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Drip irrigation and Social factors affecting agricultural water management in Lorestan Province

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ABSTRACT

Drip irrigation technology considered innovation in the domain of agriculture which its acceptance on behalf of farmers due to various factors of its particular adjustment goes back to climatic and social conditions. The current paper is outcome result from research findings with recognition goal in lack of continual innovation acceptance of drip irrigation in five villages' rural district of Tangh-e-Siab located in township of Kohdasht in province of Lorestan. Research information has collected with utilize semi-organized interview techniques, observation (participation and non participation) and target sampling approach. The findings of research shows that the most important effective factors on lack of continual innovation acceptance of drip irrigation (drip irrigation) in society under study are consist of: Farmers low income, low operating trainin and specialized skill (lack of adequate attention to training and promotion), problems in exploitation from water's joint ownership, weakness in mutual understanding among users, insufficiency of distributed water, high cost and low efficiency technology, lack of proper technology with surrounding conditions of the region, insufficient government support form users. Generally, in the society under study lack of continual innovation acceptance have been particularly impressed from social factors such as; little involvement of villagers, individual and tribal dispute in utilization, lack of existence of local guiding organizations and inattentiveness of farmers to inefficiency of irrigation network has been low regard to native knowledge of farmers which would hope in promotion and training affair to be considered seriously.

Keywords: Innovation acceptance, Rural District of Kohdasht, Drip Irrigation, Social Factor.

INTRODUCTION¹

During time of history, water has been an important factor in giving formation to living approach, technology and cultural development, in current world one of the indexes of multilateral development of societies is the existence of water. Management of this source has been one of major challenges of governments in providing foodstuffs for growing population. The quantity of available water resources in planet earth is numerous, however 97.5 % of all are salty and not being desirable for human consumption as well as agricultural proposes. It's also known that "close 90 % obtain waters from wells are used for agriculture and the required water for growing agricultural product are mainly provided with the help of irrigation [1].

Nevertheless, one of the main obstacle in agriculture progress and rural development of the country is the issue is water shortage. The optimal uses of water in increase of agricultural products which forms major share of foodstuffs is considered an essential task [2]. The reason is that the new pressurized irrigation approaches (Drip, Downpour)

prevent from irregular waste of water and to some extent resolves the issue of water shortage. Drip irrigation considered as an innovation in agriculture which must while being well-adjusted with issues of local, regional and technical conditions to be accepted by farmers. With respect to importance of daily water increase in Iran's agriculture, in past years government have performed wide investment and credits toward amassing water such as drip irrigation[3]. Now the question is that what are the outcome achievements form performed efforts in this backdrop? What are the factors and obstacles of activities' success in this backdrop?

Now, its has been clearly revealed that in addition to technical, social and cultural factors, many are effective in acceptance, employing and technological continuation. The drip irrigation also as progressive technology is not exempt from this basic rule. This technology has been applied in the pomegranate's garden of Tangh-e-Siab' rural village (located in the Kohdasht) but has not been successful for various socio-economic reasons. The purpose of this study is examination of types of effective social factors on the issue:

- This plan implemented in more than 300 acres from area's gardens;
- This task opened new horizon in acceptance study and continuation of technical innovation and provided backdrop of numerous research in case of innovations and role of social, economic, cultural and factors in acceptance, employment and continuation of innovations.

Such effective studies which has performed in this backdrop is the study of Magertel in three countries of India, America and Britain in 1983 which showed the individual and personal characteristics and surrounding structures are effective in acceptance of innovations.

Also in a study performed by Alamgear and Krouge in Bangladesh have shown that age, formal education, size of farm, income, social participation, and farming as main occupation has positive relation with technology acceptance [4].

Knows the main reasons of not accepting new technology by farmers such as factors like not to have proportionate of innovations with their socio-economic conditions. Presumption of agricultural research be collected based on needs and known farmers' problems [5].

Generally, external studies such as price increase of water, type of product, increase of income, saving in consumptions of water and workforce, world of being urban, level of education contact level with promotion worker, lack of comparative research, weakness of supportive services, lack of institutions, weakness of promotional training and not having appropriateness of innovations with socio-economic conditions of users have mentioned as factors of acceptance and lack of innovations acceptance in the agriculture[6-8].

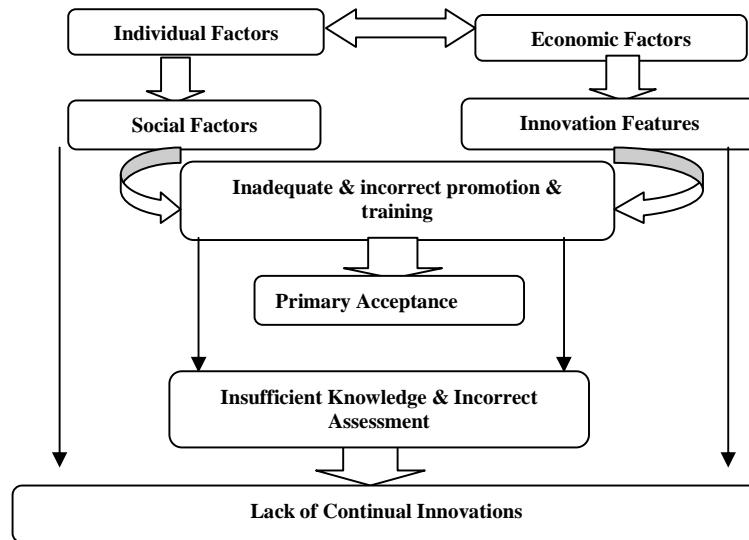
Also, various studies has performed in backdrop of effective factors on acceptance and employment of irrigation approaches in Iran. Usually researchers considered those approaches which had wide range in terms of economics and/or have examined units which their innovations have had positive economic aspect. The performed studied in Iran show that many problems (technical constraints, performance weakness of promotional institution, insufficient mutual agreement and participation of farmers, land being small etc) causes incorrect output of under pressure irrigation plan and not having interest of farmers in use of these system[9].

In a study performed by Karami et al with title of Consequences of pluvial Irrigation technology Propagation on Inequality and Rural Poverty reach to conclusions that in development of irrigation under pressure the social and economic issues usually have hidden form planners' viewpoint, while in this type of factor have important role in acceptance and development of irrigation under pressure [1].

The study of effective socio-economic factors in acceptance of under pressure' irrigation systems (Case study, Tehran province) has reached to conclusion that the individual and social characteristics such as age, work background, education, knowledge, financial facilities are effective in under pressure' irrigation systems[10]. Generally, the research which have performed in rural areas of Iran during past years in case of new technology-particularly under pressure' irrigation systems, had more emphasized the innovation acceptance factors [11]. And limited number of them side of above subject examination have studied lack of continuation acceptance of innovations of under pressure' irrigation system in agriculture [12-14].To their belief the following factors were effective on form and acceptance level and lack of innovation acceptance of under pressure' irrigation: Age, number

of family's workforce, quantity of land segments, quantity of products and status of accessibility to water, education level, farming as main occupation, communication factors, innovation characteristics, cultivation background, performance weakness of promotion institution, ownership type of water and land resources, technical limitations, relative advantage of innovation, primary investment risk in these systems, Land as being scattered and small in size.

Figure 1- Lack of Continual Innovation Model



According to this model the effective factors on lack of continual innovation fits in five categories of factors: individual, economic, promotion-training, social and factors related to innovation's features. The first three cases and to some extent the fifth factor also are considered social factors. Many technical factors more than anything have developed influence of factors and social problems such as users' cooperation and are resolvable via social factors. Effecting factors on lack of continual innovation showed in figure (1).

MATERIALS AND METHODS

In rural studies, villagers due to numerous reasons such as low knowledge cannot respond well to questions of questionnaire package to better changes for the reasons of villagers' unfamiliarity with activities and research goals and other factors the presentation of correct, precise and proper answers is difficult" [15]. Therefore, with respect to issue and research goals, this study have examined the reasons related to lack of considered continual innovation from viewpoint of lecterns' interview with using from quantitative approach (continuous presence in the field). After determination of issues of discussions, for the purpose of collecting information the techniques such as semi-organized interview, observation (participation and non participation), continuous presence at the living location of farmers and studies of documents and images have used.

Lack of technology perpetuation in this study means lack of continual use from innovation after its primary acceptance and return to approaches of pre-innovation. In other words, the purpose from continual innovation is not its repetition. The purpose is the complete acceptance and keep of project or new idea.

In this study, the sample taking was not previously planned since it was not specific as to what concepts are important and where it would direct the concepts of researchers. After primary study using target sample taking, from collection of 180 farmers' families involved with drip irrigation plan; the opinions of 75 farmers have analyzed and assessed. In our sample, he individuals who have selected are for the reasons that have first information about the phenomena; meaning have experienced the considered phenomena and have specific viewpoint about it.

RESULTS AND DISCUSSION

Process of Promoting New Idea in the Area

The township of Kohdasht has population of about 211886 (2006 head count) five sections, 11 rural villages and five urban points. This township is located in moderate semi-dry district. Climatic falls in winter and autumn is a rain and occasionally as snow in elevations. Median rainfall in year is about 410 millimeters and relative humidity 60 percent. The township water resources could be divided into two groups; surface underground waters. Surface waters include Simereh River which its heads are located at Hamedan and Kermanshah province and in their route named as Gama-Siab & Ghreh-Sue. Simereh River in recent years was about 4.05 cubic meters per second. Such underground water township's resources could be cited to Headspring of Siab (Siah-Ab), Astan' down bottleneck (Pasan), Gkershab (Gkarkhosh-Ab) and Kol-salah-eddin. The surrounding lands of these resources and allocated to gardens rather than other water cultivation. Tangh-e-Siab is a rural village from Kohani section located at Southwestern of Kohdasht's township which in 2006 have had population of 6,750 and this rural village has 22 villages which the its five village' farming lands (Namkool, Menatali, Dehbaradar, Ahmad-khan, Keramali with 300 acres were subject of coverage of drip irrigation plan. Characteristics of the study populations are shown in table (1).

Table 1- Population of villages under coverage of dip irrigation plan

Row	Name	Population	Men	Women
1	Keramali	418	212	206
2	AhmadKan	50	27	23
3	Dehbaradar	249	124	125
4	Menatali	196	91	105
5	Namkool	724	358	366
Total	-	1637	812	825

Tongh-e-Siab has many gardens of pomegranates which their waters are provided via two rivers of Siab and Kol-salah-eddin. Siab River has covered more than 600 pomegranates trees and Kol-salah-eddin about 30,000 trees, these gardens irrigated as whirlpool. Lands of the area except mountains and hills with swift slope are cultivatable. However, up to 3 km distance on left and right side of Siab river, there are more plan lands which re proper for cultivation of pomegranate. Due to high cost of water supply, no one could not to act upon separately up to the point that after people's follow up and people in charge of area, the government allocated a budget for this purpose. In this order, with respect to geographical position of Tangh-e-Siab in 1997 some actions took place on behalf of organization of water & soil of khozestan province.

Initially, a group came in this area for plan and drawing of the entire agricultural land. After passage of two years (1999) the programmed plan became ready for implementation, but since the budget was considered low, none of the water supply companies didn't carry out the plan. It was decided in 2000 to eliminate part of plan and implement the remainder of the plan. in this order, the new plan which consisted of two sections located at right & left banks of Siab river started via a water supply company namely, "Shabnam-e-Gharb". It took 2 years the finish the plan. The vastness of agricultural land of West Bank was 130 acres which 120,000 pomegranates' sapling cultivated in that and irrigated via three pumps and filtration equipment. This irrigation was performed as dripping approach. In this form each tree had three dropping tubes; one was placed at the center and two on the two sides of tree with 75 cm distance apart.

However, the river on the right side which its agricultural land is 175 acres were irrigated via four pumps and three filtration. In general, the agricultural land of almost 100 people from farmers in right bank and 80 people in left bank set under the aforesaid plan. Initially, this plan made available to the farmers. The farmers acted to organize a corporate company to control and supervise the entire water supply network and made available to the corporate members the entire related affairs.

Since the any corporate company needs to have special credit resources, one of these resources is investment of shareholders because these corporate companies in contrast to commercial institutions for strengthening its financial base rely on its forming members and little capital of these members is considered their initial investment.

Another one of finance resources for corporate are governments and for removing the needs of these corporate, should consider some collaboration so that they can continue their activities. Financial weakness of farmers

(shareholders) and not cooperating the government authorities have causes this corporate company not to continue its activities.

Long since happened the farmers decided to perform the plan affairs as committee. After a few years, concluded that not enough water reach to the trees. Much administrative contact performed for solving these problems. But no action took place on behalf of government. Some farmers who had better financial position acted to separate plan and through personal mega expense were able to irrigate their gardens with traditional approach which finally, after six years the mentioned plan failed.

Descriptive Findings

Based on information in above table the majority of farmers using drip irrigation have been male. In regard to age could not the following points; %25 of users were in the age class less than 35 which according to opinions and studies in case of acceptance and spreading of innovations, the lack of acceptance and continual innovation in this group is very low relative to higher age groups. But in mentioned plan could not give generalization to scope of this part of theory to farmers of the region. Also, as with addition of middle group percentage to total of those who the rate of acceptance of innovations and continuation of idea in them has a higher rate, then the correctness of this study findings will be verified because %65 of these farmers are less than 55 years old that if in the backdrop of proper promotion and training of drip irrigation would have been endeavored on behalf of related entities then some changes in continual innovation would have happened.

Unmarried farmers study, also are part of age group less than 35 because the scope of their garden land were higher than 10 acres, fathers or family's custodians have acted to divide the gardens because with making the size of the garden smaller, then gardening would have performed much easier and faster. From viewpoint of education, 37.3 % of farmers were illiterate or have had literacy of reading and writing, 12% of all has the document of elementary, 80% guidance, 20% diploma and 22.7% above diploma. With respect to the fact that minimum half of these individuals have literacy level of guidance or higher and as a result have been able to make use of various canals of promotional-training, therefore, it was expected that the rate of acceptance of new ideas and their continual to be higher from the side of these individuals. But as you observe, the literacy level as an influencing factor on continual innovation of drip irrigation in the area is not under consideration and must seek the root of lack of continual innovation in some other factors. The percentage of individual under custodian of supervising farmers is also as following: less than three individuals 36%, between 3-6; %50, above six is four percent.

Based on findings first occupation of half users of drip irrigation technology have been farmer and according to performed research, it's expected that if the continual innovation is more from those who their first occupation is farming, this matter in case of second group of table meaning employee (%16) with some consideration also is instance of verification. However, these results are not extended to the study area because these two groups are considerable percentage (%94) from innovation acceptors who have not continued this acceptance and returned to traditional irrigation. Also, almost %25.5 of drip irrigation' innovation users, the scope of their land of pomegranate's gardens less than 2 acres, %54.7 have between 2-4 acre and %20 have above 4 acre. Results showed in table(2).

Analytical Findings

The finding shows that the social factors have been effective more than technical and techniques factors on the subject of study. Based on findings this point is addressable that in contrast to performed studies, more income in this research sample not only have not made the continual innovation better also, parallel to its increase, have added on scope lack of continual innovation' drip irrigation.

Prior execution of this plan through government and state companies, most farmers have not been able to supply water to their land separately from the river which is close them because both required higher cost and farmers who their land were located at farther distance from river, could not act to this task without fight or engagement with adjacent villages of the river.

With execution of plan through government, both the costs were decreased and the government performed the required actions for persuading lands owners near river. But this was not end of it, due to various reasons (which we are after knowing that in this study), the scope of mutual agreement and participation of garden owners became less & less, up to point that the farmers who had better financial conditions after employing "Native Diplomacy" and

bargaining as well as giving share of garden or purchase and rent the water from those who believe have the right of water were able to perform actions to supply water to almost dry gardens and under coverage of government plan. This time, not only have not used the drip irrigation approach and new approaches but, went back to traditional irrigation. Therefore, the information of table (3), main occupation as well as source of income have been most %70 of society subject of agricultural study.

Table 2- Variables of farmers' identification under coverage of drip irrigation network.

Row	Users' characteristics		Percent
1	Gender	Man	97.3
		Women	2.7
		Total	100
2	Age	Less than 35	25.3
		35-55 years	40
		More than 55	34.7
		Total	100
3	Marital Status	Married	93.3
		Single	6.7
		Total	100
4	Education Level	Illiterate	37.3
		Elementary	12
		Guiding	8
		Diploma	20
		Associate Diploma	22.7
		Total	100
5	Number of individuals under support	Less than 3	36
		3-6	59
		More than 6	5
		Total	100
6	First Occupation	Farmer	73.3
		Employee	21.3
		Animal Husbandry	1.3
		Services	4
		Total	100
7	Vastness of Land	Less than 2 acres	25.3
		2-4 acres	54.7
		Above 4 acres	20
		Total	100

Table3- Income Level of Respondents from Various sources in 2009.

Row	Income Million Toman	% income from Farming	% income from non-farming
1	Less than 4 million	42.6	60
2	4-8 million	26.6	21.3
3	8-12 million	13.3	18.6
4	More than 12 million	17.3	-

The median income from non-agricultural sources is 3380 dollars which is almost forms %40 of total income of villagers and is more related to employee and services occupations. The existence of "Siab" river in this area has cause the lands of surrounding villages to be allocated to water cultivation and Pomegranate's garden which the income scope of five villages near to river is more than villages farther to the river. Therefore, first occupation almost 70 % residents of these villagers is agriculture. The ownership of the watery lands surrounding Siab river which had been under coverage of drip irrigation plan had been from type of personal ownership an (94.7%) and very low percentage have allocated to rental and communal ownership. Results showed in table (4).

Table 4: Status of Garden Land ownership & Source of Water Supply

Row	Type of ownership	% Land Ownership	% Water Ownership
1	Private	94.7	29.3
2	Rental	1.3	9.7
3	Communal	4	61
Total		100	100

Also, the ownership source of water supply for users of innovation's drip irrigation in the area of study have been as such; personal ownership 29.3%, rental ownership 9.3%, communal ownership %61.3. Therefore, could conclude that the scope of tendency to work-group among users has been very low and their inclination is toward private and personal ownership. Therefore, contrast to land ownership which has been more of personal type, more than half of farmers have communal source of water supply. To the farmers' belief, source of water supply as being communal is one of main factor of lack of farmers' cooperation and participation and the lack of continual innovation from their behalf and this is from reasons such as: distance of villages from each other, native disputes, inadequate & inappropriate training of area's villagers. With respect to training and promoting of a variable considered as mediator in development affair, therefore, the attention for acceptance and continual innovations as well as participation of farmers in required fields is a necessary task. Lack of adequate attention to training and promotion of farmers causes to lower scope of professional skill of farmers, and follows the lack of adequacy in cooperation and participation among farmers. For the reason that the drip irrigation plan in the area have been as communal and requires more farmers' participation in various affairs particularly in affairs of arrangement of irrigation, piping maintenance.

If the water accessibility was not difficult for the area's farmers of subject of study, perhaps many years prior to plan enforcement by government, would have acted upon water supply separately because by passage of less than 5 years from drip irrigation plan as communal, the plan faced failure and those who had facilities were able to maintain their gardens independently.

In summary, in the society subject of study, lack of continual innovation acceptance have been particularly impressed from social factors such as little interference of villagers, tribal and individual disputes in usage, local guiding organization no being available as well as readiness in farmers for technology usage, distrust of farmers to efficiency of irrigation network, little attention to farmers' native knowledge and insecurity, lack of security for employing the advance facilities. Among this must emphasize in promotion and spread of innovations social factors.

CONCLUSION

In this research have performed on examination on reasons to lack of technology continuation of drip irrigation in the area of Tangh-e-Siab and its comparison with findings of other researchers. Although in regard to above mention reasons can't cite mainly to one or few special factors as well as not considering its relation with other factors. But based on findings could present pattern, which is indicative of reasons of considered phenomena. In this order, the factors in lack of continual technology of drip irrigation which repose in two groups of social and technical factors and many technical problems which have developed influence of social factors and social problems also can be resolve via social factor. As an example; knowledge of innovation's features is an important factor in acceptance and continuation of that innovation which must increase the knowledge of farmers from innovations' features through training and promotion of innovations.

Based on the findings, the most important factor in lack of continual innovation of drip irrigation is the source of water supply being communal and/or in other words lack of mutual agreement & cooperation adequacy among farmers. Finding by last study show verifies this factor as one of the effective factors on innovation' continual acceptance in agriculture. With respect to garden owners residing in five rural villages, to create coordination in gardening affairs have not been an easy task. Other reasons of this issue could mention the lack of creation and formation of corporate and local guiding organizations as well as inadequate and improper training of areas' villagers. It seems like that the scope of available mutual agreement and corporation among garden owners was not enough for continual plan enhancement, otherwise cases such as breaking shutters water drippers of water delivery system, tap closure and waste of each other rights were not observed. The existence of fanaticisms and family disputes also has added to the issue. As in recent years, numerously we have been witness to tribal disputes among villagers. The recommendation of farmers in these cases was that the government could implement electric supply system aside water sources instead of spending toward executing the plans as communal so the people as privately and with little support of government act to supply water to the farming land themselves[1,2,12,17].

Low skill and knowledge level of users, or in other words lack of existence in an efficient executable discipline and to its followers and promotional discipline which having required ability for participation of villagers and innovation conformity with their conditions; is another effective factors on lack of continual innovation hat conforms with the following work of researchers [18, 10,19,17,14] .

With respect to important role of promotion and training in acceptance and applying innovations in rural areas it seem like this factor have been effective on lack of continual innovation in drip irrigation in the area subject of study. Also could be said that the promotion-training factors among areas' farmers subject of study have not been adequate and proper. The drip irrigation plan have not been implemented in any other part of Kohdasht's township and this fact has been other reason over unfamiliarity of farmers with drip system and more attention to training & promotion in the field of dip innovation. Therefore, in this line it's recommended that the more attention to be applied to hold training classes, inspection of sample and successful plan, distribution of training-promotional publications, holding of training workshops and must train a responsible person in agricultural management to transfer the required farming knowledge to the farmers.

The knowledge of a innovation's features is an important factor in usage from innovation. These features consist of : relative advantage, adjustment, complexity, test acceptability and transparency of innovation's results. If individuals have proper knowledge from features of those innovations, then the possibility of lack of continual innovation is less. Other outcome findings of this study conform to other researches' examination such as [6, 11, 20, 18, 1].

Based on findings, factors which are part of innovation features and have been effective in lack of continual acceptance of drip irrigation are: high cost and low performance of technology with lack of technology suitability with area' environment conditions and equipment not being standard, lack of adequate government support from farmers.

High cost and low performance of technology have had close relation with other two factors. Sandy type of area's lands, windy condition and bilaterally tubing material not being proper have caused paying high cost by farmers which lack of inadequate government support also have elevated the intensity of this issue. Maladjustment of technology with environment conditions from one side, and economic problems of users particularly in the stage of operation and maintenance on the other hand have caused the farmers who have had enough financial ability to show to reactions in this backdrop; one series of them released the acceptance of new idea at the onset of the plan and the rest have continued plan for high cost and low performance and then like first of group have not have not continued innovation. Therefore farmers who have had higher income acted upon separate water supply system in the traditional approach. Examinations shows that one of effective factors on innovations acceptance is on behalf of farmers (higher income) and lack of continual of new ideas in farmers' group with higher income is less than low income classes which conforms with the researchers' findings Rogers & Shoemaker (1990) etc. However as cited previously in this study is that the factor of income rate have had opposite relation with lack of continual innovation. Meaning, users who had more income acted to supplying water separately and returned to traditional approach and those with lower income have not been conveniently able separation form communal drip system.

Many farmers believe that drip irrigation doesn't provide their current and future benefits, or climate, the attitudes of people of the area and workgroup and their previous experiences is not compatible. For the same reasons they believe that privatization of the plan also is not proper solution in longer term and Pomegranate's gardens of the area must be irrigated with whirlpool approach. In this backdrop, government support; in addition to paying facilities to farmers, also includes other cases like accessibility of farmers to institutions, guaranteed purchase of product with proper price and time which the farmers believe the government support is not adequate.

The most important recommendation of farmers in this regard is that; because employing the system for early years, this innovation does have little or no yield, then the user of innovation in short term can not easily able to pay the more payment and it's required that the payment date to be started on time of product yielding. One other reasons of lack of continual innovation in drip irrigation which connected with innovation's features is "inadequacy of distributed water" or lack of adequate trust to innovation efficiency. This affair has caused that some garden owners in addition to taking benefit for water connect to network have turn to system such as supplying water using electric system, an establish well, This subject has relative independence of farmers in backdrop of water provision required for gardening activities as well as distrust to efficiency of water network and have reduced their rate of participation in the water network affairs. The findings of [14, 17,11] shows this factor as an impressive variable on lack of continual innovation of irrigation under rainy and dripping pressure.

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