

## The Role of Firm Ownership Type in the Adoption of Mechanical Tea Harvesting Technology in the Tea Subsector in Kenya

**Meshack K. Misoi**

Jomo Kenyatta University of Agriculture and Technology  
Kenya  
Email: mkmisoi@gmail.com – *Corresponding Author*

**Dr Wario Guyo**

Jomo Kenyatta University of Agriculture and Technology  
Kenya

**Dr George Orwa**

Jomo Kenyatta University of Agriculture and Technology  
Kenya

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### **ABSTRACT:**

*Adoption of mechanical tea harvesting technology in the tea subsector in Kenya has been identified as an option that can stem declining profitability caused by rising cost of production which is largely driven by labour costs. The uptake of this technology however is surprisingly low. The study therefore sought to establish if there is a relationship between firm ownership type i.e. local ownership or foreign ownership type and adoption of the technology. The target population was plantation tea estates segment totaling 42 firms. A descriptive explanatory survey design was used where both quantitative and qualitative data was collected by employing census technique due to small nature of the target population. Data analysis was done using descriptive and inferential statistics. A comparison of level of adoption in local and foreign owned firms indicated a relationship between technology adoption level and firm ownership type with F value of 4.277, significant at  $p < 0.05$  with foreign owned firms having a higher level of adoption than local firms. Non parametric test using chi square also indicated existence of relationship between adoption of mechanical tea harvesting technology and firm ownership type at  $p < 0.05\%$ . The research recommends that local firms should pursue more adoption of technology like the foreign owned firms so as to avoid being competed out of business.*

**Key words:** *Mechanical tea harvesting technology, firm ownership type, foreign owned firms, local owned firms, adoption of technology*

## 2 Introduction

### *2.1 Background of the study*

Technology provides an opportunity for businesses to improve their efficiency and effectiveness and even to gain competitive advantage. A decision to pursue a specific technology is of strategic importance. Bowman and Elfat (1998) linked performance in business organizations to strategic choice and action. Decision makers in organization have the power to decide on structural arrangements and courses of strategic action. The strategy that is chosen takes into consideration the organizations parameters (Heracleous, 2003). The decision to adopt or not to adopt a specific technology would depend on several factors some of which are organization specific as posited by Child (1997) whereas some factors are external as argued by (Heracleous, 2003).

Earlier studies on the drivers of technology adoption pointed to organizational characteristics such as firm size and employee's knowledge as some of the variables that are possible determinants of organizational adoption of an innovation (Rahab & Hartono, 2012). Thong and Yap (1995) mentioned particular characteristics of organization, culture, and family involvement in business hence suggesting that ownership type as also a potential factor.

### *2.2 Statement of the Problem*

Tea is a global cash crop with Kenya standing as the world third tea producer after China and India. The tea crop earned Kenya Kshs 104 billion in 2013 thus making the crop to be the leading foreign exchange earner (RoK, 2014). The cost of production of tea has however been rising globally. The drivers of these costs include high cost of labour, fuel and electricity. For example, the cost of production in Sri Lanka is considered to be the highest among tea-producing countries. In India it is also relatively high with the impact of social benefits on the large estates standing at 5 to 8 per cent of the total cost (van de Wal, 2008b).

In Kenya, the situation is no different with labour cost constituting about 55% of total cost of production. 75% of the labour cost relates to the manual harvesting of the tea crop (van de Wal, 2008a). Ongong'a and Ochieng (2013) observe that the tea industry in Kenya is also experiencing declining tea prices thus worsening the situation further.

Van de Wal, (2008b) points out that one intervention the tea subsector in Kenya has identified to mitigate the profitability decline is mechanical tea harvesting (MTH) technology. The technology is relatively labour efficient. Maina and Kaluli (2013) show that cost of mechanical tea harvesting is approximately 50 percent cheaper compared to manual tea harvesting. Misoi and Wario (2014) established that the technology adoption level in the plantation segment in Kenya stands at 32% by volume of crop harvested. The adoption level is therefore surprisingly low despite the potential viability of the technology. The study therefore sought to understand the possible reasons behind the low uptake of the technology by following the suggestion from the extant literature of a likely linkage between adoption of innovation and firm ownership type (Thong & Yap, 1995). Moreover, relationship of the technology adoption and firm ownership type in the tea subsector in Kenya is not well documented.

### ***2.3 Objective of the study***

The main objective of the study was therefore to establish whether there is a relationship between firm ownership type and adoption of mechanical tea harvesting technology in the tea subsector in Kenya.

### ***2.4 Hypotheses***

H<sub>0</sub>: There is no significant relationship between firm ownership type and adoption of mechanical tea harvesting technology.

### 3 Literature review

#### *3.1 Independent variable: Firm Ownership Type*

Rogers (2003) identifies socio-cultural practices and norms as one of the generic determinants of adoption of technology. Ndah, Schuler, Uthes and Zander (2010) assert that social system or culture therefore can inhibit or drive adoption. Organization's culture depends on the founders or owners of the organization. Brown, Earle, Vakhitova, and Zheka (2010) have pointed out that despite extensive research on how firm performance varies with ownership types and corporate governance having been done, the channels through which some owners and institutions produce superior performance is quite limited. Brown et al (2010) further argue that some owners and governance arrangements may better facilitate investment choices or implementation, resulting in higher levels of investment or higher returns and hence superior performance. Furthermore, owners can facilitate organizational change and provide trained managers.

Crespi et al (2007) has shown that in the private sector, foreign owners could monitor management more effectively through better corporate governance structures. Foreign owners could also have more experience using high technology and organizational practices that best suit it. New firms can upon entry put in place structures for new technology, giving them an advantage over established firms that would have to undertake potentially painful restructuring. Brown et al (2010) further posit that firm types may also vary in access to finance. Firms with better access can invest more. Foreign owners are likely to have better access to financing for investment than local or domestic private firms. In this study firms were categorized as either indigenous/local or foreign owned.

### ***3.2 Dependent variable: Adoption of mechanical tea harvesting technology***

Hoffman (2005) defines innovation as knowledge introduced into and utilized in an economic or social process. It includes new products, equipment and also new methods and ideas. Technology is therefore a form of innovation. The contribution of new technology to economic growth can only be realized when and if the new technology is widely diffused and used. Diffusion itself results from a series of individual decisions to begin using the new technology, decisions which are often the result of a comparison of the uncertain benefits of the new invention with the uncertain costs of adopting. Rodgers (2003) argued that all firms or individuals who get exposed to technology must make a decision about whether to adopt or reject. This can be done instantaneously or through a process.

Rodgers further pointed that decision makers of technology adoption consider relative advantage offered by the technology, aspects of complexity; the degree to which a practice is perceived as relatively difficult to understand and to adopt negatively related to its rate of adoption, trial-ability; the degree to which an innovation may be experimented at a limited basis, compatibility; the degree to which sustainable practice is perceived as consistent with the existing values, past experience and needs of potential adopters. Adoption of technology can therefore be seen as the cumulative or aggregate result of a series of individual calculations that weigh the incremental benefits of adopting a new technology.

Tea harvesting operation is very critical and constitutes a significant percent of cost of production. The tea crop is largely harvested manually. Mechanical tea harvesting technology is therefore a comparatively labour efficient. It offers quick and enhanced labour productivity and reduces the cost of harvesting.

## **4 Research methodology**

### ***4.1 Research Design***

Explanatory research design was used in this study. The design was considered appropriate because the study sought to determine relationship between variables. Explanatory design focus on developing causal explanations in a not so well understood relationships.

### ***4.2 Sample and Sampling procedure***

The target population was all tea producing firms in the plantation segment in the tea subsector in Kenya totalling 42 (Source-AFFA, Tea Directorate, November 2014). Due to the small size of the target population, census approach was used. The target respondents were therefore 42 members of management in the top, middle or junior cadre in each organization. The management were regarded as the most suitable since they are important in decision making and also in the implementation of any new technology in their enterprise.

### ***4.3 Research Instrument and Data collection and analysis***

Questionnaires consisting of structured and open ended questions were used to collect primary data. The structured questions were designed to collect some quantitative data whereas the open ended questions were designed to capture opinions of the respondents with regards to the variables under investigation. Once administered, the questionnaires were coded, checked for completeness and consistency. The questionnaires were then analyzed using both descriptive and inferential statistics in which statistical package for social sciences (SPSS) tool was employed.

In order to have a good understanding of the relationship of firm ownership type and mechanical tea harvesting technology adoption was approached in two ways. First, level of

adoption of mechanical tea harvesting technology was measured by computing the proportion in percentage terms the tea crop that was mechanically harvested against the total production in a tea plantation firm. The firms were also categorized into locally owned and foreign owned. Analysis of variance (ANOVA) was then used to compare means of adoption levels in the locally owned and foreign owned firms. The use of ANOVA was considered appropriate based on Kothari and Garg (2014) who argued that the basic principle of ANOVA is to test difference between means of a population by examining the amount of variation within each of these samples relative to the amount of variation between samples.

Secondly, summary of local and foreign owned firms into two categories i.e. those which had adopted and those which had not adopted was done. This way of measurement is informed by Rogers (2003) who defined adoption of technology as the first or minimal level of behavioural utilization. Following Kothari and Garg (2014), the chi square test was considered the appropriate test as it is a non parametric test of independence of two attributes. In this case, the attributes whose independence we intended to test was firm ownership type and adoption of mechanical tea harvesting technology.

## **5 Results and discussion**

The objective was to establish relationship between firm ownership type and adoption of mechanical tea harvesting technology in the tea subsector in Kenya. Out of 42 questionnaires that were distributed, 32 were completed and returned. This represented a response rate of 76%. This was considered adequate based on Mugenda and Mugenda (2003) who together with Bailey (2000) suggested that a response rate of 50% is adequate.

**Table 1: Proportion of firms by ownership type**

	Frequency	Percent
Indeginous/Local	17	53.1
Foreign Owned	15	46.9
Total	32	100.0

Both independent and dependent variable data was first summarized using descriptive statistics. The locally owned firms were 46.9% whereas foreign owned firms were 53.12% of the total firms in the study as shown in Table 1. The means of adoption levels of locally owned firms against foreign owned firms as shown in Table 2 were 27.01% and 52.72% respectively. Comparison of the two means to establish whether they were the same or not was carried out through analysis of variance.

**Table 2: Means and standard deviation of adoption level in %**

Ownership Type	Mean	N	Std. Deviation
Indeginous/Local	27.01	17	39.114
Foreign Owned	52.72	15	29.852
Total	39.06	32	36.906

The ANOVA results in table 3 show an F value of 4.277 is significant at  $p < 0.05$  level of significance. The results lead to the rejection of the null hypothesis that there is no relationship between the firm ownership and adoption of mechanical tea harvesting technology.



**Table 3: ANOVA**

		Sum of Squares	df	Mean Square	F	Sig.
MTH Adoption Level *	Between Groups (Combined)	5268.690	1	5268.690	4.277	.047*
Ownership Type	Within Groups	36954.881	30	1231.829		
	Total	42223.571	31			

\* The F statistic is significant at the 0.05 level.

Chi square test was also carried out to further confirm whether the adoption of mechanical tea harvesting technology was independent of firm ownership type. The data was first summarized into a contingency table containing various categories adoption of mechanical tea harvesting technology and firm ownership type in Table 4.

**Table 4: Summary by firm ownership type**

		Ownership Type		
		Local Owned	Foreign Owned	Total
MTH Adoption	Non Adopters of MTH	11	2	13
	Adopters of MTH	6	13	19

Pearson Chi square statistic was then computed as shown in Table 5. The results show that computed chi square of 8.719 was significant at  $p < 0.05$  significance level. The results indicate that there is a relationship between mechanical tea harvesting adoption and the firm

ownership type. The results corroborate the comparison between means of adoption levels in table 2 and also lead to rejection of hypothesis that there is no relationship between firm ownership type and adoption of mechanical tea harvesting technology.

**Table 5: Pearson Chi-Square Test**

		Ownership Type
MTH Adoption	Chi-square	8.719
	df	1
	Sig.	.003*

\* The Chi-square statistic is significant at the 0.05 level.

## **6 Conclusion and recommendation**

### ***6.1 Conclusion***

The study sought to find out whether there existed a relationship between firm ownership types and adoption of mechanical tea harvesting technology in the tea subsector in Kenya. The results indicate that firm ownership type is related to the adoption of mechanical tea harvesting technology. Foreign firms were found to be carrying out adoption of mechanical tea harvesting technology more than the local firms. The underlying reason for this as obtained from qualitative analysis was that most local firms focused more on legitimacy i.e. they sought to be seen as contributing to the society by avoiding mechanization which is perceived to take away job opportunities. The local firms felt that providing employment was important and pursuing mechanical tea harvesting would make them less responsive to community employment needs. The foreign owned firms seemed more concerned with profitability. The foreign owned firms were also seen to be more present along the value chain hence have more access to markets and respond to them more. Moreover, foreign

owned firms are more exposed to better technologies than local firms through international network. Foreign owned firms also have more capacity to invest in technology because of their ability to mobilize financial resources which is very critical in adoption of technology.

The findings therefore corroborate the argument by Crespi et al (2007) that foreign owners should have more experience using high technology and the organizational practices that best suit it. Also, the findings agree with observations by Brown et al (2010) that foreign owners are likely to have better access to financing for investment than domestic private firms. The findings also enhances the psychological field theory of Kurt Lewin that posits that adoption can be blocked or impeded by firm specific barriers or inhibiting forces such as insufficient capital and cultural practices (Ndah et al., 2010).

## ***6.2 Recommendation***

Following the findings that firm ownership type is related to decision to adopt and also the extend of adoption of mechanical harvesting technology, the study recommends that local firms need to pursue mechanical harvesting technology so as to enjoy cost advantages that come with the technology. The foreign firms seem to be fully aware of benefits of the technology and therefore have higher adoption levels. A balance therefore needs to be struck by the local firms between the need to be legitimate and the need to maintain profitability. The threat of business survival needs to inform the decision makers in the domestic firms with regards to adoption of technology. The firms should analyse the main reasons underlying its inability to adapt technology for example, if it is due to insufficient capital, they could enter into partnerships with the foreign firms who have better network and access to resources.

### ***6.3 Suggestion for further research***

While this research established that relationship of firm ownership type and the adoption of mechanical harvesting technology in tea subsector in Kenya existed and was significant, the direction of this association was not clearly established. Further research therefore needs to be carried out to establish the nature of relationship. This is hoped to improve knowledge on how firm ownership type affects the adoption of technology.

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