

**SAJMMR**

**ISSN (online) : 2249-877X**

# **South Asian Journal of Marketing & Management Research**



Published by  
**South Asian Academic Research Journals**  
A Publication of CDL College of Education, Jagadhri  
(Affiliated to Kurukshetra University, Kurukshetra, India)

**SAJMMR**

ISSN (online) : 2249 –877X

Editor-in-Chief : Dr. B.C.M. Patnaik

Impact Factor : SJIF 2020 = 7.11

Frequency : Monthly

Country : India

Language : English

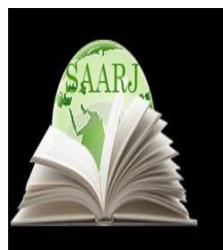
Start Year : 2011

Indexed/ Abstracted : Ulrich's Periodicals Directory, ProQuest, U.S.A.  
EBSCO Discovery, Summon(ProQuest), ISC IRAN  
Google Scholar, CNKI Scholar, ISRA-JIF, GIF, IJIF

E-mail id: sajmmr@saarj.com

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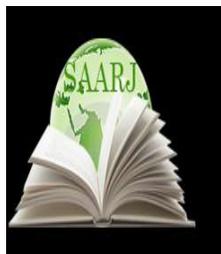


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**DOI NUMBER: 10.5958/2249-877X.2020.00001.6**

**IMPACT ANALYSIS OF THE GCI ON THE VOLUME OF FDI  
ATTRACTED TO THE COUNTRY**

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**ABSTRACT**

*The article to attract foreign direct investment, increase international participation in the index directly linked to the national economy on the basis of econometric analysis, as well as to attract foreign investment recommendations aimed at improving the offer. In recent years, we have often seen very clearly identifying the key drivers of growth, which are drivers of economic growth in the world's leading economies, in the face of intense global markets. Undoubtedly, the arsenal of different governments has a diverse set of mechanisms and tools that will drive economic growth. One of the leading economists A. Bekmurodov spoke about the features of foreign investments, their role in the economy and the investment climate: "Most countries in the world are competing with a certain degree of competition to attract FDI, thus creating a favorable and competitive investment climate. In the research, economic growth was assessed on the basis of econometric analysis of the increase in the volume of foreign direct investment in each country's economy. As a result of this analysis, it is the development of scientific-practical suggestions and recommendations to increase participation in indices published by international rating agencies of Uzbekistan. Most importantly, the creation of favorable conditions for the country to enter the international rankings and strengthen its position in the country, along with the increase in foreign direct investment, will help to create a favorable investment climate and a positive image of the country in the international arena. According to the unit root tests, the FDI variable is stationary based on the level data, which is the primary data, while the GCI variable is not stationary on 3 tests at once. As a result, there was a need to transform the primary data by extracting the difference, with the difference obtained by subtracting from the previous one.*

**KEYWORDS:** Foreign Direct Investment, Investment Climate, Global Competitiveness Index, Econometric Analysis.

## INTRODUCTION

The State Program "Year of Active Investments and Social Development" adopted within the framework of the Action Plan of the Development Strategy of the Republic of Uzbekistan for 2017-2021 outlines the most important and priority directions of development of the country, they require a radical revision of stereotyping views, especially in the area of economic growth in recent years

In recent years, we have often seen very clearly identifying the key drivers of growth, which are drivers of economic growth in the world's leading economies, in the face of intense global markets. Undoubtedly, the arsenal of different governments has a diverse set of mechanisms and tools that will drive economic growth. However, in our view, there are three factors that can have a positive impact on economic growth, but now Uzbekistan has to recognize three innovative components: investment, innovation and marketing.

In practice, the investors pay attention to any country's economy including Uzbekistan, in order to make decisions the conditions for the establishment and running of business, the socio-economic policy of the investment climate to improve the investment climate, in particular, allow foreign investors to make decisions related to investing in the economy, free economic and special zones for companies to enter, operate without any barriers, tax and other financial incentives. That is why many developed multinational companies assess the investment climate of a country using certain economic indicators before investing directly in a country's economy.

One of the key indexes used by major foreign investors in assessing the state of the economy is the Global Competitiveness Index (GCI), which is based on analyzes to help investors make strategic decisions based on such indexes and implement practical political and economic reforms in the country, requirements of the results of scientific research determine the relevance of this research.

## LITERATURE REVIEW

The President of the Republic of Uzbekistan Shavkat Mirziyoev[1] commented on the analysis of the dynamics of foreign investments attracted to the national economy: "The work on attraction of foreign investments, first of all, foreign direct investments, requires a critical analysis. The share of such investments has fallen by 30%.

One of the leading economists A. Bekmurodov spoke about the features of foreign investments, their role in the economy and the investment climate: "Most countries in the world are competing with a certain degree of competition to attract FDI, thus creating a favorable and competitive investment climate. Foreign direct investment is not only an important source of additional capital for each country in the face of limited domestic financial resources, but also a reliable source of innovation, new techniques and technologies, knowledge, training and competencies needed to keep the economy competitive.

International practice usually focuses on the investment attractiveness or investment climate of an object (country, region, industry) only by the investor's "penetration" into that area and the sum of non-profit risks.

Analysis of the formation and implementation of investment potential of the country The approach proposed by Tumusov[3] is also noteworthy. It interprets the "investment potential" as a set of investment resources that form part of the accumulated investment in the form of

investment demand in the investment market that has the potential to become a real investment requirement that meets the material, financial and intellectual needs of reproduction.

S.V. Zenchenko, M.A. Shemyotkin [4] in his research, highlights a number of factors that have the greatest impact on investors' wishes. In particular, the most important factors for assessing the investment potential of a country / region are the following: resource - raw materials (average supply of basic types of natural resources); production (general activity of farms in the region); consumption (purchasing power of the population); infrastructure (economic and geographical position of the region and its infrastructure support); intellectual (level of education of the population); institutional (the level of development of the leading institutions based on the market economy); innovative (level of implementation of scientific and technical progress in the region). It should be noted that the investment potential is one of the criteria for the classification of regions.

One of our local economists, Sh.I. Mustafakulov [5], commented on the investment climate and its formation: "Investment climate is a condition where investment processes take place, which is influenced by political, economic, social and other factors that determine the investment activity of the region and the level of investment risk.

## **RESEARCH METHODOLOGY**

In the research, economic growth was assessed on the basis of econometric analysis of the increase in the volume of foreign direct investment in each country's economy. As a result of this analysis, it is the development of scientific-practical suggestions and recommendations to increase participation in indices published by international rating agencies of Uzbekistan. The developed proposals and recommendations can be used in the development of targeted state programs on improving the mechanism of attracting foreign direct investments in the organization of investment policy in the country and modernization of the real sector enterprises.

As part of the research, a preliminary quantitative analysis of the country's feasibility of accessing the GCI index was performed. It is also suggested that high ratings in the index have a positive effect on FDI.

The analysis was based on secondary data, using two variables, namely, FDI Foreign Direct Investments and GCI Global Competitiveness Index.

### **Analysis and results**

The data collected are in the form of panel data and includes data from 127 countries over the 10-year period from 2007 to 2017. The compilation of data in panel data can, in the opinion of us and many foreign researchers (Baldev and Badi, 1992; Gujarati, 2004), provide a deeper understanding of the relationship between these two variables.

In our regression, FDI is represented as a dependent variable, while the Global Competitiveness Index acts as an independent variable. The main reason for this is that FDI is a productive factor, which is proven to have a positive impact on the economy (Borensztein et al., 1998; De Gregorio, 2003; De Mello, 1997; Mah, 2010; Rodrick, 1999). is the ultimate goal.

According to the generally accepted methods of econometric analysis (Gujarati, 2004; Brooks, 2008), the data regulation process was carried out first. The GCI data is derived from the Global Competitiveness Report published by the World Economic Forum (WEF, 2018) in the form of coefficients based on 12 country-specific indicators.

The reason we chose the GCI coefficients for the analysis was because of the problems with their nonparametric properties when performing the analysis on the basis of categorical data (ratings are actually sequentially ranked categories).

The main criterion for selecting countries in the analysis was the availability of complete data in the data sources.

Countries with less than a decade of incomplete data were not included in the analysis.

Data on FDI are available from the World Bank database (World Bank, 2018). Our research uses the definition of the World Bank, which refers to the economy's inflow of foreign direct investment. It may consist of equity, reinvested profits and other capital. FDI is a cross-border investment owned by a resident of one economy and having significant influence or control over the management of an entity located in another economy.

Ownership of shares with 10% or more of the ordinary voting rights has been considered as a criterion for direct investment. FDI data are provided in current US dollars.

After the 10-year data of the 127 countries were presented in the panel, a univariate analysis of each variable was performed to check for inpatients. After compiling the data in panel form across 127 countries and 10 cycles (Appendix 1), a univariate analysis was performed to examine each variable for stationary. For this, unit root tests were performed using the Levin, Lin, and Chu (2002), Im, Pesaran, and Shin W-stat (2003), ADF Fisher Chi-square and PP Fisher Chi-square methods. The FDI variable was converted to a logarithmic view to facilitate interpretation and to avoid heteroskedasticity of the variable. There was no need to convert the GCI variable to a logarithmic one, because the unit of measure of this variable is indexed.

**TABLE 1. UNIT ROOT TESTS**

Zero hypothesis: Unit root tests					
Methods		Levin, Lin and Chu (LLC)	Im, Pesaran and Shin (IPS) W-stat	MW-ADF Fisher Chi-quadrante	MW-PP Fisher Chi-quadrante
	Variables				
Level	FDI	-23.7366 (0.0000)	-7.34098 ( 0.0000)	421.046 (0.0000)	541.651 (0.0000)
	GCI	-9.08290 (0.0000)	-0.47084 (0.3189)	278.592 (0.1385)	243.143 (0.6769)
First difference	FDI	-27.1497 (0.0000)	-11.7386 (0.0000)	565.789 (0.0000)	1074.47 (0.0000)
	GCI	-25.2292(0.0000)	-9.91907 (0.0000)	569.754 (0.0000)	764.557 (0.0000)
<i>Source: Calculated using Eviews</i>					

According to the unit root tests, the FDI variable is stationary based on the level data, which is the primary data, while the GCI variable is not stationary on 3 tests at once. As a result, there was a need to transform the primary data by extracting the difference, with the difference obtained by subtracting from the previous one. The newly created, transformed data were tested

from the beginning of the unit root test, and at the same time, it was found that both variables were stationary. This allowed us to continue to study the relationship between these two variables (ie, stationary).

Before performing the regression analysis, it was decided to determine the correlation between these two variables. Although it is difficult to determine correlations when working with panel data, and their significance level is somewhat lower, it was important to determine at least the vector of correlation (direct or inverse).

Below are the correlation results between the two variables.

**TABLE 2. CORRELATION BETWEEN FOREIGN DIRECT INVESTMENTS AND GLOBAL COMPETITIVENESS INDEX**

	LOGFDI	GCI
LOGFDI	1	0.678206434677799
GCI	0.678206434677799	1

Results of correlation analysis show that there is a direct correlation between the variables on average power. This result enables us to begin the next stage of cross-correlation analysis.

As a rule of thumb, following data stabilization, we had two objectives: 1) to determine if there is a correlation between these two variables and, if any, how much we can change the FDI to GCI; 2) to determine which of these two variables is the cause of the other, if there is actually a correlation.

For the first task, we used the simplest standard method of panel data analysis. The main issue was to determine which one of the regression models was most appropriate, that is, the choice between the fixed effects and the random effects models (Table 3).

**TABLE 3 INTERACTION BETWEEN FDI AND GLOBAL COMPETITIVENESS INDEX: PANEL MAЃJUMOTJARI TAЃJILJII**

Subordinate variable:	Fixed effects		Random effects	
	C	S.e. (p-value)	C	S.e. (p-value)
LOGFDI				
GCI	0.956871	0.163340 (0.0000) ***	1.484479	0.122641 (0.0000) ***
Constanta	17.58341	0.693143 (0.0000) ***	15.33225	0.535359 (0.0000) ***
R quadrate	0.877140		0.021267	
F-statistics	67.73938 (0.000000) ***		25.22733 (0.000001) ***	
The number of observations	1333		1333	
Period	11		11	

Number of countries	127	127
The results of the Hausman test [23.916868 (0.0000)] <b>The model is selected based on Fixed effects</b>		
<i>Source: Calculated by Eviews</i>		

After regression on the two models, we had to choose the best one. For this, a Hausman test was performed, which found that the Fixed effects model is the most appropriate. In addition, the statistical model for the Student and Fischer criteria is becoming more significant in the selected model, with a square value of R. This in itself will ensure the reliability of the results. We can conclude that the 1 point increase in the GCI index increases the inflow of direct investment by 0.95%.

At this stage we can say with certainty that the dependence we identify is of a short-term nature. It is important for us now to determine whether a dependency also has a long-term effect, and also to determine which variable is the cause of the other in the relationship between the two variables.

We need to perform a cointegration analysis between variables to determine the long-term dependence.

**TABLE 4. COINTEGRATION TESTS**

Methods	In groups			Intergroup		
	Test	Stat.	Probab.	Test	Stat.	Probab.
LOGFDI GCI	Panel $\chi^2$ - statistics	4.046983	0.0000	Group rho -statistics	0.367086	0.6432
	Panel rho - statistics	-5.991910	0.0000	Group PP-statistics	-18.36940	0.0000
	Panel PP- statistics	-15.20078	0.0000	Group ADF- statistics	-11.30325	0.0000
Pedroni (1999)	Panel ADF- statistics	-8.037235	0.0000			
Pedroni (2004)  (Weighted statistic)	Panel $\chi^2$ - statistics	-12.12901	1.0000			
	Panel rho - statistics	4.694505	1.0000			
	Panel PP- statistics	0.402704	0.6564			
	Panel ADF- statistics	-11.53662	0.0000			

*Source: Calculated by Eviews*

The cointegration tests show that there is a long-term relationship and interaction between variables. That is, the improvement of the country's position in the competitiveness index will affect the growth of FDI even after a few years. There is no denying that the increase in foreign direct investment will improve the rating of the country after a certain year. The objective question arises, if there is a long-term relationship between the variables, which variable is the main causative variable that initiates this chain of interconnection. To answer this question, we need to implement a process called Granger causality test (Granger, 1969).

**TABLE 5. GRANGER CAUSALITY TEST**

<b>Lags: 2</b>		
Selection: 2007-2017		
Observations: 1008		
Zero Hypothesis:	F-statistics	Probability
GCI is not the cause of LOGFDI	6.39995	0.0017
LOGFDI is not the cause of GCI	1.30530	0.2716
<b>Lags: 3</b>		
Selection: 2007-2017		
Observations: 868		
Zero Hypothesis:	F-statistics	Probability
GCI is not the cause of LOGFDI	4.97030	0.0020
LOGFDI is not the cause of GCI	1.43077	0.2324
<b>Lags: 4</b>		
Selection: 2007-2017		
Observations: 738		
Zero Hypothesis:	F-statistics	Probability
GCI is not the cause of LOGFDI	2.54598	0.0383
LOGFDI is not the cause of GCI	1.33156	0.2566
<b>Lags: 5</b>		
Selection: 2007-2017		
Observations: 616		
Zero Hypothesis:	F-statistics	Probability
GCI is not the cause of LOGFDI	0.70076	0.6230
LOGFDI is not the cause of GCI	2.01668	0.0745

The Granger causality tests show that the correlation we offer is not clear, although the GCI FDI in the 2.3 and 4-year lags is the cause. But after the fifth year, this effect disappears.

We can conclude that improved positioning in the GCI would lead to an increase in FDI, and that Granger was also the reason for this variable FDI. The clear lags have shown us that the country's improvement in the GCI will have a positive impact on the inflow of FDI even after two, three and four years.

In the following studies, we will try to justify their impact, taking into account other factors affecting the growth of FDI. Analyzing similar analyzes on the basis of cluster (geographic, economic, etc.) criteria can yield interesting results. Finally, we plan to analyze the impact of a

number of factors simultaneously and to determine moderate effects using more sophisticated analysis methods (FMOLS, DOLS, VAR).

### **CONCLUSIONS AND SUGGESTIONS**

- The scientific justification of actions aimed at economic growth in the context of economic reforms in our country today requires a conceptual approach. For example, the fact that the economy of the country is working with a strong impetus for comprehensive development to raise the macroeconomic indicators to a new level exacerbates the importance of decision-making.

- The country's participation in global economic performance determines its investment role and innovative development in the international arena, and provides important information about the economy, revealing its relative advantages and disadvantages. In addition, this index will serve as an important source of information for foreign investors and economic partners and will also serve as an indicator for future reforms.

- Based on our empirical quantitative analysis, there is a strong correlation between GCI and foreign investment.

- Our research shows that high positions in the GCI have a positive impact on the growth of FDI. The main conclusion is that Uzbekistan's entry into the Global Competitiveness Index and its high rankings ensures the inflow of FDI even after four years.

It is planned to identify interactions between these and other factors through other models that are more flexible (FMOLS, DOLS, VAR).

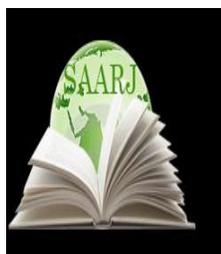
Initial research on Uzbekistan's willingness to participate in global economic and innovative performance paves the way for a more transparent economy. In addition, such collaboration between researchers and practitioners results in the practical application of research results.

Most importantly, the creation of favorable conditions for the country to enter the international rankings and strengthen its position in the country, along with the increase in foreign direct investment, will help to create a favorable investment climate and a positive image of the country in the international arena.

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(Double Blind Refereed & Reviewed International Journal)



DOI NUMBER: **10.5958/2249-877X.2020.00002.8**

## STRATEGIC MANAGEMENT OF THE DEVELOPMENT OF PRODUCTION AND DISTRIBUTION OF AGRICULTURAL PRODUCTS OF THE AGRICULTURAL SECTOR OF THE REGION

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### ABSTRACT

*The aim of the article is to study the methodological foundations and the development of a two-stage model for forecasting alternative options for the optimal development of production and sales of agricultural products in the agricultural sector of the region. The methods of economic-mathematical models and algorithms for forecasting and choosing the best options for the development and distribution of agricultural production through their implementation channels were used, alternative development options for the production and sale of agricultural products and their socio-economic efficiency were determined. Methods of empirical analysis of sources on this topic were also used. Based on the results of the study, appropriate forward-looking recommendations and suggestions for decision makers were prepared. The author comes to the conclusion that the article summarizes the typical conditions for the development and distribution of agricultural products through the channels of their implementation, taking into account quantitative and qualitative characteristics.*

**KEYWORDS:** Management, Decision, Scientific Method, Information, Policy, Strategy, Apparatus, Trend, Component, Aspect, Forecast, Experiment.

### INTRODUCTION

In a market economy, responsibility of republican authorities for their decisions increases, and the role of scientific methods of analyzing economic information for carrying out social and economic policies increases. Moreover, the country should develop its own economic strategy in

accordance with the economic characteristics of the republic. Thus, the problems of scientific analysis of republican (regional) socio-economic systems are now of particular importance.

The peculiarities of the past and present development of the country dictate the need to make, above all, effective decisions on the development of agriculture. But this is impossible without the presence of an appropriate apparatus for analyzing, forecasting and choosing the optimal development option both in the country as a whole and in its individual regions. In essence, such a tool should enable specialists in the conditions of interaction of elements of this system to find reserves for production growth and improve the distribution of finished products.

One of the effective tools for solving these problems is the methods of mathematical modeling, which allow to integrally explore the structure of production and sale of agricultural products of the agro-industrial complex, taking into account the transformations taking place in inter-regional economic relations and individual elements of market mechanisms.

In these conditions, the development of effective management decisions is impossible without the use of appropriate mathematical tools that allow for a systematic analysis of the production and sale of agricultural products of the agro industrial complex both in primary units and in the country as a whole.

Effective implementation of these procedures is associated with the use of tools that take into account the qualitative characteristics of the structures of production and sale of agricultural products of the agro-industrial complex, the principles of market relations. One of the rational tools for solving these problems are the methods of mathematical modeling. They allow multivariate calculations on a PC using a model, which makes it possible to identify certain reserves for the production and sale of agricultural products of the agro-industrial complex.

The development of economic-mathematical methods and models of the development of the production of the AIC is devoted quite a lot of work. Nevertheless, the issues of modeling and forecasting the development of the production and sale of agricultural products of the agro industrial complex and the formation of a new mechanism of commodity-money relations have been studied far enough. The urgent need to solve this problem determines the relevance of this article.

The purpose of this article is to study the methodological foundations and the development of a two-stage model for forecasting alternative options for the optimal development of production and sales of agricultural products in the agricultural sector of the region.

New economic relations require, first of all, a deep knowledge of the current state of affairs in the agriculture of the region. For this purpose, the existing structures of production, sale and consumption of agricultural products and the price system by the population of the region are comprehensively analyzed. Obviously, all this is of significant importance for the cotton-growing regions, which, in addition to the main specialization, produce and have an order for potatoes, fruits and vegetables and other agricultural products. All this further complicates the food problem. As a result, despite the presence of favorable climatic conditions and sufficient labor force, the consumption of basic foodstuffs per capita in all regions of the republic lags far behind the international level and the biological norm.

One of the most important conditions for mitigating the severity of the food problem in the region is to optimize the structure of production and sales of agricultural products. The study of retrospective indicators of agricultural development, both in the republic as a whole and in

individual regions, showed an unjustifiably large proportion in the structure of social production of industrial and moisture-intensive crops. Drastic measures are needed to develop food production and improve the distribution structure of agricultural products. It should be noted that a significant role for the formation of a promising structure for the production and sale of products of regional agriculture will be played by new relations between states.

New economic relations are characterized by the formation and functioning of a local market economy. Under these conditions, the structure and volume of production should be focused on the regional market demand for agricultural products. Agricultural production is determined by many factors. First of all, the effect of changes in crop yields and area under crops, productivity and livestock of animals on the growth or decline in agricultural production should be determined. The increase in the latter is also affected by the intensification of agricultural production, the introduction of new progressive forms and methods of organizing and remunerating labor, and scientifically based farming and animal husbandry systems. At the same time, the effect of fluctuations in yield and area under crops, productivity and livestock of animals on the volumes of agricultural production can be determined using the methods of economic and statistical analysis and based on an objectively determined assessment of various ingredients of the optimization model, etc.

Currently, sub complexes and links of the regional AIC in addition to other systems of the economy of our country are developing with a focus on the market economy. The need to include elements of a market economy in economic relations makes it difficult to solve forecasting and analytical tasks, which cannot be overcome without a diversified analysis of the functional structure of the management mechanism of agricultural production. This made it possible to classify and select a set of interrelated and interdependent tasks.

To solve this set of tasks, the work substantiates the need to create and use a two-stage model in order to identify alternative options for the development of the agrarian sector of the regional agricultural sector. It should be noted that the representation in one model of production forecasting and sales processes with a description of the mechanism for selecting an effective option is unjustified, since this unduly increases the dimension of the problem and, therefore, complicates its solution. In this regard, we took the path of a phased solution. The structure and scheme of the relationship of models and algorithms for the development of production and sales of agricultural products of the agro-industrial complex of the region are shown in Fig. 1, whence it is clear that at the first stage of modeling, variants of the development of production are determined using alternative optimality criteria.

As a result of the implementation of the model of the first stage, prognoses are developed for the variants of the structure and volume of agricultural production at lower hierarchical levels. In this regard, the task at the second stage consists in modeling the mechanism of a bunch of forecasts for the development of agricultural production at lower hierarchical levels with the higher ones in optimizing the distribution of agricultural products.

In our country, a large number of diverse economic and mathematical models have been developed to optimize the structure of production of regional agro-industrial complex products.

Without denying the very positive aspects of these models, it should be noted that they do not fully contain the specific features of a scientifically-based agricultural management irrigated zone. Insufficient attention in them is paid to the modeling of feasible options and the development of ways to select the most effective direction for the development of production and

sales of agricultural products. In addition, models and algorithms of informational tasks for predicting the development of production and sales of products under irrigated agriculture and cotton zones are not presented here.

The main differences between the models we have proposed and those developed earlier are that their structures include the conditions and limitations caused by the farming system in the irrigated agriculture and cotton zone.

The conditions for the selection of technological methods for the production of crop and livestock products are formulated. The model includes conditions on the size of the crop rotation area in the context of the recommended schemes.

Criteria have been defined for the optimal functioning of agricultural branches of the agro-industrial complex in the context of increasing the effect of interregional commodity-money relations.

In the model, the availability of land resources is set in the context of individual types of agricultural land at the beginning of the period under consideration. The size of land resources is periodically updated due to the constant allocation of land for the construction of industrial facilities, the population for development and maintenance of personal subsidiary farming, etc. Variants of the regional population's needs in agricultural products of the agro industrial complex and demand volumes are divided into two indicators along distribution channels and the model presents as the minimum required and the maximum possible volume of agricultural production of agro-industrial complex. The distribution structure of the products produced is formed on the basis of the volume of the order, direct contract, intra-regional demand, etc. within the framework of commodity-money relations. Socio-economic indicators of production and sales of finished products are estimated taking into account the level of provision of the population of the region with low-transportable and perishable products.

The main determining factors for multiple predictions are technological methods of production with their corresponding crop yields and animal productivity, as well as the availability of land, labor and other production resources.

To record the economic and mathematical models of two interrelated tasks, we introduce the following conventions:

**Indices:**  $\gamma$  - number of administrative regions;  $\tau$  is the number of the technological method of production;  $j$  - is the number of crops, livestock and bird species;  $\varphi$  - is the number of types of agricultural land;  $s$  - number of crop rotation scheme;  $i$  - type number of agricultural products;

**technological coefficients:**  $C_{\tau j}^Y$  – the cost of production from 1 ha of  $j$  culture and 1 centner of livestock products with  $\tau$  technological method of production in the  $\gamma$  region;  $Z_{\tau j}^Y$  – production costs per 1 ha of  $j$  crop with  $\tau$  technological method of production in the  $\gamma$  region;  $L_{s j}^Y$  - specific gravity  $j$  of crop rotation in the  $s$  - th crop rotation scheme;  $l_j^Y$  – the specific gravity of the  $j$  - th perennial plantation at the fruiting age in the  $\gamma$  region;  $U_{\tau j}^Y$  – productivity  $j$  of culture and fruit plantations, as well as productivity of livestock and birds;  $V_{\tau j}^Y$  – but normal costs  $j$  - th species feed at  $\tau$  - m content of technological mode of livestock and poultry in the  $\gamma$  - m area;  $P_{\tau j}^Y, L_{\tau j}^Y$  – the coefficients of the ligaments of the main repeated and intermediate crops of  $j$  culture in the  $\gamma$  region with  $\tau$  technological method of agricultural production;  $U_{\tau s j}^Y$  – yield  $j$  of crop

rotation in the  $s$ -th crop rotation scheme at  $\tau$  technological method of production in the  $\gamma$  region;  $t_{\tau j}^{\gamma}$  – labor costs per 1 hectare of  $j$  culture and for the maintenance of 1 head of cattle at  $\tau$  technological method of production in the  $\gamma$  region;

**specified values:**  $B_{\varphi}^{\gamma}$  – alic  $\varphi$ -th species in agricultural lands  $\gamma$ -m region;  $A_s^{\gamma}$  – sown area  $s$ -th sevooborta scheme  $\gamma$ -m administrative area;  $M_j^{\gamma}$  – area  $j$ -x fruit and vineyards in the  $\gamma$  region;  $Q_{\varphi}^{\gamma}, W_s^{\gamma}$  – the minimum and maximum volumes of demand for agricultural products in the  $\gamma$  region;  $P_{\varphi}^{\gamma}$  – livestock of  $j$ -livestock in  $\gamma$  area;  $T^{\gamma}$  – mr. alic manpower in the  $\gamma$  region;

**variables:**  $X_j^{\gamma}$  – the desired size of the area  $j$  of the culture of fruit and grape stands, livestock and poultry in the  $\gamma$  region;  $X_{j\neq\varphi}^{\gamma}$  – the desired size  $j$  of the crop in the  $\gamma$  region for  $\varphi$ - agricultural land;  $X_s^{\gamma}$  – the area of the  $s$ -th crop rotation scheme in the  $\gamma$  area;  $Y_j^{\gamma}$  – the desired size of the area of fruit and grape stands of the  $j$ -th species in the  $\gamma$ -th region;  $X_k$  – is the desired size of the  $k$ -th type of purchased feed;

**set:**  $J_1$  – set number of crops, fruits and vineyards;  $J_2$  – many species of cattle and birds;  $J_3$  – is the set of crop numbers;  $J_4$  – many numbers of perennial plantations;  $J_5$  – is the set of crop rotation numbers.

Based on the accepted notation, the economic-mathematical model for predicting the development of agricultural production with alternative optimality criteria is as follows.

Need to find:

$$F_1 = \sum_{j \in J_1} C_{\tau j}^{\gamma} X_j^{\gamma} + \sum_{j \in J_2} C_{\tau j}^{\gamma} X_j^{\gamma} \rightarrow \max$$

or

$$F_2 = \sum_{j \in J_1} Z_{\tau j}^{\gamma} X_j^{\gamma} + \sum_{j \in J_2} Z_{\tau j}^{\gamma} X_j^{\gamma} \rightarrow \min$$

Subject to the following restrictions and conditions:

- On the use of agricultural land

$$\sum_{j \in J_1} X_{j\neq\varphi}^{\gamma} = B_{\varphi}^{\gamma}$$

- On the use of crop rotation area

$$X_s^{\gamma} \leq A_s^{\gamma}, L_{sj}^{\gamma} X_s^{\gamma} - X_j^{\gamma} = 0, \quad s \leq S, \quad j \leq J_5$$

- On the use of the area of perennial plantations

$$Y_j^{\gamma} \leq M_j^{\gamma}, l_j^{\gamma} Y_j^{\gamma} - X_j^{\gamma} = 0, \quad j \leq J_4$$

- On the balance of production and use of feed

$$\sum_{j \in J_2} U_{tj}^Y X_j^Y - \sum_{j \in J_2} V_{tj}^Y X_j^Y - X_k = 0$$

- On repeated and intermediate crops

$$\sum_{j \in J_1} P_{tj}^Y X_j^Y - \sum_{j \in J_2} L_{tj}^Y X_j^Y - X_k \geq 0$$

- For the production of the minimum required volume of agricultural products

$$\sum_{s \in S} U_{tsj}^Y X_j^Y \geq W_i^Y, \quad \sum_{s \in S} U_{tsj}^Y X_j^Y \geq Q_i^Y, \quad i \in I_5$$

$$U_{tj}^Y X_j^Y \geq W_i^Y, \quad U_{tj}^Y X_j^Y \geq Q_i^Y, \quad i \in I_1$$

$$X_j^Y \geq P_j^Y, \quad j \in J_2$$

- On the use of labor resources

$$\sum_{j \in J_1} t_{tj}^Y X_j^Y - \sum_{j \in J_2} t_{tj}^Y X_j^Y \leq T^Y$$

- By non-negativity of variables

$$X_j^Y \geq 0, X_{j\varphi}^Y \geq 0, X_s^Y \geq 0, Y_j^Y \geq 0, X_k \geq 0$$

In this model, the optimal solution is characterized by the size of the final product and production costs. Maximization of the final product is achieved on the basis of the mutual influence of indicators of growth in agricultural production and improvement of its structure. In this case, the decisive role is played by the conditions of the model for choosing development options. In different cases, the variables will have different values that are linked to labor and material resources, which contribute to their distribution in those industries that provide maximum efficiency at minimum cost.

As a result of the implementation of this model, alternative options for the development of agricultural production in the agricultural sector of the region are determined. These options are used as output for the implementation of the economic and mathematical model for choosing the optimal option for the development of production and distribution of agricultural products of the agro-industrial complex.

Under the conditions of market relations, there will be changes in the proportion and structure of the distribution of agricultural products in the agricultural sector through the channels of its sale. Therefore, it is necessary to quantitatively characterize the need for individual distribution channels and balance with the potential of the agricultural sector in the region. At the same time, there should be a tendency to increase the share of the distribution of agricultural products in order to increase their consumption by the population and processing.

In this regard, at the second stage of economic and mathematical modeling, a choice is made of the options for the development of production and the distribution structure of agricultural products that maximize profits taking into account the technological method of production.

For the mathematical formalization of the conditions of the problem of choosing options for the development of production and distribution of products, we additionally introduce the following conventions:

**Indices:**  $k$  - number of channels for the sale of agricultural products;  $r$  - is the number of options for the production of crop and livestock;

**coefficients:**  $P_{ik}^\gamma$  - unit cost of the  $i$ -th commercial product by the  $k$ -m distribution channels in the  $\gamma$ -m area;  $Z_{ik}^\gamma$  - the cost of production and sale of the  $i$ -th commercial product through the  $k$ -th distribution channel in the  $\gamma$ -m area;  $B_{\varphi r}^\gamma$  - size of the  $\varphi$ -th land in the  $r$ -m production option in the  $\gamma$ -m area;  $T_r^\gamma$  - labor costs in the  $\gamma$ -m area for production and sales of products with the  $r$ -m production option;  $Q_{ir}^\gamma$  - the volume of production of the  $i$ -th crop and livestock production in the  $\gamma$ -m area with the  $r$ -m production option;  $U_{ikr}^\gamma$  - is the share of sales of the  $i$ -th product in the  $r$ th version of their production along the  $k$ -th distribution channel in the  $\gamma$ -m area;  $C_r^\gamma$  - is the value of the gross output of the  $\gamma$ -th area with the  $r$ -m production option;

**the values of the constraints of the model:**  $B_\varphi$  - the presence of the area of the  $B_\varphi$ -th type of agricultural land in the whole region  $\varphi$  - availability;  $T$  - of labor resources in the whole region;  $W_i, Q_i$  - the minimum required and maximum allowable production volumes of the  $i$ -th product, respectively;

**variables:**  $x_{ik}^\gamma$  - the desired volume of realization of the  $i$ -th product on the  $k$ -th distribution channel in the  $\gamma$ -m area;  $x_r^\gamma$  - is the intensity factor of using the  $r$ -th version of the development of production in the  $\gamma$ -m area;  $x_{ir}^\gamma$  - is the required size of the  $i$ -th product of the  $\gamma$ -th area at the  $r$ -th production variant;  $x_r$  - the desired value of the gross output of agriculture in the region with  $r$ -m production option;

**set:**  $K$  - set of channels for sales of agricultural products;  $R$  - a set of numbers of options for the development of crop production and livestock.

The model of choosing the optimal variant for the development of production and distribution of agricultural products of the agro-industrial complex according to the criterion of profit maximization is as follows.

It is necessary to find:

$$\sum_{\gamma \in \Gamma} \sum_{i=1} \sum_{k \in K} P_{ik}^\gamma x_{ik}^\gamma - \sum_{\gamma \in \Gamma} \sum_{i=1} \sum_{k \in K} Z_{ik}^\gamma x_{ik}^\gamma \rightarrow \max$$

Under the following conditions and restrictions:

- On land use

$$\sum_{\gamma \in \Gamma} B_{\varphi r}^\gamma x_r^\gamma \leq B_\varphi$$

- On the use of labor resources in agriculture

$$\sum_{\gamma \in \Gamma} T_r^\gamma x_r^\gamma \leq T$$

- For the production and distribution of crop and livestock products

$$\sum_{\gamma \in \Gamma} Q_{ir}^\gamma x_r^\gamma \geq W_{i\gamma}, \quad \sum_{\gamma \in \Gamma} Q_{ir}^\gamma x_r^\gamma \leq Q_i$$

$$\sum_{\gamma \in \Gamma} Q_{ir}^\gamma x_r^\gamma - x_{ir}^\gamma = 0, \quad U_{ikr}^\gamma x_{ir}^\gamma - x_{ik}^\gamma = 0$$

- To determine the value of gross agricultural output

$$\sum_{\gamma \in \Gamma} C_r^\gamma x_r^\gamma - x_r = 0$$

- At the choice of an intensive variant of the development of production

$$\sum_r x_r^\gamma = 1$$

- by nonnegativity of variables

$$x_{rk}^\gamma \geq 0, \quad x_{ik}^\gamma \geq 0, \quad x_r^\gamma \geq 0, \quad x_r \geq 0$$

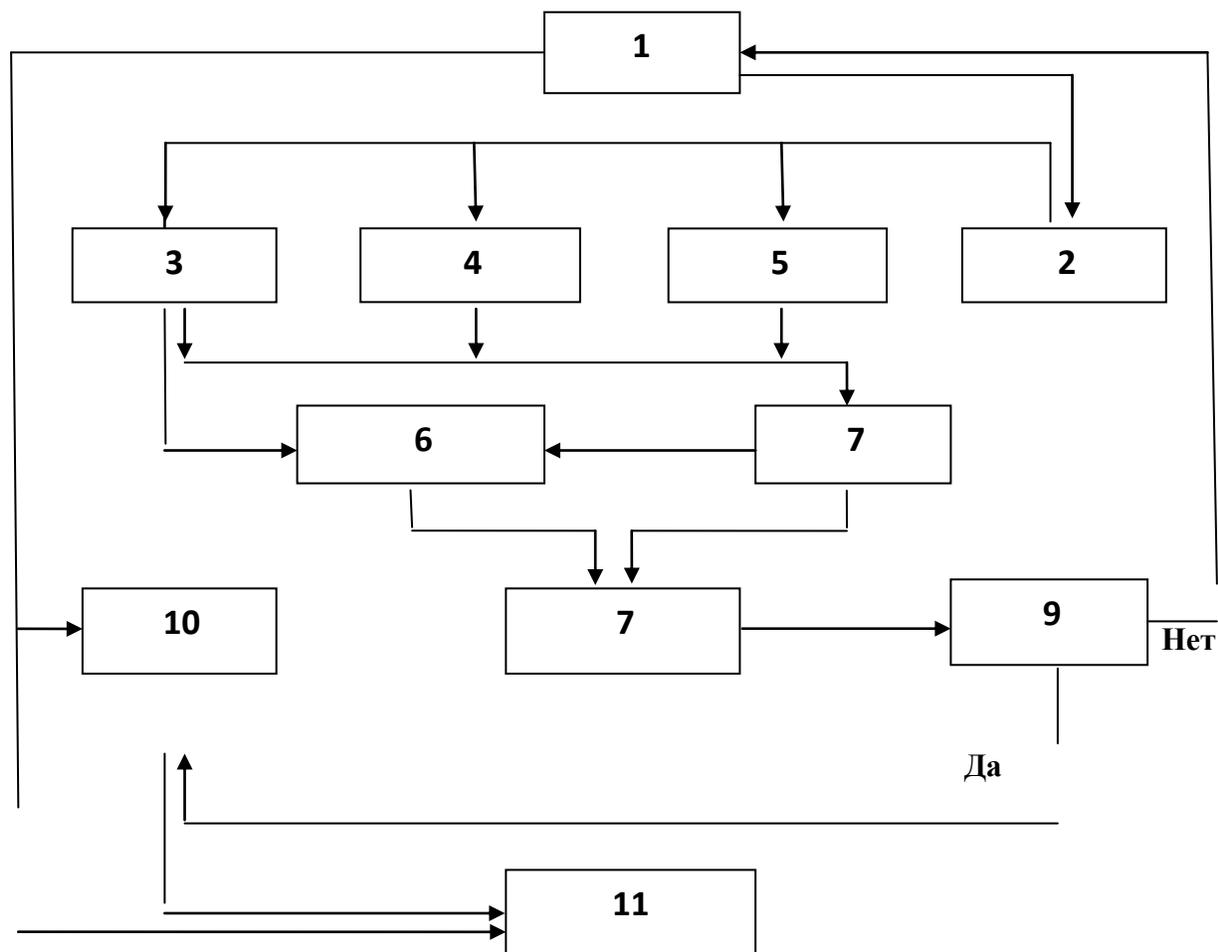
The developed models and algorithms were the basis for creating a system that allows you to implement the management of targeted development of production and distribution of agricultural products of the agro-industrial complex of the region. The study describes in more detail the characteristics of the software and information base of the system. The developed software package is implemented using a linear programming system on a personal computer.

Managed by the parameters of the model to justify the directions of development of production and distribution of agricultural products of the agro-industrial complex of the region are: the actual composition and structure of the area; the dynamics of crop yields and fruit plantations, as well as the productivity of livestock and poultry; standards for crop yield and productivity of livestock and poultry, etc.

Output parameters are formed as a result of the implementation of each model and algorithms, some of which are then used as input for solving subsequent forecasting and analytical tasks. Based on the principle of information and logical communication and the structure of the system of tasks, we have developed an integrated scheme for their implementation on a PC (Figure 1).

In the figure, the following designations are adopted: 1 - decision-maker (DM); 2 - database; 3 - population's need for food; 4 - standards for crop yields and livestock and poultry productivity; 5 - standards of production costs in agriculture; 6 - model of choosing the optimal variant of development of production and distribution of products; 7 - forecasting model for the development of crop and livestock production; 8 - coordination of decisions in two adjacent levels of production and distribution of agricultural products; 9 - whether the consistency of decisions is achieved; 10 - algorithms for forecasting indicators of socio-economic development

of the agro-industrial complex; 11 - model results for the analysis and evaluation of the socio-economic efficiency of options for the development of production and sales of products.



**Fig. 1. The mechanism for assessing the production and distribution of agricultural products of the agroindustrial complex of the region**

The proposed methodology and two-stage model are implemented on the basis of materials from the regions of Jizzakh region to substantiate the options for the development of production and distribution of agricultural products. In tab. 1 and 2 are alternatives for forecasting the development of agricultural production and their distribution along consumption channels.

**TABLE 1 OPTIONS FOR THE DEVELOPMENT OF AGRICULTURAL PRODUCTION IN THE CATEGORIES OF FARMS OF JIZZAKH REGION**

Product type	Fact 2018 (thousand tons)	Forecast Options (kt)			Forecast options in% by 2018		
		1	2	3	1	2	3
Corn	535,5	552,6	573,5	662,4	103,2	107,1	123,7
Raw cotton	310,0	300,4	298,8	288,9	96,9	96,4	93,2
Potatoes	61,7	68,7	97,7	107,6	111,4	158,4	174,4
Vegetables	390,4	454,0	511,0	568,8	116,3	130,9	145,7
Bakhchi prodovol.	228,8	257,9	361,0	399,9	112,7	157,8	174,8

Fruits and berries	79,5	95,4	108,4	122,2	120,0	136,3	153,7
Grapes	30,5	31,9	41,4	46,1	104,6	135,8	151,1
Meat	212,8	220,5	238,5	268,1	103,6	112,1	126,0
Milk	594,3	624,0	639,5	677,5	105,0	107,6	114,0
Eggs (million pieces)	257,9	262,0	301,2	346,6	101,6	116,8	134,4
Wool	0,28	0,3	0,4	0,4	115,4	134,6	153,8
Cocoons (tons)	596,4	633,4	707,9	745,5	106,2	118,7	125,0

The data table. 1 indicate that according to calculations there is a reduction in cotton production. This creates the necessary prerequisites for the sustainable development of fruit and vegetable, grain, meat and dairy and feed products. According to our calculations, the highest increase in production will be observed for potatoes (175% growth by 2018). A sufficiently high growth in production can be expected in such crops as vegetables, fruits and berries, grapes, and wool. Here, growth in relation to 2018 will be from 146 to 154.

Thus, the priority areas for the development of agriculture are seen primarily in the development of the production of fruit and vegetable crops. However, this in no way means a drastic reduction in cotton production. There will be a gradual, phased reduction of cotton sown areas. But the simultaneous introduction of intensive methods of growing and harvesting will help maintain a high level of cotton production. According to the III variant of the forecast, cotton production will decrease by 6.8% compared to 2018 and will amount to 288.9 thousand tons.

According to the calculation of y, some structural changes should occur in the distribution of products by channel of their implementation (table 2). With a certain increase in the supply of fruits and vegetables for intraregional consumption, their supply to the fund increases. This significantly increases the supply of early vegetables and potatoes.

**TABLE 2 BALANCE OF PRODUCTION AND DISTRIBUTION OF AGRICULTURAL PRODUCTS AIC OF JIZZAKH REGION (THOUSAND TONS)**

Product type	Volume of production	Distribution channels				
		Supply republican fund	Selection for proper-processing	Sale on the collective farm market	Selection of seed targets	Implementation in the cities of the region
<b>I option</b>						
Potatoes	61,7	45,1	0,2	3,2	2,9	10,2
Vegetables	390,4	242,8	76,1	28,9	3,5	27,3
Bakhchi	228,8	147,6	0,7	43,5	0,0	37,1
Fruits and berries	79,5	52,8	20,4	2,3	0,0	4,0
Grapes	30,5	12,7	16,9	0,3	0,0	0,6
<b>II Option</b>						
Potatoes	97,7	71,2	0,5	5,2	4,6	16,2
Vegetables	511,0	332,7	98,6	37,8	4,6	35,8
Bakhchi	361,0	232,8	1,4	68,6	0,0	58,1
Fruits and	108,4	79,6	28,2	3,0	0,0	5,2

berries						
Grapes	41,4	17,3	22,9	0,3	0,0	0,9
III option						
Potatoes	107,6	78,5	0,4	5,7	5,1	17,9
Vegetables	568,8	370,9	110,9	42,1	5,1	39,8
Bakhchi	399,9	257,9	1,6	76,0	0,0	64,4
Fruits and berries	122,2	81,4	31,4	3,4	0,0	6,1
Grapes	46,1	19,4	25,5	0,3	0,0	0,9

In connection with the introduction of new capacities for processing fruit and vegetable products, the volume of their supply to processing enterprises within the region increases.

According to calculations, the size of incomes, the level of profitability of production, and, in general, the efficiency of agriculture in the Jizzakh region significantly increase.

The transition of agriculture of Jizzakh region to the proposed version of the structure of production and distribution of products creates real prerequisites for improving the food supply of the population and, thereby, saturates the market with goods and increases the socio-economic efficiency of agricultural production.

## CONCLUSIONS

1. Cash-analytical methods, focused only on the traditional source of information processing technologies do not allow developing a variety of options for the development of production and distribution Niya products and choosing the most effective. At the same time optimization techniques, combined with balance constructs may serve as a reliable tool for predicting integrated development of production and distribution of agricultural products Nia Regional AIC .
2. Developm ana-step mathematical economic models the s based composite approach, via which the coordination control objectives of lower hierarchy level with the top levels of the production and distribution audio w agricultural products.
3. The proposed economic-mathematical model describes the regional traditions of food consumption, evidence-based farming systems, the possibility of changing the production resource values, and will allow to develop a fully informed and effective socio-economic solutions for the development of production and distribution no yuagri cultural products of agrarian and industrial complex regionalnog under specified limiting conditions and the objective function of the model.
4. According to the author carried out experimental calculations at the district level received options for the development of production and distribution that neither I products AIC of Jizzakh region. All of them show a decrease in crop area under cotton. By reducing the production of cotton in all cotton-growing areas of the region, the production of potatoes, fruit and vegetable, grain and fodder crops is increasing.

Expansion of acreage under feed crops creates certain prerequisites for increasing the number of livestock and poultry and increasing their productivity, thereby contributing to the growth of production. Animal products, so necessary for the second balanced consumption

of the population. However, creating high product Foot herds - can be complicated and long. Therefore, expect a sharp increase in production in the near future. This product does not have to. This is confirmed by the calculations made in the study.

**5.** Economic analysis and comparative assessment of multivariate calculations for forecasting the development of production and sales agricultural products AIC shows their reliability and stability in terms of the impact of changes in the values of parameters and the objective function of models on performance indicators.

As a result of the optimization of the implementation structure produced by the production volume with the explanation of the price of a differentiated distribution channels under the existing commodity-money relations achieved steady growth of commodity output cost.

In accordance with the structural changes in the development of agricultural production, the value of profit varies from variant to variant. In the second variant, in comparison with the first, the profit increases by 10.3%, in the third variant relative to the second - by 10.7%.

**6.** The methods and economic-mathematical models developed in the study can also be used in other regions in justifying the prospects for the development of production and the distribution of agricultural products in the agro-industrial complex.

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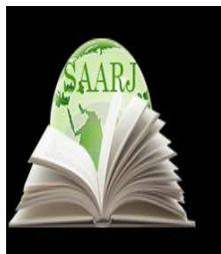
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**South Asian Journal of  
Marketing & Management  
Research (SAJMMR)**

(Double Blind Refereed & Reviewed International Journal)



**DOI NUMBER: 10.5958/2249-877X.2020.00003.X**

**EFFICIENCY OF MICRO FINANCE INSTITUTION IN INDIA  
USING DATA ENVELOPMENT ANALYSIS**

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**ABSTRACT**

*This paper investigates the efficiency of selected MFIs using Data Envelopment Analysis (DEA). DEA can aggregate the input-output components in such situations for obtaining an overall performance measures. The three inputs namely, number of personnel, physical assets of selected MFIs, operating costs and two outputs, viz, revenues and loans were considered to evaluate the relative efficiencies of MFIs of the sample set. It can be only 41.67% of MFIs were efficient under both model of DEA and rest of the units were inefficient. 58.33% of Sample MFIs were efficient under the Variable Return to Scale (VRS) model and 41.67% under the Constant Return to Scale (CRS). The RBI has since the mid 1990s helped in attracting funding for the sector by including microfinance in the "priority sector", to which banks are mandated to allocate a percentage of their lending. However, no specific regulation was imposed on the sector as a whole primarily because it was felt that regulation may hamper the sector's key strengths of informality and flexibility. With minimal worker and reduced operating cost leads to reach efficient to BWDA, Grama vidyal, SKS, Spanddana and Suryoday. Only 41.67% of MFIs were efficient under both model of DEA and rest of the units were inefficient. 58.33% of Sample MFIs were efficient under the Variable Return to Scale (VRS) model and 41.67% under the Constant Return to Scale (CRS).*

**KEYWORDS:** *Data Envelopment Analysis (DEA) Efficiency of MFIs*

## **INTRODUCTION:**

Microfinance is the viable and sustainable provision of a broad range of financial services (savings and credit) generally, by the private sector to poor and low-income households engaged in livelihood and micro enterprise activities using non-traditional and innovative methodologies and approaches (e.g. non-collateralized cash-flow based lending). Microfinance has made tremendous strides in India over the years and it has become a household name in view of the multi-pronged benefits reaped/ receivable from microfinance services by the poor in our country. There is growing interest in microfinance as one of the avenues to enable low income population to access financial services. India with a population of around 300 million poor people has emerged as a large potential opportunity for the microfinance sector. With only 48% of the population accessing financial services, expanding the microfinance sector is also important from the perspective of financial inclusion (World Bank, 2008). While there have been various initiatives to promote microfinance in India since the 1970s, the sector witnessed rapid growth only in the 1990s. The RBI has since the mid 1990s helped in attracting funding for the sector by including microfinance in the “priority sector”, to which banks are mandated to allocate a percentage of their lending. However, no specific regulation was imposed on the sector as a whole primarily because it was felt that regulation may hamper the sector’s key strengths of informality and flexibility. The term microfinance is defined in the Indian context as “the provision of thrift, credit and other financial services and products of small amounts to the poor in rural, semi-urban and urban areas for enabling them to raise their income levels and improve living standards”.

### **Objectives of this study:**

The main objectives of the paper are as follows:

- To examine the performance of the top MFIs mainly through outreach indicators, productivity and the financial performance;
- To calculate the efficiency of MFIs using Data Envelopment Analysis.

## **REVIEW OF LITERATURE**

There has been little research conducted on the efficiency of microfinance institution. However, several studies examine various measures of MFI efficiency across the regions.

**Study by Farrington (2000)** identifies a number of accounting variables to reflect the efficiency of the microfinance institutions. These accounting variables are administrative expense ratio, number of loans per loan officer and loan officers to total staff, portfolio size, loan size, lending methodology, source of funds and salary structure as the efficiency drivers and hence as the measurements for MFI efficiency.

**Lafourcade, Isern, Mwangi and Brown (2005)** use cost per borrower and cost per saver as measure of efficiency. They found African MFIs incur highest costs per borrower but have the lowest costs per saver. They also mention that regulated MFIs maintain higher efficiency through low costs per borrower and per saver. In contrast, African cooperative-MFIs are the least efficient with the highest cost per borrower. Nevertheless, cooperative-MFIs have the lowest cost per saver but unregulated MFIs have the highest. None of these two studies use any parametric or non-parametric approach to evaluate the efficiency of MFIs.

**Gutierrez-Nieto, Serrano-Cinca and Molinero (2006)** applied data envelopment analysis (DEA) to measure the efficiency of 30 Latin American MFIs and then explored the multivariate analysis of the DEA results. They developed 21 specifications using two inputs and three outputs. They identified an NGO (W-Popayan), and a non-bank financial institution (Findesa) as the most efficient among the group of 18 MFIs.

The other key MFI paper is that of **Hassan and Tufte (2001)** using a parametric approach (stochastic frontier analysis or SFA) found that Grameen Bank’s branches staffed by the female employees operated more efficiently than their counterparts staffed by the male employees.

**Further, Desrochers and Lamberte (2003)** have also used parametric approaches to study the efficiency of cooperative rural banks in the Philippines. They found that cooperative rural bank with good governance were more efficient than their counterparts with bad governance.

**Leon (2001)** reported that productivity of resources, governance, and business environment were the contributing factors for the cost-efficiency of the Peruvian municipal banks. Parametric approach includes stochastic frontier approach, flexible profit function etc and non-parametric approach includes data envelopment analysis (DEA analysis). We add to the literature by applying DEA on MFIs where profit maximization may not be the vital interest to policymakers and regulators.

**METHODOLOGY:**

In this paper, the efficiency measures of selected MFIs were evaluated using non-parametric linear programming technique known as DEA (Data Envelopment Analysis). DEA was initiated by Charnes, Cooper and Rhodes (1978). The basic DEA model for ‘n’ DMUs with ‘m’ inputs and ‘s’ outputs proposed by CCR, the relative efficiency score of p<sup>th</sup> DMU is given by

$$Maxz_n = \frac{\sum_{k=1}^s V_k Y_{kp}}{\sum_{j=1}^m U_j X_{jp}}$$

Shows that 
$$= \frac{\sum_{k=1}^s V_k Y_{ki}}{\sum_{j=1}^m U_j X_{ji}} \leq 1$$

Where, k = 1 to s (no. of outputs); j = 1 to m (no. of inputs); i = 1 to n (no. of DMUs); y<sub>ki</sub> = amount of output k produced by DMU<sub>i</sub> ; x<sub>ji</sub> = amount of input j utilized by DMU<sub>i</sub>; v<sub>k</sub> = weight given to output k and u<sub>j</sub>= weight given to input j. This model was called CCR output oriented maximization DEA model. The efficiency score of ‘n’ DMUs was obtained by running xlDEA under both model ie. VRS and CRS.

**Data and Variables:**

For the study of efficiency of selected DMUs, 12 MFIs were selected as randomly. The three inputs namely, number of personnel, physical assets of selected MFIs, operating costs and two outputs, viz, revenues and loans were considered to evaluate the relative efficiencies of MFIs of the sample set. Necessary data have been taken from [www.mixmarket.org](http://www.mixmarket.org) is a global website for

MFIs information. In order to calculate the total efficiency (TE) of the selected units, 60% weightage was assigned to inputs whereas the output carries 40% weight age.

### Analysis and Interpretation of study:

#### Efficiency measures of MFIs:

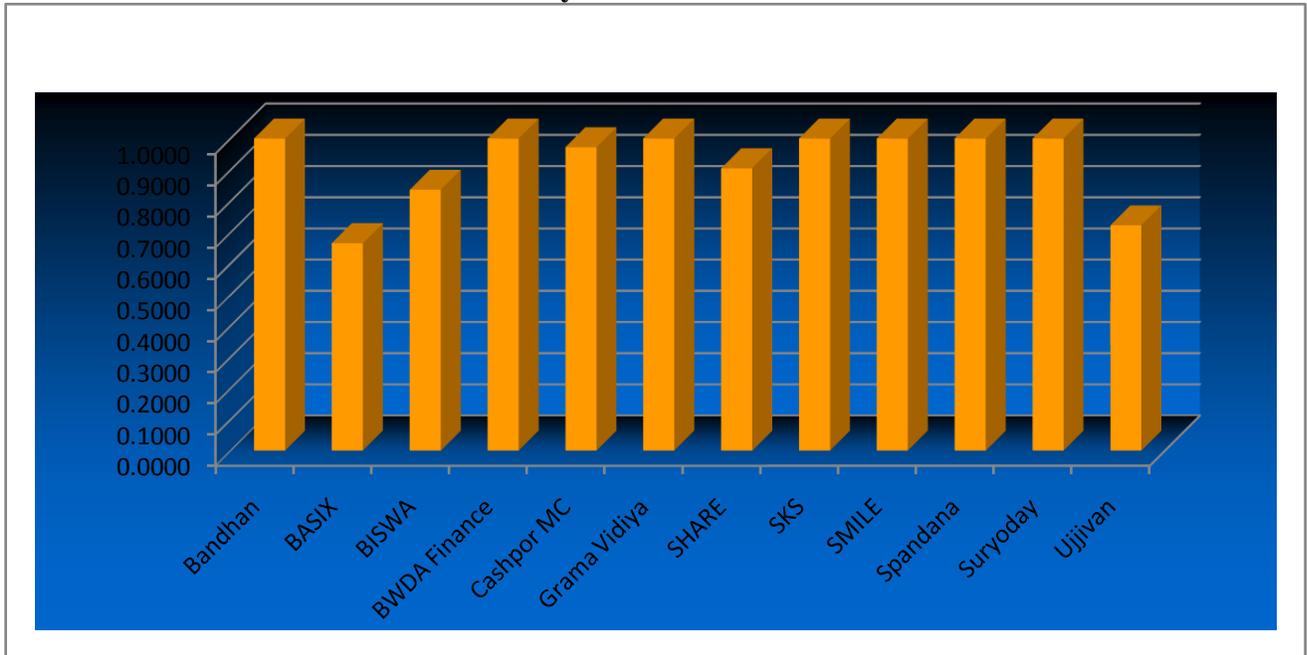
The objective function for DEA has been fixed as the ratio of weighted sum of outputs to the weighted sum of inputs assuming that the output seldom touches the inputs. Hence, a DMU becomes a 'benchmark unit' when the objective function becomes unity. In other words, input equals to output. The general output oriented maximization DEA both (CRS and VRS) model was used to obtain the efficiency score.

**TABLE NO.:1 EFFICIENCY SCORE OF SAMPLE INDIAN MFIS:**

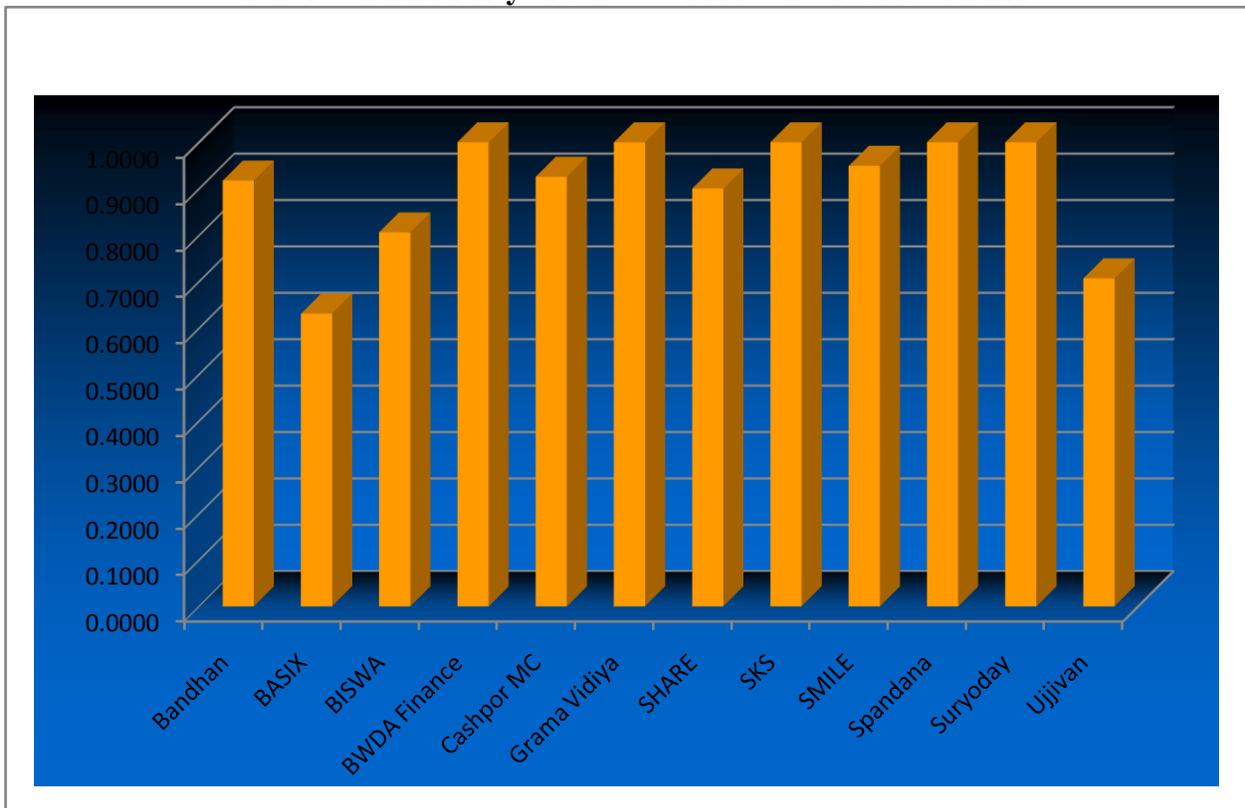
SI No.	Microfinance Institutions	Efficiency scores under VRS	Efficiency scores under CRS
1	Bandhan	1.0000	0.9176
2	BASIX	0.6648	0.6307
3	BISWA	0.8362	0.8058
4	<b>BWDA Finance</b>	<b>1.0000</b>	<b>1.0000</b>
5	Cashpor MC	0.9723	0.9257
6	<b>Grama Vidiyal Microfinance Ltd.</b>	<b>1.0000</b>	<b>1.0000</b>
7	SHARE	0.9048	0.9003
8	<b>SKS</b>	<b>1.0000</b>	<b>1.0000</b>
9	SMILE	1.0000	0.9492
10	<b>Spandana</b>	<b>1.0000</b>	<b>1.0000</b>
11	<b>Suryoday</b>	<b>1.0000</b>	<b>1.0000</b>
12	Ujjivan	0.7221	0.7068

Table No. 1 shows that the MFI Bandhan has reached efficient under the DEA model Variable Return to Scale. It near efficient under Constant Return to Scale. BASIX is the only MFI in the table having low score on both model of efficiency, but it obtains the above average score. BISWA also the MFI which doesn't reach efficient region it's over the 0.7 (efficient 1). BWDA is the one of MFI in the table have reached the efficient level. It proved that the BWDA is efficient unit under the both model of DEA analysis. Cashpor MC has score more than 0.9 under the two model of DEA. BWDA, Grama vidyal, SKS, Spanddana and Suryoday, have been found that, the efficient MFIs among the sample. The main reason for their efficient operation their staff member relatively less than the other MFIs in the table and the operating cost also less than the inefficient units. With minimal worker and reduced operating cost leads to reach efficient to BWDA, Grama vidyal, SKS, Spanddana and Suryoday. Only 41.67% of MFIs were efficient under both model of DEA and rest of the units were inefficient. 58.33% of Sample MFIs were efficient under the Variable Return to Scale (VRS) model and 41.67% under the Constant Return to Scale (CRS).

**Chart No. 1 Efficiency of Selected MFIs under VRS**



**Chart No. 2 Efficiency of Selected MFIs under CRS of DEA**



The above two chart were explain the efficiency as graphically and state the difference between two model 1 was maximum stage. 7 MFIs have touch the maximum ceiling of 1 under VRS. Only 5 MFIs has reach the ceiling of 1 under CRS.

#### **FINDINGS AND CONCLUSIONS:**

The growth in the number of microfinance institutions continues to prove that microfinance, when delivered properly, can be a sustainable, viable, and profitable undertaking.

In this paper, the methodology based on DEA was discussed to rank the selected MFIs using their TE scores. The methodology facilitates to identify the benchmarking institutions which can be referred by inefficient institutes to become efficient units. Five institutions were found to be most efficient institute in DEA-CCR model. Additionally two more institutes were deemed to be efficient as their total efficiency scores were higher than the mean efficiency scores of all the sample units. The correlation coefficient between the rankings as per the number of personnel and DEA-CCR rankings shows a high degree of association. On the overall, it can be concluded that 58.3% of the selected DMUs were considered to be efficient units and these units may be referred by the other institutions to improve their efficiency measures.

To conclude, the microfinance institutions are more seriously looking into best practices and performance standards, which is leading to a more transparent and competitive industry. These developments are encouraging for the microfinance sector. It has been proven in many cases that commercially viable institutions are able to expand their reach to wider geographical areas and provide a more extensive range of financial services to their clients. With more commercially viable institutions in play, micro enterprises will ultimately benefit from more responsive products and services, innovative methodologies, and lower costs.

#### **LIMITATIONS OF THE STUDY:**

In this study only limited number of DMUs was selected for measuring the performance and efficiency measures due to inadequacy of time. It would be rather effective, if the number of DMUs has been increased. .

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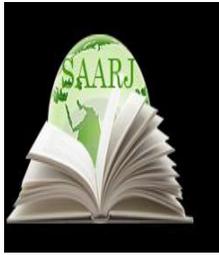
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DOI NUMBER: **10.5958/2249-877X.2020.00004.1**

## BUSINESS MODEL OF AMAZON INDIA – A CASE STUDY

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### ABSTRACT

*Amazon is an American international e-commerce company. It was started by Jeffrey P. Bezos in the year 1994. And it was launched in India in June 2013. Three years back, Amazon had no infrastructure in India, and now it dominates the Indian markets. At the very start it was perception of investors that in India It will not go long like China as in the year 2004 when Amazon entered in China it hasn't seen much success there with Alibaba, its Chinese competitor, dominating the e-commerce market. After its bad run in China, Bezos is going all in for India. Fact behind formation of Amazon in India was its huge number of headcounts i.e. 1.25 billion four times as big as the U.S.'s and more than doubles Europe's. Of these, 500 million, around 35 percent, are internet users. As per researches the yearly growth rate of internet users is highest in India around six million users join every month. Researchers expect the online shopping market in India to reach \$15 billion by 2016 up from only \$35 million in 2014. For example small business seller or dresses in Rajasthan, currently their reach is very constrained and growth is much limited. But by participating in these market places, this small business can now reach all over India. All the marketplaces have specific services for sellers that define on boarding, verification, tools to provide insights and fulfillment services. For attracting the customer Amazon India is doing a lot for this it has enlisted mom-and-pop store owners as partners in its delivery platform. In small villages and remote areas where few people have internet access, residents can go to their local store and use the owner's internet connection to browse and select goods from online Store.*

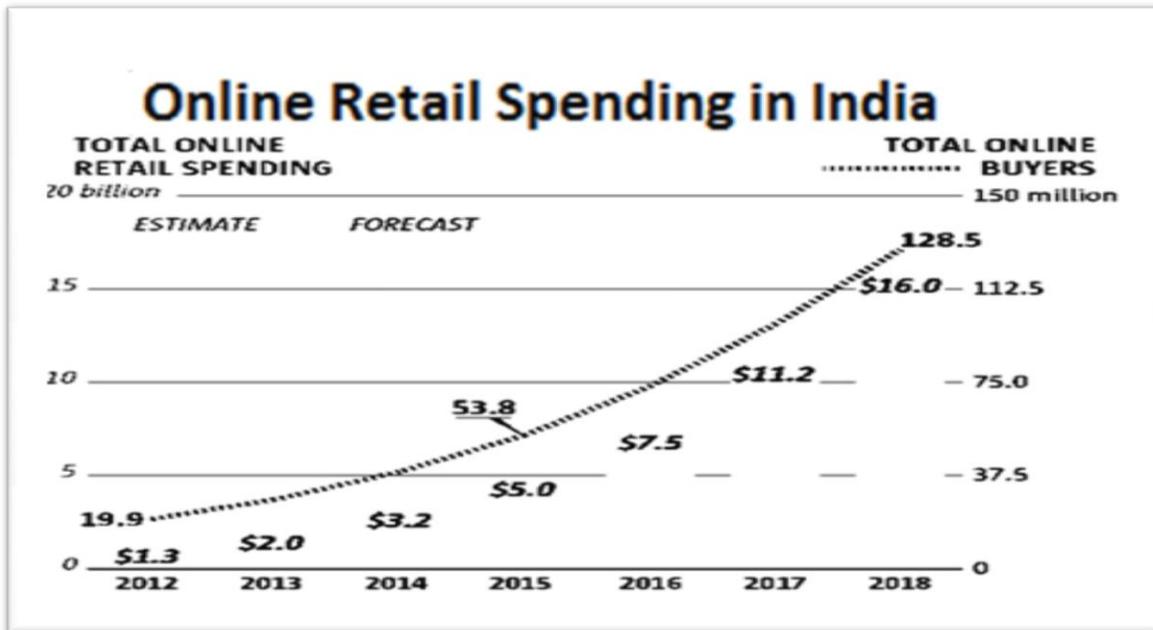
**KEYWORDS:** *Entry and Expansion Strategy, Amazon, Strategy, Customer Services, Alibaba, China, India, Business Model, Chai Cart,*

**INTRODUCTION**

Amazon is an American international e-commerce company. It was started by Jeffrey P. Bezos in the year 1994. And it was launched in India in June 2013. Three years back, Amazon had no infrastructure in India, and now it dominates the Indian markets. At the very start it was perception of investors that in India It will not go long like China as in the year 2004 when Amazon entered in China it hasn't seen much success there with Alibaba, its Chinese competitor, dominating the e-commerce market. After its bad run in China, Bezos is going all in for India.

Fact behind formation of Amazon in India was its huge number of headcounts i.e. 1.25 billion four times as big as the U.S.'s and more than doubles Europe's. Of these, 500 million, around 35 percent, are internet users. As per researches the yearly growth rate of internet users is highest in India around six million users join every month. Researchers expect the online shopping market in India to reach \$15 billion by 2016 up from only \$35 million in 2014.

This makes India a very important market for internet giants. India will overtake China as the world's most populous country in just seven years, according to the UN. It is now the world's fastest-growing major economy, and the IMF projects 7.5% growth next year. Online retail spending data of Indians are shown in Figure 1.



*Source:* Forester Research online, Retail Forecast, 2013-2018, Asia Pacific

They just required an innovative business model, beginning with finding products to sell In India though, with FDI restrictions in Retail, Amazon launched Jungle.com though the website did not allow any transaction on the site, and it helped Amazon get an insight into the e-commerce space in India as well as to build brand loyalty. Amazon opted marketplace model. Market place model provides small businesses a huge scaling opportunity without having to build the technical or operational infrastructure of scale. For example small business seller or dresses in Rajasthan, currently their reach is very constrained and growth is much limited. But by participating in these market places, this small business can now reach all over India. All the marketplaces have specific services for sellers that define on boarding, verification, tools to provide insights and

fulfillment services. For example, Amazon has Vendor services to make it very easy for a vendor to bring their warehouses online. Apart from all these Amazon provides studio services that support the vendor to photograph all the products and make them ready for online selling. Through the whole life of the relationship for example, these market places provide inventory reports, order reports and trends. The vendors need to focus on their products and find easy ways to ship their products to the Warehouses of the Marketplace.

### **Objectives**

- Assess the issues and challenges of running Amazon in India
- To study amazon business models to overcome these challenges and become the leading ecommerce company in India.
- To study expansion strategy of Amazon in India

### **Challenges**

Amazon has consumer market in United States but it is a growing online consumer market in India having different challenges. The first and foremost challenge in India faced by the amazon was restrictions on foreign companies using e-commerce to sell their products directly to the Indian consumer. The Indian government, however, plans to allow foreign companies that manufacture their products in the country to sell them directly to consumers over the Internet. But Amazon would have to start making its products in India to take advantage of the change in the law.

Another difficulty that Amazon India faced was the limited infrastructure available to get the goods to consumers.

In India, people uses plastic cards i.e. credit or debit cards, so Amazon has had to adapt to a "Cash on Delivery" model, which isn't yet available in all the areas. There is no shortage of goods produced by Indians, but most vendors in the country are small. Three years ago, relatively few retailers there sold their products online because they believed e-commerce to be too complex and time consuming. And India's cash economy did not facilitate online transactions.

### **Amazon India Business Models**

Ecommerce business model generally consists of eight key components i.e. value proposition, market opportunity, revenue model, competitive environment, competitive advantage, market strategy, organizational development, and management team (Ghosh, 1998).

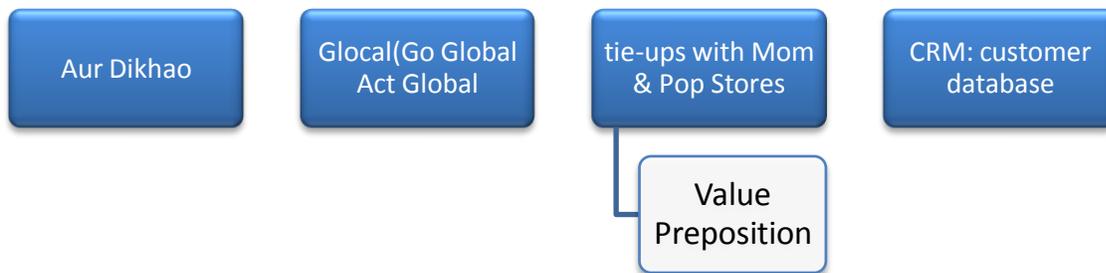
Value proposition specify how product and service are put together and extended to fulfil customer needs by company (Kambil et al., 1996). For attracting the customer Amazon India is doing a lot for this it has enlisted mom-and-pop store owners as partners in its delivery platform. In small villages and remote areas where few people have internet access, residents can go to their local store and use the owner's internet connection to browse and select goods from online Store. Store owners record their orders, alert customers when their products are delivered to the store, collect the cash payment, and pass along the money — minus a handling fee to Amazon. And store owners report increased sales of their own while customers are on-site.

Amazon targets the middle class & upper class people who have hands on experience in technology but don't have much time to do shopping from the physical outlets. Taking this into

consideration Amazon has successfully positioned itself as a *Glocal (Go global Act local)* e-commerce giant where one can buy anything & get it delivered at any remote locations. Using the catchphrase *AurDikhaoin* its most recent campaign in India, it has further helped them carve a distinct space in the consumer's mind.

Company acquired many IT & e-commerce start-ups like pets.com, audible.com, Junglee.com, IMBD.com, Zappos.com, Woot etc. for providing high value to their customers using existing technology of the acquired partners at low cost.

Company's CRM records data on customer's buying behavior. It enables them to offer individual items, related items or bundle them as an offer, based upon preferences demonstrated through purchases or items visited.



**Figure 2: showing ecommerce business models**

Revenue model defines how a firm aims to generate higher return on investment and profits. Important-commerce revenue models include advertising, subscription, transaction fee, sales, and affiliate revenue models (Laudon and Traver, 2009). Market opportunity gives description of possible revenue a company is likely to generate from its proposed market space.

Amazon's strategy involves discounts, low prices and wide range of products sold via direct selling or market place. In the U.S., by contrast, Amazon holds and sells its own inventory of toys, books, and more in addition to selling goods from third-party sellers. The Indian Government, however, plans to allow foreign companies that manufacture their products in the country to sell them directly to consumers over the Internet. But Amazon would have to start making its products in India to take advantage of the change in the law. Amazon's model in India differs slightly from the business model in United States. As we discussed earlier that Indian government doesn't allow companies with major foreign ownership to operate retail locations having their own inventory. Because of this, Amazon serves as a middle man between sellers and buyers, and doesn't sell any inventory of its own. But, Amazon helps sellers with warehousing and shipping goods. In the U.S., by contrast, Amazon holds and sells its own inventory of toys, books, and more in addition to selling goods from third-party sellers.

Competitive environment pertains to rival companies operating in same market space, potential new entrants in the market, product substitutes available in the market and bargaining power of customers and suppliers over your business (Porter, 1979).

Market strategy is the program company designs to outline how it will get into the market and draw in customers (Laudon and Traver, 2009).

Organizational development strikes a balance between all the functions and skills necessary to carry out each job in a company, which requires timely recruitment of suitable candidates. Management team comprises employees at the highest-level of company who determine growth and expansion. Amazon has the same business model considering all key components.

### How Amazon Model Works

First of all Portal shows the Sellers List who sell the desired portfolio products and then get customers browsing through those products. After matching seller and customers it creates appealing discounts after that Customer Shops for the desired products and then Seller ships the product to customer. If Product Accepted and Not returned back then Seller gets his agreed price of the product minus the commission charged by Amazon for doing everything they do. Thus the core bread and butter of the Model is “**X% commission on the total sale value given to the seller**”. This model has been shown by the Figure 3



Figure 3: showing workings of Amazon model

### Strategies for Sellers

Amazon moved out a program “**Amazon Chai Cart**” these are the mobile tea carts that navigated city streets, serving refreshments to small-business owners and teach them the benefits of e-commerce. The Chai Cart team reportedly traveled more than 9,400 miles across 31 cities and engaged with more than 10,000 sellers.

Other move that Amazon created was **Amazon Tatkal**, a self-described “**studio on wheels**” that provides a suite of launch services, such as registration, imaging, cataloging, and sales training so far it has been covered in 15 cities. Tatkal enables Small and Medium Businesses (SMBs) to get online and sell on Amazon. in, in less than 60 minutes. Starting with New Delhi, Amazon Tatkal will traverse the country, engaging with thousands of entrepreneurs, artisans, manufacturers and sellers and help them sell online on the spot.

Amazon. in has five crore products from 75,000 sellers. The number of sellers has witnessed a 250 percent growth annually in 2015 and as per the officials of Amazon this launch would help thousands of small and medium businesses in India.

The company also introduced “**Easy Ship and Seller Flex**” With easy ship Amazon couriers pick up packaged goods from a seller’s place of business and deliver them to consumers. And with the seller flex, vendors registered under Amazon designate a section of their own warehouses for products to be sold on the website, and Amazon coordinates the delivery logistics. This “neighborhood” approach is convenient for sellers and has benefited Amazon by speeding up delivery of some products.

Amazon also had to adapt delivery and fulfillment. In the U.S., Amazon uses a centralized shipping platform, which it calls Fulfillment by Amazon (FBA), to store and distribute the products it sells. Sellers send their goods to Amazon’s fulfillment centers and pay a fee for the corporation to store, pick, pack, and ship their wares. Amazon implemented FBA in India as well, and to date has built nearly two dozen warehouses there, the largest one in Kothur in Telangana.



Figure 4: showing the growth of Amazon India

After reading a report that in future web commerce will grow upto 2300%, Jeff Bezos selected about top 20 products to sell them online. After that he narrowed these products to 5 books,

videos, computer software, hardware, and compact discs and then at last selected Books. This is result of good planning and innovative thinking. The result was just achieved in the first two month with sales rise upto \$20,000/week.

Amazon is the only major player to increase its market share from 14 to 21 percent. It is consistently eating up Flipkart and Snapdeal's share, and the \$3 billion investment will certainly help.

Overall, Amazon only saw tepid 3% international sales growth this quarter, though the company said that would have been 12% if it weren't for the unfavorable foreign exchange impact. Still, even 12% is down from 14% quarterly growth in Q2 2014, and 20% in 2013 (those figures also exclude the effect of exchange rates).

In India, he faces a set of challenges unique to the country. For example, it's incredibly mobile-first - the director of Google India predicts that by 2017, 70%-80% online transactions will happen via smartphone. Plus, The AP reported in August 2014 that fewer than 12% of Indians had credit or debit cards, so Amazon has had to adapt to a "Cash on Delivery" model, which isn't yet available in all areas.

### Amazon – A road ahead

Amazon started with bookstores, which soon converted to the top online retailer across the world, and currently, even though it has a lot of competition, Amazon has a strong base of customers who buy from the online retailer.

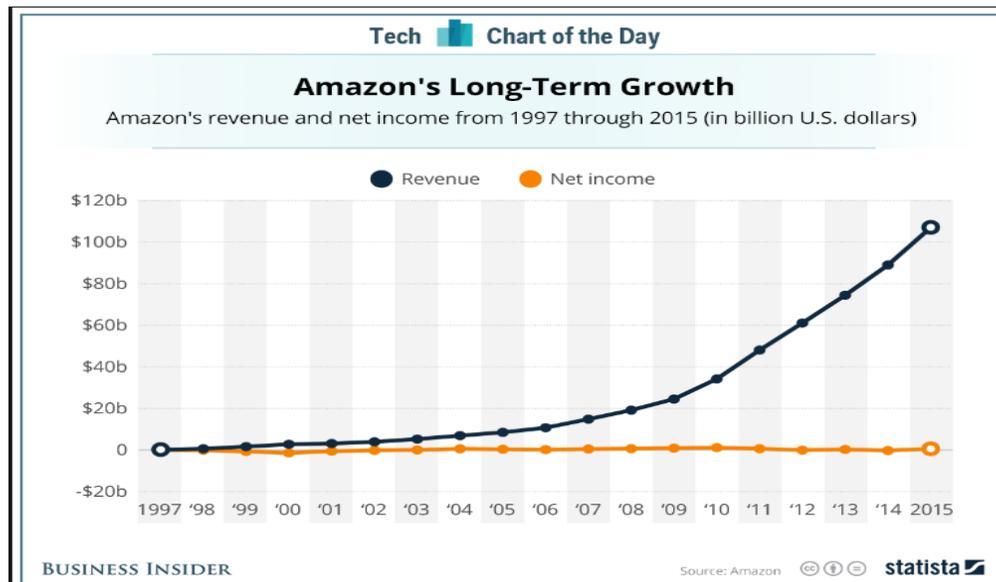


Figure 5: showing the Revenues of Amazon India

### CONCLUSION

Amazon is an American international e-commerce company. It was started by Jeffrey P. Bezos in the year 1994. And it was launched in India in June 2013. Three years back, Amazon had no infrastructure in India, and now it dominates the Indian markets. So main objective of the case is to study the challenges faced by Amazon India during initial years and what strategy it followed to overcome the challenges. This case will also study the Business Models of Amazon India.

At the very start it was perception of investors that in India It will not go long like China as in the year 2004 when Amazon entered in China it hasn't seen much success there with Alibaba, its Chinese competitor, dominating the e-commerce market. After its bad run in China, Bezos is going all in for India.

Fact behind formation of Amazon in India was its huge number of headcounts i.e. 1.25 billion four times as big as the U.S.'s and more than doubles Europe's. Of these, 500 million, around 35 percent, are internet users. As per researches the yearly growth rate of internet users is highest in India around six million users join every month. Researchers expect the online shopping market in India to reach \$15 billion by 2016 up from only \$35 million in 2014.

Amazon is known for knowledgeable products. Amazon in India work on complex business challenges to innovate and create efficient solutions that enable various Amazon businesses, including Amazon websites across the world as well as support Payments, Transportation, and Digital products and services like the Kindle family of tablets, e-readers and the store. Reasons of its success are the finest talent and strong leaders with proven experience working to make Amazon the Earth's most customer-centric company. Apart from this Technological innovation drives the growth of Amazon, offering customers more selection, convenient shopping, and low prices

### **TEACHING NOTES**

1. What is the overall case about?
2. What are problem(s) faced by Amazon in India ?
3. Discuss managerial issues and resources related to this case.
4. What role do different players (decision-makers) play in the overall planning, implementation and management?
5. What are the possible alternatives and pros and cons of each alternative facing the organization in dealing with the problem(s) related to the case?
6. What is the solution that can be recommended to the management of the organization described in the case? Provide your arguments in support of the recommended solutions.

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