

PURCHASE CHANNEL SELECTION OF AGRICULTURAL MACHINERY BY WHEAT AND BARLEY FARMERS IN IRAQ: A TRANSACTIONS COST ATTITUDE

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ABSTRACT

This study was aimed to identify the role of transaction costs and their attributes in the selection of markets for the purchase of agricultural mechanization services in Baghdad province. To achieve this goal, a random sample of 150 wheat and barley farmers in the province was selected, and the data was collected through a questionnaire form prepared for this purpose. The research was based on the transaction cost theory as a modified theoretical framework to explain the farmer's behavior towards choosing installment market channels to buy agricultural machinery and through the analysis of the binary logistic regression model. The results of the regression analysis showed that some elements of transaction cost, such as a privacy and uncertainty, have an important role in determining and choosing the installment market for the purchase of tractors, while the element of the number of repeat transactions proved its important role in choosing the installment market for seeders, and the time saving element showed its important role in choosing the installment market for combine harvesters. The results also showed the existence of significant differences in some demographic and economic characteristics related to farmer, such as farmer experience, farm area and net farm income, in influencing the respondents' decision towards choosing the markets for agricultural machinery transactions referred to above.

Key words: bargain, installment, expenditures, negotiation expenditures.

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اختيار قناة الشراء للمكانن الزراعية من قبل مزارعي القمح والشعير في العراق: منهج تكلفة المعاملات

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المستخلص

استهدفت هذه الدراسة التعرف على دور تكاليف المعاملات وعناصرها في مجال اختيار اسواق شراء خدمات المكننة الزراعية في محافظة بغداد. لتحقيق هذا الهدف اختيرت عينة عشوائية شملت 150 مزارعا من مزارعي القمح والشعير في المحافظة، وتم تحصيل البيانات من خلال استمارة استبيان اعدت لهذا الغرض. استند البحث الى نظرية تكلفة المعاملات كأطار نظري معدل لتفسير سلوك المزارع نحو اختيار قنوات الاسواق الاجلة لشراء المكانن الزراعية ومن خلال تحليل نموذج الانحدار اللوجستي الثنائي. اوضحت نتائج تحليل الانحدار أن بعض عناصر تكلفة المعاملات مثل الخصوصية وعدم اليقين لها دور مهم في تحديد واختيار سوق المعاملات الاجلة لشراء الساحبات، بينما اثبت عنصر عدد مرات تكرار المعاملة دوره المهم في اختيار سوق المعاملات الاجلة للباذرات، فيما اظهر عنصر ادخار الوقت دوره المهم في اختيار سوق المعاملات الاجلة للحاصدات المركبة. أظهرت النتائج ايضا وجود فروقات معنوية في بعض الخصائص الديموغرافية والاقتصادية ذات الصلة بالمزارع مثل خبرة المزارع ومساحة المزرعة وصافي الدخل المزرعي، في التأثير في قرار المبحوثين نحو اختيار اسواق معاملات المكانن الزراعية المشار اليها اعلاه.

كلمات مفتاحية: صفقات الشراء بالاجل، مصاريف البحث والمعلومات، مصاريف التفاوض، مصاريف الرقابة، محافظة بغداد.

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INTRODUCTION

Technological progress is one of the main and important components in increasing and accelerating the rates of economic, social and cultural growth in different countries (11), and it is the common element of various economic development processes, particularly agricultural development. Technological progress in the field of agriculture takes different forms. It may be embodied in the skill of the producer's work and in agricultural machinery with appropriate technical and economic characteristics, such as tractors, combine harvesters and other agricultural equipment's (4). Iraq's interest in using agricultural mechanization in agriculture has increased significantly since the sixties of the last century (14), where it was one of the main factors that contribute to increase agricultural production and productivity, especially tractors, harvesters and their equipment from agricultural machinery in agricultural work, where they increase labor productivity, on the one hand, and on the other hand, it reduces the burdens and difficulties of agricultural work (3). Iraq relied on imports to provide various agricultural mechanization services from different countries, and were allocated primarily to farmers who produce grain crops at subsidized prices (in the form of purchase transactions), especially wheat and barley, the main crops in achieving food security for the population of the country (5). Many economists talk about the market economy. According to the concept, it is that system in which production and prices are determined as a result of the meeting of demand and supply from buyers and sellers. Without burdens, the buyer pays and the seller gets the price paid, and this is how buying and selling or transactions take place - in general - without additional cost borne by the seller or the buyer or both (2). But the truth is quite different, the transactions are not free, there is a cost borne by the seller or buyer in order for the transaction to take place, and the cost of transactions may increase or decrease according to the farms. There are farms where transaction costs rise significantly, obstructing the growth of transactions, and then economic activity. There are also other farms, as in the developed farms, where transaction costs are

reduced, which increase the volume of dealings among producers' individuals and thus increase the volume of economic activity (13). The diversity of issues that surround agriculture, such as missing markets, and inconsistency of information, risks and uncertainty, inseparability between consumption and production, incomplete property rights, incomplete transactions, and institutional failure, all make it fertile ground for application and testing of transaction cost theory. Most applications of transaction cost theory in agriculture fall under three general themes: contracts and property rights issues, farm organizations and arrangements, and market exchange (20). The necessity to feat and apply economies of scale in the use of agricultural machinery, and the presence of constraints in front of the ability for large investment, requires improving the role of current transactions to provide agricultural mechanization services to farmers at the lowest costs (1, 15). The research assumes that the choice of wheat and barley farmers in Baghdad province for the purchase channels of agricultural machinery services is affected by the variables and elements of transaction costs in addition to being affected by the set of social and economic characteristics associated with the farmer or the farm. So the study mainly aims to explore the role of transaction costs and their attributes in choosing the markets for purchasing agricultural machinery services of the study sample.

MATERIALS AND METHODS

Conceptual framework

The research is based on the principle of transaction costs theory and its elements as one of the theories that explain the methodology and status of agreements and contracts in the acquisition of agricultural machinery services. Through this theory and the elements associated with it, it is possible to explain the farmers' behavior towards organizing various purchase transactions with supplying companies or choosing the cash spot markets to obtain the required service (18). The main approach to making a decision regarding the organization of transactions for the purchase of machinery from the provided agricultural companies (purchasing by installments) against their purchase from the

cash spot markets (purchasing with cash), calculating the fixed and variable costs of those machinery in both cases, and evaluating the transaction cost when the machinery services have been completed buy them by installments (12, 21, 22). The historical roots of transaction cost theory go back to the economic researcher Ronald Coase, who used it to develop a theoretical framework for predicting when firms would perform certain economic services. In 1937, the economic researcher Coase presented the transaction costs theory in his famous paper “The Nature of the firm” and pointed out that the market option instead of the company involves three additional costs, which are (8):

1- The costs of research and information on the other party: They are the costs resulting when determining whether the required commodity is available in the market, what is the lowest price for it, and so on.

2- The costs of negotiating and closing the contract with the other party: These are the costs required to reach an acceptable agreement with the other party to the transaction, arranging an appropriate contract, and so on.

3- The costs of monitoring and controlling the carrying out of the terms of the closing contract: They are the costs of ensuring that the other party abides by the promises and terms of the contract, and taking the necessary procedures if this party does not comply with that (usually through the legal system).

Coase explained that these costs can be eliminated or reduced by organizing the

relevant services under the supervision of the firm itself. In other words, the firm exists and develops as long as its costs are less than transaction costs (market costs), where Coase' view was a break with the dominant thinking at the time. In 1975, the economic researcher Oliver Williamson tried combining between Coase' idea regarding transaction costs and Simon's restrictive behavior theory in 1961, he explained that the determinants of any transaction are (17): specificity, uncertainty and frequency (Figure 1). He considered implicitly that transaction costs are an equilibrium theory that assumes rationality on the part of buyers or managers of production processes. Regarding to this Matrix, Williamson indicated that the option of organizing transactions and the need to arrange a contract with the other party will be preferred if three basic conditions are met: 1) The assets included in the transaction are not specialized, that is, if an unlimited number of suppliers or sellers own the equipment necessary to achieve the activity, the ability of the customer or buyer to bargain will increase, which will positively affect the price of the transaction. 2) The degree of uncertainty in the transaction is low, that is, if it is not difficult to promise to perform the contract, the supplier may have non-opportunistic behavior that strengthens customers or buyers of services. 3) The transaction is a non-recurring type, that is, if the firm has to purchase small quantities of the product for suppliers, then the option of organizing transactions will be better for them.

Uncertainty	Specificity of the transaction		Frequency
	WITH	WITHOUT	
	High	Mid	
Uncertainty	Weakness uncertainty	Buying on installments on the condition of having a third party (a hybrid traditional contract)	Once (Ineffective)
	Strong uncertainty	Purchase with cash (single contract or no contract)	Many times (Effective)
		Purchasing on installments on the condition of inspection and auditing (a hybrid traditional contract)	Buying on installments without restrictions or conditions (traditional contract)

Figure 1. Matrix of types of purchase transactions and choose the optimal contract

Source: prepared by researchers based on Williamson’s suggestion in 1975

Transaction costs theory took its real importance and place in economic studies and practical application after the 2000 year, when many researchers, such as Barzel (1982), Riordan (1985), Zeller (1990), and Shelanski (1995), proved over different years that there are elements related to organizing transactions can affect, positively or negatively, the three types of transaction costs, and then the producers' or farmers' decision about the purchase by organizing transactions or not (7). These elements can be clarified as follows (10):

1. **Specificity:** It means the assets or services that are used in a specific activity. As for the service that can be used in more than one production activity, it is considered a non-specialized service and can be redeployed. Assets that are used in a specific activity and that cannot be used in other activities are assets with specificity. The more specific the assets, the greater the dependence of the buyer on the owner of these assets, and this dependence is dangerous when it comes to long-term transactions. In other words, the specificity attribute of the assets positively affects the costs of the transaction of the asset.
2. **Uncertainty:** The importance of the obligation to implement the agreed items of the contract according to their closed timings, where an increase in the uncertainty attribute positively affects transaction costs.
3. **Frequency:** The rate of frequency of organizing the transaction and the need to

purchase the service throughout the year, where the higher the frequency of the transaction, the higher the uncertainty and the higher the risk. In other words, the repeating attribute of a transaction positively affects the transaction costs of the asset.=

4. **Complexity:** The degree of complexity of organizing the contracts ended between the parties to the transaction in an appropriate way to ensure their satisfaction. Increasing the degree of complexity attribute of a transaction positively affects transaction costs.

5. **Measurability:** The possibilities of the farmer receiving machine service to measure the cost and quality of this service in advance. Increasing the measurability attribute of a transaction negatively affects transaction costs.

6. **Investment Level:** The amount of capital allocated to each transaction in order to obtain the relevant service. An increase in the level of investment attribute is negatively related to transaction costs.

7. **Length of Transaction:** It means long the farm's activities are limited by the decision to choose a particular contractual arrangement for access to the service. Increasing the duration of the contracting about the service positively affects the transaction costs.

Figure 2 (developed to suit the purchase cases) shows the assumed relationship between the elements of the transaction cost and the purchase decision on installments in order to obtain agricultural machinery services.

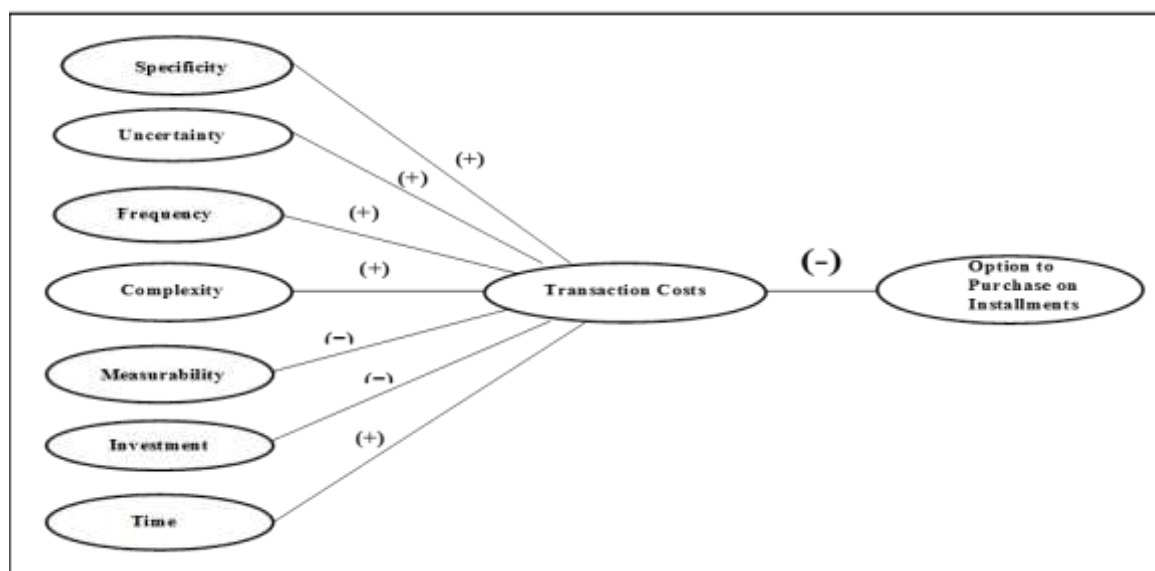


Figure 2. Flowchart of option to purchase on installments based on modified transaction costs model

Source: prepared by researchers based on previous studies

The researchers (Vernimmen, 2000 & Teo and Yu, 2005 & Latif and Kadhim, 2018) have argued that there are also external factors that can influence an individual's options towards buying channels; in addition to the internal factors represented by the elements of organizing transactions. These factors contain demographic, environmental and economic factors related to the individual or the farmer himself, including age, educational level, experience' years, number of family members, farm area, farm income level, and willingness to use agricultural machinery. All of these characteristics will increase or decrease the probability of the farmer's decision to purchase on installments.

Study data and questionnaire

In order to test the role of transaction costs and their basic elements based on discussions related to the channels of purchasing agricultural machinery and equipment, the study relied on the data of the field survey that was conducted on a random sample of wheat and barley farmers in Baghdad province. The

survey included 150 farmers, and the data were collected using a composite questionnaire, with open and closed questions. The questionnaire was carried out with direct visits to the selected farms. This study also was conducted based on the data and information available at the ministries and official departments in the country (9), in addition to the previous published scientific research and studies related to the subject of the current study.

Analysis methods

The research follows the descriptive statistics method represented by percentages and arithmetic averages, as well as the standard quantitative method represented by using the logistic regression model (6) in analyzing the data and extracting the required results through the use of ready-made statistical programs.

RESULTS AND DISCUSSION

Socio-economic characteristics of the study sample

Table (1) displays the socio-economic characteristics of the measured respondents

Table 1. Respondents' socio-economic characteristics (N=150)

Typical	N	%	Typical	N	%
Age:			Average of experience years:		
20-59	119	79	> 10	119	79
60-90	31	21	≤ 10	31	21
Education level:			Farm ownership structure:		
Uneducated	20	13	Hire	62	41
Primary	66	44	Own	44	29
Secondary	38	25	Contract	29	20
Above diploma	26	18	Others	15	10
Occupation in agricultural work:			Total Farm Area:		
Full time farmer	87	58	< 50	95	63
Part time farmer	63	42	≥ 50	55	37
The status of using the agricultural machinery:			Average of total income:		
New use	137	91	1-49	131	87
Old use	13	9	50-99	14	9
			≥ 100	5	4
Household number:			Source buying of the farm machinery:		
2-8	125	83	Company of agricultural supplies		
9-15	25	17	by installments	71	47
			Spot markets	53	35
			Company of agricultural supplies		
			by cash	26	18

Source: prepared by researchers based on data of questionnaires and SPSS program

As shown in Table 1, about 79% respondents have age below 60 years while the rest 21% of respondents are above 59 years. Majority of the respondents (44%) have primary education, 13% are ignorant, and 25% have

secondary school education while the rest 18% respondents have graduate level education. 58% respondents depend on only on agriculture as they do not have any other work, while the rest of the farmers are busy in some

other works as well such as commercial, service, employment etc. A large number of respondents (91%) use modern agriculture machinery as tractor and harvest operations while few of them (9%) use the old cultivation machinery. As for number of family members, about 83% of the farmers have family number between 2-8 persons while the rest 17% have a family between 9-15 persons. About 79% respondents have agricultural experience of more than 10 years while the rest 21% have below or equal to 10 years' expertise. On the subject of farm ownership structure, the percentage of farmers who hire the farm was 41%, followed by own their farms (29%), contract with the government (19%), and other cases (10%). Most the farmers have farm area less than 50 dunums (63%) while 37% of farmers have farm size more than 50 dunums. On the topic of total income of farm, the largest income group had less than 49 million Iraqi dinars category (87%) while only 4% of the farmers have total income equal or more than 100 million Iraqi dinars category, and about 9% of the farmers have total income between 50-99 million Iraqi dinars. About 35% farmers buy their needs of agricultural machinery from local spot market while 17% of them buy from the general company for agricultural supplies by cash payment, and the rest 47% buy their needs of farm machinery from the general company for agricultural supplies by installments or on credit payment.

Respondents' awareness and understanding in contracts and the transactions organization of purchasing agricultural machinery : As was showed in table 1, the respondents in the survey specified three main buying sources to get their needs from agricultural machinery, which are: purchase from the local spot market, purchase with cash from the general company for agricultural supplies, or purchase by installments from the general company for agricultural supplies. The first two sources could be combined as the market-price source, where market price organizes marketing behavior. In contrast, in the source of purchase by installments from the general company for agricultural supplies, respondents will have to negotiate pre-buy contracts, either oral or written, with certain conditions such as marks and quality. The

awareness of respondents about the contracts and the transactions organization of purchasing agricultural machinery resulting from the negotiation process were tested by statistical percentages. The respondents (N=71) were asked six questions related to the bargain agreements. With respect to the main reason for buying agricultural machinery and equipment by installments and organizing a legal contract, the results in table 2 showed that out of the four statements related with this question, the first reason occupies the first order based on its importance (87%), where the farmer was asked; the reason is the lack of sufficient capital to purchase cash. Regarding the contract period for various types of transactions related to the purchase of agricultural mechanization, the results in Table (2) clarified that out of the three statements related with this question, the long run period occupies the first order based on its importance (82%), where the farmer was asked; the term of the contract is more than one year. Relating to the knowledge towards good contract contents, the results in table 2 also explained that out of the three statements related with this question, the first item occupies the first order based on its importance (63%), where the farmer was asked; whether he knows them very well. About the method used to determine the service price in the contract, the results in table 2 displayed that out of the six statements related with this question, the second item occupies the first order based on its importance (41%), where the farmer was asked; determining the price through a committee or technical institute. Concerning the most important problems and weaknesses facing the farmer when contracting with the other party, the results in table 2 presented that out of the five statements related with this question, the second item occupies the first rank based on its importance (38%), where the farmer was asked; the lack of sufficient legal support to meet the terms of the contract. In relation to last inquiry: How useful is the current method of organizing the contract with the other party? The results in table 2 illuminated that out of the three statements related with this question, the first item occupies the first order based on its

importance (52%), where the farmer was asked; the method is useful. In general, the results in table 2 show that most respondents have awareness and understanding about buying contracts as well as the possibility of

pre-contracting for purchasing the required agricultural machinery due to the lack and weakness of the financial capabilities that encourage them to choose the installments markets.

Table 2. Respondents' awareness towards contracts and the transactions organization (N=71)

No.	Inquiries	N	%
	Q1: What is the main reason for buying agricultural machinery and equipment on credit and organizing a legal contract?		
1	Not having enough capital to buy by cash for any reason.	62	87
2	Minimize responsibilities and risks associated with potential errors in the case of cash purchases.	5	7
3	The social customs and traditions that govern the farmer, as he used to buy on installments from the beginning.	0	0
4	Buying on installments helps me survive and expand in farming.	4	6
	Q2: What is the contract term for various types of transactions related to the purchase of agricultural machinery?		
1	One year.	5	7
2	More than a year.	58	82
3	Without specifying a period of time.	8	11
	Q3: Do you know the contents of a good contract?		
1	I know them well.	45	63
2	I know them a little.	22	31
3	I have no idea about it.	4	6
	Q4: What is the method used to determine the price of the service in the contract? Bargaining between the contracting parties based on their knowledge of supply and demand.		
1	Determining the price through a committee or technical institute.	15	21
2	Relate price to production costs and income from one acre.	29	41
3	On the basis of opportunity costs of the service provided.	8	11
4	Using a specific guide or formula in light of agreed-upon differences from the prevailing price in a particular market.	10	14
5	I have no idea how to determine the price of the service or the purchased machine.	2	3
6		7	10
	Q5: What are the most problems and weaknesses that the farmer faces when contracting with the other party?		
1	The difficulty of agreeing with the partner to provide the service with the required specifications and quality.	17	24
2	The lack of sufficient legal support to comply with the terms of the contract.	27	38
3	Failure to implement the contract on time for reasons related to social customs and traditions.	7	10
4	There is no unified formula for the purchase of agricultural machinery services.	17	24
5	Other problems.	3	4
	Q6: Do you think that organizing the contract with the other party according to the current method is beneficial for the farmer?		
1	Useful.	37	52
2	Not useful.	8	11
3	Not sure.	26	37

Source: prepared by researchers based on data of questionnaires and SPSS program

A transaction attributes that influence respondents' options towards buying with installments: The relation between respondents' knowledge around different transactions attributes and their options towards buying by installments was measured by using also statistical percentages. The

importance of the seven attributes of any transaction for the various agricultural machineries (tractors, seeders, farm sprinklers, and combine harvesters) that are related with both farms wheat and barley is shown in table 3.

Table 3. Results of measurement of transaction attributes for buying machines type of the study sample (N=71)

Transaction Attributes	Contracting Machinery Type							
	Tractors		Seeders		Farm Sprinklers		Combine Harvesters	
	N	%	N	%	N	%	N	%
Machinery Specificity: State the type of specificity of a buying service?								
Use in more than one production process (Nonspecific).	50	70	10	14	15	21	14	20
Use in one production process (High specific).	19	27	57	80	49	69	46	65
*Not sure.	2	3	4	6	7	10	11	15
Uncertainty: Do you have perfect confidence about the behavior of other party that he will do all items of signed contract?								
Certain.	60	85	48	68	45	63	49	70
Uncertain.	7	10	14	20	9	13	11	15
*Not sure.	4	5	9	12	17	24	11	15
Frequency: State the number of Frequency of a transaction?								
One time.	47	66	41	58	27	38	46	65
Many times.	19	27	11	15	22	31	11	15
*Not sure.	5	7	19	27	22	31	14	20
Complexity: State the degree of Difficulty of a transaction organization with the other party?								
Difficult.	48	68	39	54	19	27	30	43
Easy.	14	20	16	23	33	46	6	8
*Not sure.	9	12	16	23	19	27	35	49
Measurability: Can you imagine how much a buying service costs previously?								
Yes.	49	70	47	66	42	59	39	55
No.	11	15	12	17	13	18	7	10
*Not sure.	11	15	12	17	16	23	25	35
Saving the time: Does the completion of the transaction purchased on installments require a long time to complete with the contracting party?								
It takes a little time (1 week).	22	31	22	31	31	44	15	22
It takes a lot of time (more than a week).	34	48	39	55	19	27	11	15
*Not sure.	15	21	10	14	21	29	45	63
Investment level: How much is the investment or money allocated to each transaction?								
Low investment (less than 100,000 dinars).	17	24	16	23	30	42	37	52
Medium investment (100 thousand - 250 thousand dinars).	25	35	35	49	30	42	4	6
High investment (more than 250 thousand dinars).	29	41	20	28	11	16	30	42

Source: prepared by researchers based on data of questionnaires and SPSS program

As displayed in Table 3, about 80% of the respondents believe that the specificity of machinery is more relevant for seeders machines than for tractors, farm sprinklers, and combine harvesters' machines. In addition around 85%, 70%, 68%, and 63% of respondents have confidence about the action of the other party in the transaction with respect to the tractors, combine harvesters, seeders, and farm sprinklers, respectively. The maximum frequency of use can be detected for the farm sprinklers (31%), because those are multiuse machinery. The degree of complexity of contract organization with the other party can be expected to reduction with the low price of machinery included in the contract; so it is the few for crop protection machinery (27%), while the ratios of farmers who assumed that the degree of complexity of contract organization for tractors, seeders and combine harvesters is difficult were 68%, 54% and 43%, respectively. The ability to measure the cost of machinery is easier for tractors by 70%, and becomes more difficult for the rest machineries; seeders, farm sprinklers and combines harvesters by 66%, 59%, 55%, respectively. About half of respondents (44%) believe that there is a saving in time for the completion of the crop protection machinery transactions, while with regard to the time of completion of the transactions of seeders machinery; about 55% of the respondents see that they take a long time, which may establish an obstacle next to the contracting process for buying the service. By asking the respondents about the level of investment or the money allocated to each transaction, it was found that about 52% of the respondents had allocated only small amounts of money to invest in combines harvesters machinery due to the insufficient farm income to secure the access of these machines on farm, where the purchase

price of the machines was different according to the sources of their purchase. The purchase price of tractors ranged between 12-75 million Iraqi dinars, the purchase price of seeders was 3-27 million, and the purchase price of combine harvesters was 50-200 million Iraqi dinars.

Results of the analysis of the binary logistic regression model for the respondents' options of the agricultural machinery purchase markets:

A binary logistic model was used to analyze the regression between socio-economic characteristics and transaction attributes (independent variables), and respondents' options towards buying the core agricultural machines (tractors, seeders, and combine harvesters). The dependent variable in this study is derived from the question around two events of buying (cash, or installments) of the main agricultural machines (tractors, seeders, farm sprinklers, and harvesters). So the dependent variable was divided into two categories, which are farmers, who buy by installments coded as one and farmers who buy by cash coded as zero. The binary logistic model can be shown as following:

$$L = \ln \left(\frac{P_i}{1 - P_i} \right) = O_i = a + \sum b_j X_{ij} + e_i \quad (i = 1, 2, 3 \dots 150)$$

Where: P_i is the probability of the buying options. So we have:

$P_i = 1$ if respondents buy by installments

$P_i = 0$ if respondents buy by cash

L = normal log of odds ratio

Some explanatory variables (X_i) in this model were coded the value of 0 or 1 and other were coded as quantitative explanatory variables (Refer to Table 4). Thus seven transaction attributes and selected socio-economic factors were included in the original logistic model formulation for each of mentioned agricultural machines.

Table 4. Coding systems of independent variables

Explanatory Variables	Coding Systems	Explanatory Variables	Coding Systems
Specificity	1 Nonspecific 0 Otherwise	Investment level	1 Little time 0 Otherwise
Uncertainty	1 Certain 0 Otherwise	Farm area	Quantitative Variable 0 = Uneducated 1 = Read and Write 2 = Primary 3 = Secondary 4 = Diploma or Bachelor
Frequency	1 One time 0 Otherwise	Education level	1 Equal or more than 17 years 0 Less than 17 years
Complexity	1 Easy 0 Otherwise	Experience years	1 Equal or more than 17 years 0 Less than 17 years
Measurability	1 Yes 0 Otherwise	Income level	Quantitative Variable
Saving the time	1 Little time 0 a lot of time	Farm age	1 Equal or more than 48 years 0 Less than 48 years

Source: prepared by researchers based on data of questionnaires

A - Regression analysis of tractor services

After estimating the logistic model for tractors services, it was revealed that some independent variables were insignificant and others, in addition to being insignificant, did not have the expected sign. Therefore, the researchers resorted to the technique of dropping the variables that did not affect the phenomenon studied. The regression results of the logistic model, after excluding these factors, are indicated in table 5. The factors

included in the model are: farm area, experience years, net income, specificity and uncertainty. The model was selected based on expected signs and Wald-statistics at the 0.05 level. The overall significance of the model is measured by the LR statistic, which follows a chi-squared distribution. The model was significant at the high level of significance. So, the alternative hypothesis can be accepted for the model.

Table 5. Results of logistic regression analysis related of tractor services

Tractors Services: (N =150)							
Variables	B	S.E.	Wald	df	Sig.	Exp (B)	
Step 1	AREA	.009	.004	5.119	1	.024*	1.009
	EXP	-.986	.389	6.419	1	.011*	.373
	INCOME	.001	.000	6.393	1	.011*	1.000
	SPEC	.997	.378	6.979	1	.008*	2.711
	UNC	.847	.474	3.199	1	.074*	2.334
	Constant	-.866	.502	2.980	1	.084*	.420
-2 Log likelihood = 182.111,		Chi-square = 25.406,		Sig = 000*,			
Nagelkerke R Square = 0.21,		Hosmer and Lemeshow Test = 2.048		Sig = 0.			
.979							

Source: prepared by researchers based on data of questionnaires and SPSS program, * = significant

The results in Table (5) indicate that the probability of channel selection of buy by installments for tractors services is influenced by a higher degree of machinery specificity and behavioral uncertainty of other party, and a higher proportion of experience years, net farm income, and farm area. The significance level of behavioral uncertainty was not as good as 0.05 levels, but this attribute was still involved, as it is important in theoretical

potentials. The reason for respondents selecting this channel is that buying by installments could result in better costs and a quality advantage. On the other hand, the increasing concern about tractors marks and quality from farmers has pushed supplying companies to adopt quality mechanism checks. Thus, to contract better utility, this has encouraged respondents to choose buying by installments. With regard to other transaction

costs attributes, they are dropped during the first analysis. These attributes did not show much difference between the two buying channels.

B - Regression analysis of seeders services

In this model also the researchers used the dropping technique of the variables that did not affect the phenomenon studied. The factors included in the model are: farm area, experience years, net income, and frequency.

The model was selected based on expected signs and Wald-statistics at the different levels. The overall significance of the model is measured by the LR statistic, which follows a chi-squared distribution. The model was significant at the high level of significance. So, the alternative hypothesis can be accepted for the model. The regression results of the logistic model, after excluding these factors, are showed in table 6.

Table 6. Results of logistic regression analysis related of seeders services

Seeders services: (N =150)						
	B	S.E.	Wald	df	Sig.	Exp (B)
Step 1	AREA	.010	5.408	1	.020*	1.010
	EXP	-.959	6.318	1	.012*	.383
	INCOME	.000	6.042	1	.014*	1.000
	FREQ	-.779	4.253	1	.039*	.459
	Constant	.843	.371	5.162	1	.023*
-2 Log likelihood = 187.385,			Chi-square = 20.132,		Sig = 000*,	
Nagelkerke R Square = 0.17,			Hosmer and Lemeshow Test = 15.665		Sig = 0. .05	

Source: prepared by researchers based on data of questionnaires and SPSS program, * = significant

The results in Table (6) indicate that the probability of channel selection of buy by installments for seeders services is influenced by a higher proportion of experience years, net farm income, farm area, and a higher level of frequency of a transaction, where the higher the frequency of the transaction, lead to the higher the uncertainty and the higher level of the risk. On the other hand, there was no significant confirm for basic attributes that are specificity, and uncertainty at any acceptable statistical level to influence on the choice of buy by installments for agricultural seeders services, where according to the theoretical prediction, increasing machine specialization can be insignificant attribute in the decision on installments and consequent increased uncertainty about the behavior of the other contracting party especially if the transaction is the repeated type during the agricultural season.

C - Regression analysis of combine harvesters' services:

In this model several attempts have made to get the best results. The factors included in the model of step wise regression are: farm area, experience years, net income, and saving the time. The significance level of investment level was a little worse than 0.10, but this attribute was not excluded, as it is important in hypothetical expectations (negative sign). The model was selected based on expected signs and Wald-statistics at the different levels. The overall significance of the model is measured by the LR statistic, which follows a chi-squared distribution. The model was significant at 0.001 levels. So, the alternative hypothesis can be accepted for the model. The regression results of the logistic model, after excluding insignificant factors, are point out in Table (7).

Table 7. Results of logistic regression analysis related of combine harvesters

Combine harvesters' services: (N =150)							
Variables	B	S.E.	Wald	df	Sig.	Exp (B)	
Step 1	AREA	.007	3.406	1	.065*	1.007	
	EXP	-.940	6.103	1	.013*	.390	
	INCOME	.000	3.949	1	.047*	1.000	
	TIME	.992	2.865	1	.091*	2.698	
	INV	-1.815	1.237	2.156	1	.142	.163
	Constant	.217	.259	.704	1	.401	1.243
-2 Log likelihood = 186.969,			Chi-square = 20.548,		Sig = 001*,		
Nagelkerke R Square = 0.17,			Hosmer and Lemeshow Test = 3.393		Sig = 0. .907		

Source: prepared by researchers based on data of questionnaires and SPSS program, * = significant

The results in table 7 indicate that the probability of channel selection of buy by

installments for harvesters' services is influenced by a higher proportion of

experience years, net farm income, farm area, and a specific level of time that require to achieve the transaction with the contracting party. The positive sign of saving the time attribute means a lot of time to complete the transaction of the service with the contracting party, lead to the lower level of the probability that combine harvesters services will be buying on installments. This result confirms the hypothesis that increasing the duration of the contracting about the specific machine positively affects the transaction costs. Therefore in order to avoid some buying risks, studied grain crops farmers would prefer a save of time through buying on installments.

CONCLUSIONS

This research tries to clarify why some of wheat and barley growers are ever-changing from the cash market channels to installments market for buying agricultural machinery services. The elementary influences are based on the transaction cost economics. By examining a transaction cost attributes; this research introduces a regression model for analyzing wheat and barley farmers' purchasing behavior via installments payment for some agricultural machines in Baghdad province. The results showed that farmers' desire to buy by installments for tractors services is negatively associated with their apparent transaction cost, and perceived transaction cost is associated with machine specificity and uncertainty. When farmers' observe less asset specificity of buy by installments and less uncertainty in installments buying, they are more expected to purchase by installments. Contrasting, farmers' preferences to buy by installments for seeders services are negatively associated with their apparent transaction cost, and perceived transaction cost is associated with machine purchasing frequency. When farmers' observe less frequency of buy by installments, they are more expected to purchase by installments. Finally, farmers' willing to buy by installments for combine harvesters' services are negatively associated with their apparent transaction cost, and perceived transaction cost is associated with saving the time. When farmers' observe little time to achieve the transaction, they are more expected to purchase by installments. The inferences of the

analysis also can be seen as farmer experience, farm area and net farm income are the most important among all the demographic and economic characteristics for the wheat and barley farmers. With more farm area and more net farm income and fewer experiences, most farmers may select to buy by installments to avoid buy risks by cash payment.

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