable contributions towards the quality data collection for this study. Their willingness to share their knowledge and perspectives was instrumental in ensuring the integrity of the research process.

## Ethical Clearance

In ensuring the field survey is properly conducted with the right procedures and respecting privacy, the researcher was strictly followed and implemented UNISA research ethics policy and ethic clearance has received from UNISA-CAES HEALTH RESEARCH ETHICS COMMITTEE with reference numbers: 2019/CASE\_HREC/114. The low risk application was reviewed by the UNISA-CAES Health Research Ethics Committee on 23 January 2020 in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.

## Informed Consent

The informed consent form is prepared to request the consent of persons to participant in the study and it is appended in the final thesis work. The researcher was started by briefly explaining the objective and purpose of the study for the participants with local language including their right during the interview period. For the participants who cannot read and write the researcher or the data collectors were read loud the purpose of the study and those who agree to participate were requested to give their oral consent while the remaining given written consent. Thus, the consent letters were stated and informed that all participants have the right to withdraw from the study any time if their rights are violated. Further, to ensure that the survey is properly conducted with the right procedures and respecting privacy, the researcher was followed and implemented UNISA research ethics policy.

## Data Availability Statement

All the necessary data, including the SPSS files, have been safely deposited and are accessible if needed by the publishing house or other researchers. The data underlying the conclusions of this study are included either within the article or in the supplementary information files thus available in data repository.

## Conflict of Interest

The authors declare no competing interests.

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