



## **FOREIGN DIRECT INVESTMENT, ADVANCED PRODUCTION TECHNOLOGY AND LOCAL FIRM'S PERFORMANCE**

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### **Abstract**

*There is little documentation on the role of Advanced production technology spillover on the performance of firms. This paper investigates the effect of Advanced production technology spillover on performance of manufacturing firms in Kenya. The study comprised 100 companies registered with Kenya Association of Manufacturers that had over 10 percent foreign ownership as at the time of data collection in 2019. Respondents included organization CEOs or designated officers. Respondents were required to indicate how the spillover of advanced production technology affected the performance of Kenyan Manufacturing firms. The results revealed that Advanced production technology spillover has statistically significant effect on the firm performance implying that an incremental change in the Advanced production technology*

would generate growth in company's performance. As such, Kenya and other sub-Saharan African countries, government need to come up with policies geared to supporting technology spillover to spur the growth of the key sectors of the economy.

*Keywords: Foreign Direct Investment, Advanced production technology, Firm Performance*

## INTRODUCTION

Sub-Saharan African (SSA) countries lack viable technological capacity needed to spur economic growth in the region. These countries have made attempt to upgrade their skills and technologies through importation of capital goods, investment in appropriate research and development, recruitment of well-trained workers and managers from Multinational Enterprises (MNEs). Nonetheless, these attempts to acquire modern technologies has not worked for Sub-Saharan African and this has slowed down their progress towards industrialization (Onyekwena, 2012).

Kenya's technological and skill position like many other Sub-Saharan African (SSA) countries, is very weak. The country suffers low productivity and growth attributed to inappropriate education system, low investment in research and development and poor linkage with institution of higher learning among other factors. Ngui, Chege and Kimuyu, (2016) asserted that Kenya lack requisite technological dynamism attributed to inappropriate educational system that has not addressed the country's skills need. The country as a result has faced a constrained technological position that has slowed its development. Academicians and policy practitioners agree that Kenya and other SSA countries can overcome this situation by attracting foreign direct investment. Loungani and Razin (2001) observed that unlike other forms of capital, foreign direct investment is better as it is more resilient to the turbulence of financial crisis and also carries others benefits through spillovers.

Scholars have noted that research and development and technology is concentrated in some few countries and is mainly diffused to local firms through labour turnover and imitation of technology from foreign firms. Technology spillovers are residual benefits that come from foreign direct investment and accrues to indigenous firms raising their overall level of productivity (Harris & Robinson, 2004). Leman and Ismet, (2015) observed that multinational companies a key FDI vehicle invest heavily in research and development laboratories spread across the world making them a key source of new technologies, new products and production processes, new patent and speeding up of innovative activities within host countries. The International Monetary Fund (2018) and Government of Qatar (2014) affirmed that besides the provision of capital to host countries, FDI encourage partners to transfer knowledge and

technology to host countries providing them with opportunities to promote their products in the global market.

Compared to other form of investment like Portfolio equity, debt flows and domestic investment, FDI possesses intangible assets, such as superior technology that help them intensely compete in foreign markets making them an attractive supplier of cutting edge technology for less developed countries. (Onyekwena, 2012). The intangible assets characterizing FDI infer that it's a personification of contemporary technologies with possible paybacks to host economies through the introduction of new technologies and innovations, superior managements systems, products, skills and manufacturing know-how (Javorcik, 2004).

### **Kenya's Manufacturing Sector**

Immediately after independence, the new Government of Kenyan found itself under extreme pressure to transform political liberation into economic freedom. Aware of the capacity limitation of locals to undertake transformative economic activity, the new government ratified a number of new laws to preserve and encourage more foreign investment. As is the case with many Sub Sahara African Countries, the Kenya manufacturing sector is not robust enough and the economic growth is predominantly supported by agriculture and the service sector. Over time, the manufacturing has stagnated at less than 10 percent and has experienced early deindustrialization as evidenced by the reduction in GDP contribution by the sector to 4.2 per cent in 2016 (KAM, 2018).

The Kenyan manufacturing industry is part of the key agenda in the Kenya Government transformation program. With a GDP contribution of 9.5 per cent % in 2018, the sector is at the heart of Kenya industrialization policy and provide the best entry point for FDI. The goal of the National Government is to ensure that manufacturing industry increases its contribution to national economy by about 15 percent of the GDP come 2022. This can only be realized if we increase the level of investment in this sector and ensure we have the necessary skills and technologies to drive the sector.

Despite the importance of the manufacturing sector to the transformation of our country, domination of the sector by large foreign manufacturing firms and the important role played by local firms, the effect of technology spillover on local firm performance has not been systematically studied making this study appropriate. The study will analyze the effect of advanced production technology spillover on the local firm's performance.

## RELATED LITERATURE

Dadzie (2012) pointed out that foreign direct investment is instrumental for the growth of local firms as it increase their productivity through adoption of better technologies. Onyekwena, (2012) asserted that studies on foreign direct investment spillover assumes that technologies are freely available to local organization and that FDI automatically involve transfer of technology and therefore local firm's benefits automatically. Pedro, Jorge and Jose (2014) established that spillover from MNCs is a source of technical progress and thereby contributes to overall firm performance. Newman, Rand, Talbot & Tarp (2015) evaluated the association among technology transfer, foreign investment and productivity spillover and empirically established that certain gains in productivity were linked directly to connection between domestic and foreign owned companies along supply chain.

Onyekwena, (2012) affirmed that developing countries pursuit of foreign direct investment is motivated by the belief that this kind of investment has definite advantages compared to other forms of investments, and in particular domestic investment. International Monetary Fund (2018) affirmed that the benefit of FDI does not appear as expanded resources that can be invested, but it also appears in the transfer of knowledge and technology. As such, FDI may be said to encourage partners to transfer know-how and technology and also provide opportunities specially to host countries to promote their products in the global market (Government of Qatar, 2014). They asserted that multinationals are a key foreign direct investment vehicle and invest heavily in research and development laboratories spread across the world. As a result, they are a key source of new technologies, new products and production processes, new patent and speeding up of innovative activities within host countries. Thus, foreign direct investment promotes the development of local firms that produce local intermediate products and services, which in turn, boosts the overall development of firms that deal with production of final products.

Görg and Strobl (2001) established econometric evidence that multinationals have positive influence on the productivity of local firms in the Irish economy through the creation of linkages with local suppliers. This suggests that there are spillovers in high tech firms whereby local firms learn new production technologies from multinationals enabling them to produce more efficiently. The lack of spillovers in low tech firms may be attributed their lack of absorption capacity for the new knowledge. The findings by Görg and Strobl (2001) observe that the favorable effect increase chances of survival of such firms, at least in high tech sectors. Further, Wang, Deng, Kafouros and Chen (2012) established a positive link between a company's footprint in a foreign country and the productivity of the hosting economy.

Leman and Ismet, (2015) noted that multinational Enterprises expose local firms to modern technology in the process transferring technology knowhow to the local economy. Moreover, workers who move from MNEs or their affiliates to local firms are able to transfer technological know-how. Damgaard, (2011) established that domestic firms that supply to foreign firms becomes more efficient because of the productivity improvements and training programs undertaken by foreign firms. Liu and Wang (2003) cited in Bonga-Bonga and Guma (2017) used Chinese experience to show that the drive to attract strong investment flows from outside is a highly effective mechanism for pushing forward the technological capacity of the host regions.

Onyekwena, (2012) asserted that studies on foreign direct investment spillover assumes that technologies are freely available to local organization and that FDI automatically involve transfer of technology and therefore local firm's benefits automatically. Pedro, Jorge and Jose (2014) established that spillover from MNCs is a source of technical progress and thereby contributes to overall firm performance. Newman, Rand, Talbot & Tarp (2015) evaluated the association among technology transfer, foreign investment and productivity spillover and empirically established that certain gains in productivity were linked directly to connection between domestic and foreign owned companies along supply chain.

Leman and Ismet, (2015) noted that foreign direct investment introductions have been the main source of economic development among Sub-Sahara African countries. They asserted that multinationals are a key foreign direct investment vehicle and invest heavily in research and development laboratories spread across the world. As a result, they are a key source of new technologies, new products and production processes, new patent and speeding up of innovative activities within host countries. Foreign direct investment inflows have enabled recipient countries to accumulate capital, acquire know-how and new technological practices that have improved their levels of innovativeness and even promoted economic growth (Temiz and Aytac, 2014, Asuantri and Yasmin, 2017). As a result, countries that lack technological know-how should attract foreign investors to boost their economic growth. Liu and Wang (2003) cited in Bonga-Bonga and Guma (2017) used Chinese experience to show that the drive to attract strong investment flows from outside is a highly effective mechanism for pushing forward the technological capacity of the host regions. They also observed that such efforts were impeded by dearth of skilled labor in the hosting economy. Allais, (2012); Rasool and Botha, (2011) asserted that skill shortage impacts hampers the positive outcomes of FDI on TFP and in extension a country's economic growth potential.

In contrast, Diyamett and Mutambala (2014) study on Tanzanian firms found that very few firms acknowledged that FDI as the bases of technical capabilities achieved fact revealed in

their limited linkages with foreign investors. Damgaard (2011) study on analysis of total productivity spillover established a statistically significant negative spillover effect at the cumulative level. However, the study asserted that results differed widely across industries with firm's high export orientation and those in competitive environments experiencing less negative spillovers. Further, Pavlinek and Zizalova (2014) affirmed that local firms were vulnerable to positive and negative spillovers. The negative horizontal spillovers emanated from failure to eliminate crowding out phenomena forcing most local companies to be purchased or engage in joint arrangements with foreign companies and in the worst cases close business. Barrios, Görg and Strobl (2006) observed an insignificant link between these spillovers and performance of local companies in East–Central Europe. Further, entry of FDI resulted to temporal negative horizontal spillover (Pavlinek & Zizalova, 2014). Renzi (2012), study on the impact of multinational corporations on the South African economy established mixed results. However, in terms of guiding government policy, the study confirmed the significance of FDI in evolving markets.

### Conceptual Framework

Kombo and Tromp (2009) noted that conceptual framework denotes a set of broad thoughts and values extracted from relevant spheres of study and adapted in configuring a subsequent presentation. The conceptual framework was established on a diverse theoretical underpinning including FDI theories, dynamic capabilities and knowledge based. The study conceptualized FDI as a source of Advanced Production Technology spillover to local firms. The spillover Advanced Production Technology in turns leads to better local firm performance. The framework is illustrated in figure 1.

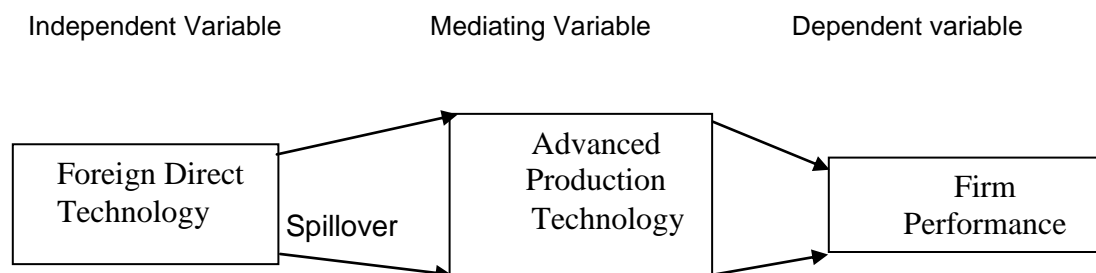


Figure 1. Conceptual framework

### METHODOLOGY

This research adopted a correlational design to evaluate relationship among variables. The study population consisted of all the 100 manufacturing firms registered with KAM and that

had over 10% foreign investment in Kenya. The firm was the principal unit under investigation. The data was collected from one member of the top management preferably CEO or the finance and strategy director who were considered knowledgeable about the issue under investigation; as such, they were the key informants. Their choice is consistent with similar studies conducted by Shabarati, Jawad and Bontis (2010) and Cabrita and Bontis (2008) who claim top managers are knowledgeable about organizational characteristics.

Both descriptive and inferential statistics were utilized to analyze the data. Descriptive statistics was computed to represent general information and firm characteristics (Kothari, 2014). Additionally, a series of regression analyses was conducted to assess the relationship between the independent and dependent variables to determine whether the results are significant or not. Table I provides a summary of the hypothesis test and analytical procedures.

Table 1: Objectives, hypotheses, tests and analytical models

Objective	Hypothesis	Hypothesis Test	Analytical model
Objective: Establish the effect of advanced production technology on manufacturing firm's performance	H:Advanced production technology has no significant effect on firm's performance.	Simple regression analysis $FP = \beta_0 + \beta_1 APT + \epsilon$ ...where FP= Firm performance APT =Advanced production technology $\beta_0$ = Constant (intercept), $\beta_1$ =Regression coefficient for advanced prod. technology, $\epsilon$ = Error term	Coefficient of determination (adj. R2) value will show the % of firm performance explained by advanced production technology regression coefficient will show the change in firm performance due to a unit change in advanced production technology.

## RESULTS AND DISCUSSION

### Screening and Preparation of Data

Table 2: Data Entry Errors

		FDIAPT
"N	Valid	75
	Missing	0
	Minimum	5.00
	Maximum	15.00
Percentiles	25	11.0000
	50	11.0000
	75	13.0000

From the frequency table 2 above, it is evident that the data set has no data entry errors. Advanced production technology, the valid responses were 75 respondents while no data from respondents was missing.

Table 3: Outliers

	N	Minimum	Maximum
Zscore(FDIAPT)	75	-3.33000	1.73592

The above table 3 indicates the maximum and minimum Z score values for each of the individual variables. According to Shiffler (1987), absolute z values greater than +/-3 are considered to have outliers. The values that were outside acceptance area were removed while analyzing the data.

Table 4: Range Values

		FDIAPTav	FPav
N	Valid	75	75
	Missing	0	0
	Minimum	1.00	1.50
	Maximum	3.00	3.63

The descriptive output table 4 above indicates the average maximum and minimum values for each of the variables. From the likert scale adopted, it is clear that the minimum values to be obtained on the independent variables should be 1 whereas the maximum value to be obtained should be 3. As evident in table 4.3, the Advanced Production Technology values ranged from 1 to 3 and Firm Performance scores from 1.5 to 3.63.

### Diagnostic test

To complete the analysis, the study relied on descriptive statistical and regression tools. To test the quality of the data and ensure that the classical linear regression assumption was met, the data was checked for normality, multicollinearity and heteroscedasticity. Normality test was done using histograms and the Kolmogorov-Smirnov test. The findings of normality test show that the data met the condition of normal distribution. Multicollinearity was tested in the model by checking the VIF scores and the findings indicated that the assumption of multicollinearity has not been desecrated in the study. As such, the precondition was fulfilled for all the explanatory variables except business environment conditions.



## Descriptive Results

Advanced production technology indicated the scope to which introduction of foreign direct investment lead to transmission of advanced production technology to the local manufacturing firms. To establish the extent of transmission of production technology attributable to FDI activities in the local manufacturing firms, descriptive statements were presented to the respondents. The statements depicted improvement in products, production technologies and availing of license or patent. The respondents were to indicate if they agreed or disagreed with each of the statements. A summative analysis of the responses is illustrated in Table 5.

Table 5: Advanced Production Technology

Benefits of Technology Transfer	N	Mean	Std.		
			Deviation	Variance	CV
Improved an existing product	75	2.60	0.77	0.59	0.30
Developed a new product	75	2.04	0.99	0.98	0.49
Improved an existing production process	75	2.67	0.72	0.52	0.27
Introduced new production technology	75	2.40	0.89	0.78	0.37
Provided the firm with license or patents.	75	1.87	0.93	0.87	0.50
<b>Overall</b>	<b>75</b>	<b>2.31</b>	<b>0.86</b>	<b>0.75</b>	<b>0.38</b>

The average scores for the advanced production technology construct ranged from 1.87 to 2.67. This means that the respondents agreed that advancement production technology had taken root in their firms and that a lot of improvement had taken place because of this. The statement that advanced production technology improved an existing production process had the highest average rating of 2.67 (SD=0.72) an indication that the firms surveyed had improved production processes for the better.

The overall coefficient of variation was 0.38 an indication that respondent generally were in agreement on the usefulness of FDI in advanced technology transfer to Kenyan Manufacturing firms. The highest variability was that the advanced production technology associated with FDI provided the organisation with license or patents (CV=0.50) thus suggesting there was absence of consensus amongst the participants in connection to the provision of patents. The item with the lowermost variability was that FDI improved an existing production process (CV= 0.27) indicating that there was consensus amongst the respondents on the degree to which the companies' existing production process were improved. The statement with the second highest mean score (mean =2.60, SD = 0.77) was that the FDI

improved an existing product. This was a pointer that manufacturing firms have management to leverage working efficiency in boosting their performance. The item that FDI helped in development of a new product had the second lowest average score of 2.04 ( $SD=0.99$ ) an indication that majority of companies focused more on improvement of existing product than on developing new ones.

The above findings affirm the earlier assertion by Muhammad and Kashif (2013) that FDI inflows enable developing countries to acquire new technological practices that help improve their levels of innovativeness. The study findings also agree with Leman and Ismet (2015) who observed that foreign investment are key sources of new technologies new products and production processes, new patents and speeding up of innovation activities within the host country. The study findings contradict the findings by Diyamett and Mutambala (2014) who found that very few local firms indicated that their source of knowledge for technology capabilities achieved were from FDIs.

## Correlation Analysis

### *Relationships between Predictor and Criterion Variables*

The intended goal of this study was to ascertain whether or not the advanced production technology and firm performance are interrelated. To this end, Pearson correlation analysis was employed. The objective of the analysis was to discern not only the strength but also the direction of the interrelationships involving the variables. Based on the output, it is notable that performance was not significantly related to advanced production technology ( $r = 0.092$ ,  $p > 0.05$ ). The results of this analysis are displayed in table 6.

Table 6: Correlation Analysis

		FDIAPT	FP
FDIAPT	Pearson Correlation	1	.092
	Sig. (2-tailed)		.431
	N	75	75
FP	Pearson Correlation	.092	1
	Sig. (2-tailed)	.431	
	N	75	75

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\*. Correlation is significant at the 0.01 level (2-tailed)

## Regression Results

The researcher set out to test the spillover effect of Advanced production technology on the performance of manufacturing firms in Kenya. The hypothesis was developed from gaps identified in theoretical and empirical studies and were evaluated with the aid of regression models. The grounding of the hypotheses was on the relationships among the study variables as conceptualized in the conceptual framework.

*Hypothesis: Advanced production technology has no significant relationship with performance of manufacturing firms in Kenya.*

The hypothesis was tested using simple linear regression. A construct index for Advanced Production Technology was regressed on performance and the results are as displayed in Table 7.

Table 7: Regression Results for Advanced Production Technology on Firms Performance

Model	ANOVA			Coefficients			Resulting model
	R2	F	Sig.	Beta	t	Sig.	
1				2.147	8.552		FP=2.147+0.060APT
(Constant)							
Advanced production technology	0.006	0.459	0.500b	0.060	0.677	0.500	

a. Predictors: Advanced production technology (APT)

b. Dependent Variable: Firm's performance (FP)

It is apparent that Advanced production technology accounted for 0.6% of variation in firm performance ( $R^2=0.006$ ). The model exploring the link between advanced production technology and performance was also significant as well as the coefficient of the explanatory variable ( $\beta=0.060$ ,  $t=0.677$ ,  $P<0.05$ ).

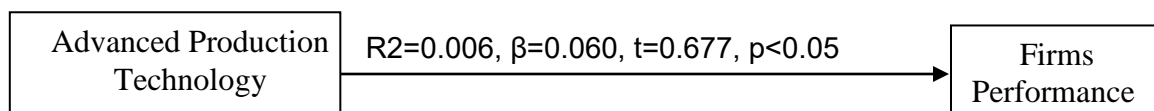


Figure 2: Summary of Resultant Findings

The results from the test of hypothesis test established that Advanced production technology ( $R^2=0.006$ ,  $F=0.459$ ,  $\beta=0.079$ ,  $p<0.05$ ) had positive and significant impact on performance. These results confirm that Advanced production technology increases

performance of the companies, implying that firms that attract FDI investors will improve their performance. The association between Advanced production technology and performance was found to be significant ( $R^2=0.006$ ,  $F=0.459$ ,  $\beta=0.079$ ,  $p<0.05$ ) and had an explanatory power of 0.6%. These findings tie well with a study by Leman and Ismet (2015) who noted that FDI inflows lead to increase in new technologies, production processes and set ground for innovation resulting to better firm's performance. The findings also concur with Pedro, Jorge and Jose (2014) whose study evaluated the influence of foreign capital on Spanish manufacturing firms and established that FDI had positive spillovers on indigenous firms and that when the foreign capital was large enough, it promoted technical progress.

Further the findings support Nadide and Ibrahim (2014) study that established that FDI contributes to economic development by increasing technology improvements which in turn improves the performance of firms. They noted that capital accumulation leads to investment in the innovation of new concepts and skills, and since knowledge is to some extent a public good, it increases the level of technology not only within the organization but in the whole country. The study further supports IMF (2018) observation that foreign direct investment benefits does not appear as expanded resources that can be invested, but it also appears in sharing of knowledge and technology. The findings concur with the Government of Qatar, (2014) that observed that FDI encourage partners to transfer know-how and technology and also provide opportunities specially to host countries to promote their products in the global market giving them market access.

However, the study contradicts the study by Diyamett and Mutambla (2014) study on Tanzanian firms found that very few firms acknowledged FDIs as their sources of knowledge for technological abilities attained, a fact supported by their limited connections with foreign investors.

## CONCLUSION AND RECOMMENDATIONS

The objective of the study was to establish the effect of advanced production technology on the performance of manufacturing firms in Kenya. The study found that there was a significant linkage between advanced production technology and firm performance. Advanced production technology displayed a positive association with performance. The results from the test of hypothesis established that advanced production technology had positive and significant implications on performance.

The findings lend credibility to the burgeoning empirical bases that demonstrate the salience of FDI spillovers in the elevation of developing economies. The study has several implications emanating from the literature review and results of the study that can be considered

by the government for policymaking. First, the government should enact a policy framework to provide incentives, to encourage foreign direct investments in bid to attract advanced production technology, to break into local and international markets, particularly for Kenya, a country that want to achieve newly industrialized status by 2030. The implication of this is that the country should develop policy framework to attract more FDI in the sector with the anticipation of improving aggregate productivity for the country-manufacturing sector through spillovers’.

Secondly, Kenya being an emerging economy, many of her manufacturing firms have inefficient production technologies and management systems. The government policy should encourage local firm’s relationship with foreign firms, while advancing their research and development undertakings to improve their absorptive capability which in turn will assist them gain from likely spillovers in their industry. The local firms stand to gain from policies crafted to help them appropriate advanced production technology from the FDI firms. The government and management of local firms need to formulate a broad range of policy framework and guidelines to capitalize on the FDI spillovers to local manufacturing firms. Moreover, the relationship and connection between the indigenous and foreign companies should be reinforced and supported by appropriate policies. Thus, the government should come up with policies that makes our manufacturing sector attractive to foreign investors.

Thirdly, the government is required to provide an environment that allows local firms to appropriate the benefits of FDI firms. In addition, the government should improve the business environment to make Kenya an attractive destination for FDIs. The government should also enact a policy on intellectual property rights to enable the innovators to enjoy their innovations.

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