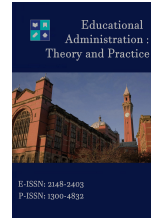




Kuram ve Uygulamada Eğitim Yönetimi
Educational Administration: Theory and Practice
2023, Cilt 29, Sayı 2, ss: 150-167
2023, Volume 29, Issue 2, pp: 150-167
www.kuey.net



Research on the Construction of Agricultural Product Brand Leadership Based on Consumers' Education Level

He Zhihan ¹, Khairul Aidil Azlin Abd Rahman ^{2*}, Mohd Sallehuddin Mat Noor ³

<p>Article History</p> <p>Article Submission 10 November 2022</p> <p>Revised Submission 08 December 2022</p> <p>Article Accepted 02 February 2023</p>	<p style="text-align: center;">Abstract</p> <p>Globalization has necessitated Higher Education Institutions (HEIs) to change the notion of education and leadership policies in the domain of agriculture. The accelerated demand for high quality, large quantity and wide variety of agricultural products, has in turn stimulated the development of global leaders in the agricultural sector by opening the doors for branding the commodities and also for provisioning agricultural education. The distributed educational leadership of China has raised the consumer's educational level, leadership skills, branding of products and patenting innovative products and processes. This work investigates the impact of distributed education leadership among agricultural institutions on the productivity, innovations and education level of consumers in China with the help of data mining and statistical approaches. The empirical analysis is done using Ordinary least squares and Linear Regression to learn whether the variables considered are showing an inclined or declined trend in promoting distributed educational leadership. This research will be immensely helpful for entrepreneurs, educationalists and agriculturalists to delegate the responsibility to provincial structures and HEIs which will be beneficial to all the stakeholders of agriculture.</p> <p>Keywords: Agricultural Branding; Distributed Education Leadership; Education Level; Education Index; Relative Importance Index</p>
---	--

¹Professor, Faculty of Design and Architecture, Universiti Putra Malaysia, Selangor, Malaysia, hezhihan.2017@gmail.com

^{2*}Professor, Faculty of Design and Architecture, Universiti Putra Malaysia, Selangor, Malaysia, drkhairulazlin@gmail.com

³Professor, Faculty of Design and Architecture, Universiti Putra Malaysia, Selangor, Malaysia, mohdsallehuddin@upm.edu.my

Introduction

Recent years have witnessed an inclined trend in fostering entrepreneurial education in Higher Educational Institutions (HEIs) (Iazzi & Santovito, 2016). Economic growth and globalization have elevated the educational opportunities for branding the agricultural and its allied value-added products. As the consumer's awareness level and educational class improves, the demand for agri based branded products are also gaining significance. A wider range of agri-based products is consumed by higher income and educated groups all over the world. China, which is one of the major agricultural powers, occupies a pioneering position in the global agricultural market. The quality products with proper branding knowledge are the twin factors that can be attributed to its better status quo in agriculture.

China has put a great deal of effort for assessing, isolating and fostering entrepreneurial ventures in agricultural sector (Lans et al, 2014). Agriculture and entrepreneurship both cannot be perceived as personal occupation as the culture and behaviour occur as an evolution. A strong correlation can be found between branding agricultural products and building entrepreneurial skills in HEIs. This has eventually contributed to the development of new products and innovative agricultural services. This has positioned China to be a pioneer in the agricultural research and development. The government and private HEIs of China houses nearly (43,000) researchers at more than (1,000) research agencies. Also, the investment in agricultural education increased twice between 2001-2008.

In the digital era, consuming branded agricultural products holds primal importance in the mind of the educated sector of people. It is evident that brands are a tool of trust, loyalty, and reputation in any sector. They improve the customer awareness and promise better quality than non-branded products (Raggio & Leone, 2007). Also, the customer has a very strong inclination towards choosing branded products mainly to achieve the fullest health benefits and money value. This phenomenon imparts high inertia value to a specific brand (Keller & Lehmann, 2006). From the perspective of agriculture, branding ascertains the customers that the food product consumed by them today will be identical in quality to the one the consumer has consumed and sampled earlier. This, in turn, instills the mindset of persistent purchase of same product and avoid quality related risks (Leischnig & Enke, 2011).

The economic development of agri-based country is mainly depended on its leadership education in branding the domestic agricultural products. China, has instigated many steps to add value in processing agricultural products, horticultural yields, poultry, pisciculture and even in non-farming enterprises by imparting educational policies and leadership programmes. As agricultural activity has its inherent uncertainty in terms of profits and formal knowledge of branding the products that help the farmers to sustain the highly unpredicted market. Commodity marketing was once seen as an alternate solution by the farmers to endure the fluctuations. Figure 1 shows the evolution of branding. But entrepreneurial branding policies accustomed by the formal agricultural education stand as a vigilant alternative because of the following reasons:

- (1) Proper planning strategies by analysing the market.
- (2) Realising agricultural leadership through educational reforms and policies.
- (3) HEIs have now started to focus on agri-focused curriculum and render opportunities for hands-on farming experience.
- (4) Agriculture-based enterprises provide space for students to circumstance the policy development and its related ideologies.
- (5) Including the agricultural graduates in their next generation working groups.
- (6) Educate the next generation farmers about the management of agricultural operations, policies by conjoining the farmer organization to design strategic plans to foster brand-based agricultural enterprises.

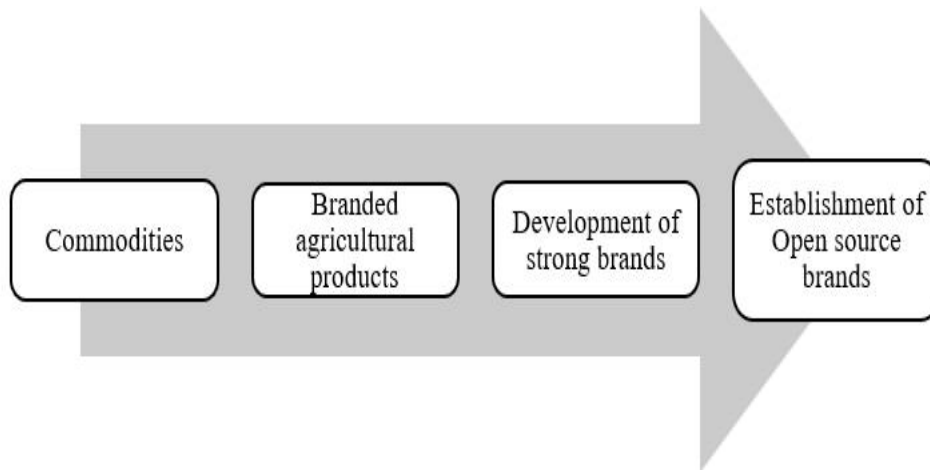


Figure 1. Transition from commodity marketing to agricultural branding

Modern day agriculture is undergoing reform pressure because of the development of supply-side structures. The national economies reckon on agriculture for its steady growth. On the other hand, the innovation and entrepreneurship in businesses impart the culture of marketing into the agricultural sector, thus transforming the notion of agriculture. The market is replete with a wider gap of management acumen in the form of strategic thinkers who perceive the views of all stakeholders involved in agriculture.

Agriculture in China, which is seen as a time-honoured industry has undergone a lineage of transformations at product level, technology level and even demand level than other sectors. These transformations were effective as the country rebels to achieve a higher educated community that could realise the innovations. As it is well known that the development and launching of new methods or products are principal drivers of economic progress. China's agricultural industry has well tapped the innovations to handle the highly unprecedented transnational challenges, like climate, pandemic, and other global health crises. Recent years witnessed that Chinese leaders push their economy above the global value chain and strive to achieve sustainable development, by improving the country's education and access. The educational reforms in China have facilitated the evolution and development of new ideas thus opening new business regimes. At present, Chinese trade is inclined towards attracting foreign investments through goods and services. But the educational revolution in recent decades has accelerated national and international level patenting especially in the field of agriculture.

China has realised this gap and has taken many initiatives to build the agricultural knowledge support system to foster the entrepreneurial ecosystem with three dimensions education, research and extension services. The reform and opening have transformed the outlook of Chinese agriculture as well as the associated rural society. More specifically Deng's reforms deluded the decision-making authority of the households. This necessitated the accessibility and reach-ability of agricultural information to every household at appropriate time. In addition to this, the diversification of agriculture to cultivate more cash crops, and earn profit rather than rely on subsistence has widened the scope of agricultural education and leadership policy making. The extension agents were once the medium of conveying such information to are now replaced by HEIs offering various vocational and graduation courses in agriculture.

There is a multitude of internal and external factors that has accelerated the reformation of China's agricultural education system. Among them, the following are key factors that draw much attention:

- (1) Well-qualified and better-skilled graduates to solve the dynamic technical and managerial problems that arise in the agricultural sector.
- (2) Government pressure to improve the investments in education.

(3) Learning the reformation of the agricultural education systems in other similar countries.

Creating awareness about marketing opportunities and leadership policies in agriculture to meet consumer demands, and efforts made by the governments have actually realized rampant growth, thus opening the doors for new ventures to agricultural products by virtue of the strength of the capital market. Also, fast and effective promotion of these agricultural ventures holds primal importance in upgrading and promoting the production, which increases with the brand value. A proper channelised education and leadership policy to integrate the customer needs, entrepreneurial scenario, educational status of the present data population and status quo of agricultural research are quintessential for refurbishing and reviving the country's agriculture in terms of yields, products, patents, ventures and innovations. In addition to this, emphasizing the educational reforms takes edge over some of the bottlenecks like elevated costs, imbalanced supply and demand structure, piled up stocks that are commonly confronted by Chinese agriculture in very recent days by guaranteeing uninterrupted supply-chain management with proper management policies and is shown in Figure 2 (Sui & Zhao, 2022).

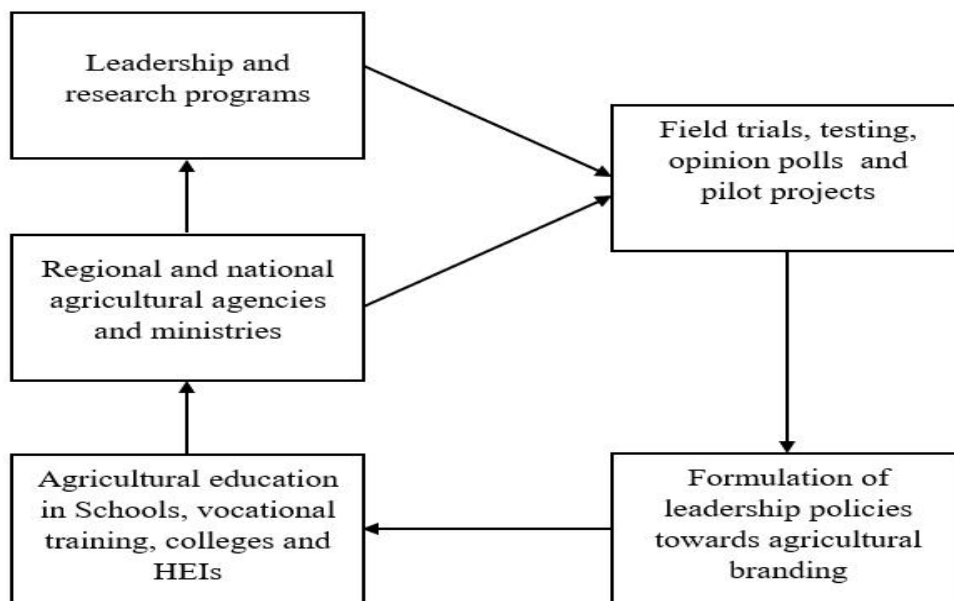


Figure 2. Evolution of agricultural education, R&D and leadership policies

The inception of more formalised agricultural education and management policies has increased agricultural development, employment, equity and indeed innovations. The educational reforms to a capital-intensive, industrially focused agriculture sector show great variations in terms of formulating the strategy planning both in terms of branding and agriculture. So, it becomes quintessential to study the relationship between cognition and the behavioral inclinations of agricultural education in China.

The agricultural education system of China stands as the backbone by rendering fundamental support innovation, research and branding practices in agriculture through regular courses and training programmes as mentioned in Figure 3.

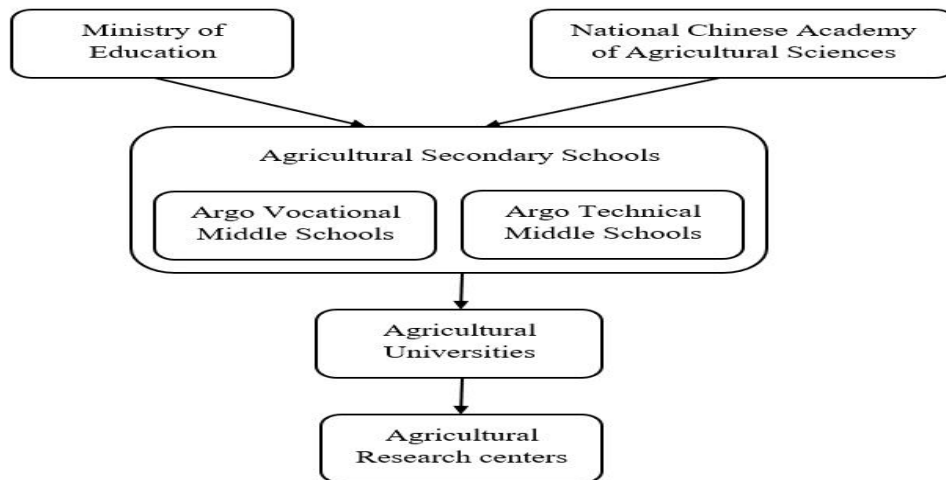


Figure 3. Relationship between various educational avenues and agriculture

The distance education system provides opportunities for lifelong learning as well as in-service training for farmers and agricultural students. This is further complimented by the agricultural research system, which provides ample space for incubating new ideas and transforming them as products and agricultural brands thus developing agrotechnology. Moving further the Agro Vocatio Middle Schools (AVMs) join hands with Agro Technical Middle Schools (ATMs) to impart secondary-level agricultural technical education for agriculture. AVMs can be viewed as a vocational alternative for students who could not pursue their regular college and is equivalent to college preparatory high schools. The aspirants into the ATMs are older students who did not succeed in their college entrance examination. The highest level of imparting agricultural technical education is the Agricultural Universities which are positioned as two universities per province. These universities offer a wide range of courses on agriculture, horticulture, animal husbandry, and other related subjects. Further, the universities and HEIs are now shifting their focus towards agricultural management courses to build brand-based ventures. The effective utilization of these decentralized systems and their leadership policies has placed China as one of the leading producers and marketers of food crops by deploying more innovative practices. The proof of evidence, on one hand, is the increased yield of crops and on the other hand, is the elevated number of agricultural patents as mentioned in Figure 4. The evidence of an increase in agricultural patenting is extracted from European and US patent offices.

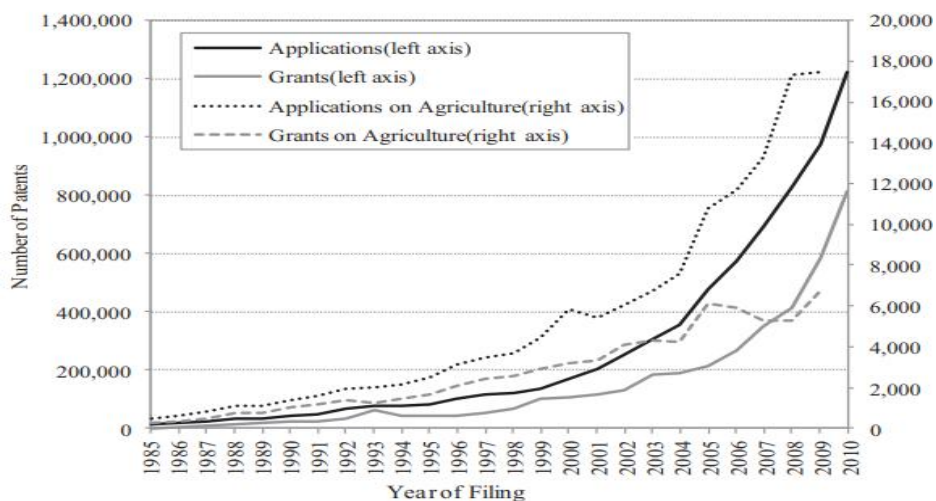


Figure 4. Trend-line of agricultural patents in China

Distributed Agricultural Leadership among HEI's

This taxonomy in imparting agricultural education has changed the landscape for falling under the umbrella of Distributed Leadership (DL) (Shava & Tlou, 2018). The multiple inroads to this paradigm have further gained popularity as it is conceived as a collective social process involving multiple stakeholders like students, educationalists, entrepreneurs and farmers. This decentralization of education has various discernible benefits (Harris et al, 2007):

(1) All policy decisions and activities will have their pivotal focus on improving students' educational experiences pertaining to farming.

(2) There is strong interdependence coexistence and correlation between farmers, learners, consumers and agricultural entrepreneurs.

(3) Each stakeholder's opinion and involvement is valued.

(4) Agricultural entrepreneurship and branding opportunities are nurtured through interaction about the influential practices and organizational routines of the leading firms.

(5) Convening appropriate structures dynamically to facilitate collaborative and participative decision-making.

Study the Climate of Trust Among the Consumers

The totality of leaders' work aggregates to more than the sum of the individual parts. This ascertains the elevated levels of interdependence among the farmers, consumers and entrepreneurs.

China has institutionalised the paradigm of DL in the agricultural sector. These educational inventions play a vital part in international trade and further catalyst the educational transformation realised in China, attracting more international students to pursue agriculture-based education in Chinese HEIs. The aim of this study is to convert these ideas into commercially viable products and processes. This work unveils the effect of educational reforms and leadership policies conceptualised in China to promote time-critical aspects of agricultural productivity, enterprises, branding and innovations based on consumers' education level shown in Figure 4.

Literature Review

Developing leadership qualities for agricultural entrepreneurs depends on a multitude of factors like global challenges, changes in entrepreneurial perceptions and changes in firm development notions. The immediate demand that the world should meet is a rampant increase in global food production by around 70% by the year 2050 (Dobermann & Nelson, 2013). Yotopoulos concluded that a direct outcome of agricultural education among the farmers is the function of agricultural productivity whereas the education level of consumers helps the farmers to acquire the markets. The new Sustainable Development Goals (SDGs) formulated by developed countries prioritize innovative culture and research inclined to food security and other agricultural activities to be a part of the curriculum (Betta, Jones & Latham, 2010). All agriculturalists agree to the fact that branding agricultural products is a quintessential activity in the globally connected world, as the customers for regional agricultural products are no longer regional. The world has shrunk by various technological and logistical advancements, thus bestowing the customers' worldwide knowledge, which is a direct implication of the educational opportunities acquired by the farmers as well as the customers. Thus, the education level of customers is an indirect impulse to the agricultural sector to foster the branding culture.

Almost all the developed countries have promulgated their own agricultural leadership programmes either in a conventional or unconventional way for promoting agricultural branding and entrepreneurs (Brosnan, 2014). The leadership programmes focus on five major factors of Emotional Intelligence as shown in Figure 5.



Figure 5. Traits of Emotional Intelligence in Entrepreneurship

The interesting fact is that these factors are not confined only to the entrepreneurs but also to the customers or followers (Goleman, 2018). These characteristics are expected from agricultural entrepreneurs who transform themselves into brand developers and the responsibility of bestowing these traits rests on the HEIs. But the main hindrance faced by the agriculturalists is unawareness of the business strategies and leadership skills. A much greater vision is the need of the hour for transforming agricultural entrepreneurs into agro-product branders to captivate and realise new ideas and innovative farming-based business practices by considering the education class of the customers, which is the pivotal focus of this study.

The agricultural education demonstrates that the policies and welfare measures taken by the government show very limited progress and not many people comprehend the schemes in the intended way (Swanson, 2006). Even today many rural farmers in China remain without sufficient resources to continue their farming activity. Establishing faculties of agriculture and universities could eventually increase agricultural production as a result of the application of current technology in the farms and research (Jamaluddin & Alias, 1997). The creation of new ventures for agricultural education is to formalise the scientific study by involving the farming community (Walls, 2008). The educational programmes teach the farmers to leverage the cutting-edge technologies, convey the results to a broad class of people to create awareness among the consumers and farmers, and cultivate agriculture teaching in a more sustainable way (Rambo, 1995).

In the recent past, many studies were published that focused on farmer's market analysis either from the perspective of farmers or customers. These investigations were centered around attitude, opinion, demography, purchase intention, loyalty, food supply chain, culture and behaviour of people under the study (Solanki & Inumula, 2021; Monroe-Lord, 2020; Ma & Chang, 2022). Another important aspect of agricultural trade is that they act as communication interface between the consumers and farmers, which was assessed solely by questionnaires and opinion polls (Bai & Koong, 2017). In addition to this, agricultural businesses and brands were flourish mainly based on mutual trust-relationships, knowledge transfer about products and processes and regional practices. The argo-based trading was carried out by knowing the consumer preferences and needs (Feldmann & Hamm, 2015).

Agricultural brands are new visionaries for both farmers and entrepreneurs for attaining premium prices, which is realised due to the evolution of the customer mindset. Many new brands primarily focus on safety and quality of products and this has become a strategic protocol in China (Kecheng & Yuanyuan, 2012). Indeed, Chinese agriculture has taken a new twist after branding the farm products, especially in the rural and middle-class economic sectors. The Chinese markets are flooded with numerous branded vegetable products (Ares, Giménez & Deliza, 2010). The choice of agricultural products relies on brand, especially in urban regions in China, where most of the

educated population vests in. Branding is also playing a pivotal role in determining the market of horticultural products also (Yue & Tong, 2011). An empirical study indicates that regional brands captivate collective opinion with common labelling and are accessible by very large populations whereas grower brands rely on size, quantity and quality of their products. A much larger class of brands are store brands which is a tool that gets simulated by the retailers (Lewis, Grebitus & Nayga Jr, 2016).

Although the literature reveals the prominent works in leadership strategies and educational reforms in that fosters marketing and branding of agricultural products, the development of the domain is still in the stage of infancy. Very limited works have been witnessed in envisaging the importance of HEIs in agricultural branding especially from the perspective of customer's education level. In the post-Covid era, where the world has totally transformed into digital marketing and online trading, the education level of customers plays a major role in determining the leadership strategies in agricultural product branding, especially in a populous country like China. This work attempts to uncover the relationship between the evolution of agricultural branding in the context of customer's education levels and examine the results of the agricultural education in improving the yields and brands, and constructing strong leadership practices.

Methodology

This study used Choice Experiments methodology to examine the education level of consumers, entrepreneurs, educational structure and construction of leadership traits at an entrepreneurial level in agricultural branding. The method of a choice experiment is found to be highly consistent with Lancaster's theory of utility maximization as well as the random utility theory which states that consumer utility is a totally dependent function of the attributes of the products (Huang, Cai & Mai, 2010). This method is robust and it can learn the present day market scenario where the customer is the king.

Data Acquisition

The data for this comprehensive study was obtained from multiple sources like Indiegogo, Google Patents Public Datasets on BigQuery and Kaggle. Exploration of the datasets reveals that out of 1034 agricultural ventures, nearly 773 are Chinese firms. 280,000 product venture projects in different industries and fields by the end of 2015. These data will be very much beneficial as they contain partial personal information related to the educational qualification of the leaders. Also, it focuses on the raise in the education level of common people of China, who are the primary customers of these agricultural branded products.

Investigation of the Development of Agricultural brand leadership

Globalization and a rapidly growing economy have necessitated the detailed investigation of various hypotheses pertaining to the development of new agricultural brands and change in education level of Chinese society (Georgantzias, Katsamakias, & Solowiej, 2009). The influence of entrepreneurial leadership in agriculture was further stimulated by the introduction of new educational policies to change the notion of the rural economy. This study proposes the following hypothesis connecting the role of leadership in forming new agricultural brands and the education level of Chinese farmers as well as consumers.

Hypothesis 1: Involvement of distributed leadership among the HEIs in agricultural education programmes has increased the agricultural productivity.

Hypothesis 2: Fostering distributed leadership in agricultural educational systems in HEIs has accelerated the increase in the number of innovations in agricultural trade.

Hypothesis 3: The increase in the number of agricultural brands is positively impacted by the rise in consumers' educational level and new educational reforms in China.

China is undergoing a tremendous transformation in its notion of higher education since 1999. More emphasis is given to higher and scientific education to foster the entrepreneurial culture as well as to elevate the country's intellectual properties. Table 1 shows the comparison of educational status between the US and China. The tenth and eleventh five-year plans adhere to the

commitment of tertiary education to all classes of people. This reformed the organizational and entrepreneurial structure, which is distinct from other developing countries in the world. The study indicates there is a steep increase in the number of graduate and undergraduate students up to 30% since 1999 and the recent numbers indicate it has quadrupled. Figure 6 shows the accelerated growth in the literacy rate of China which is competing with the global average.

Table 1. Comparison of educational status of Chinese and US farmers

Criteria	China	United States
Ratio of women farmers	53.2%	30.9%
Farmers with Master's and Doctoral degree	15.6%	91%
Farmers with Bachelor's degree	0.6%	25.7%
Farmers with access to the Internet and social media	2.2%	69.6%

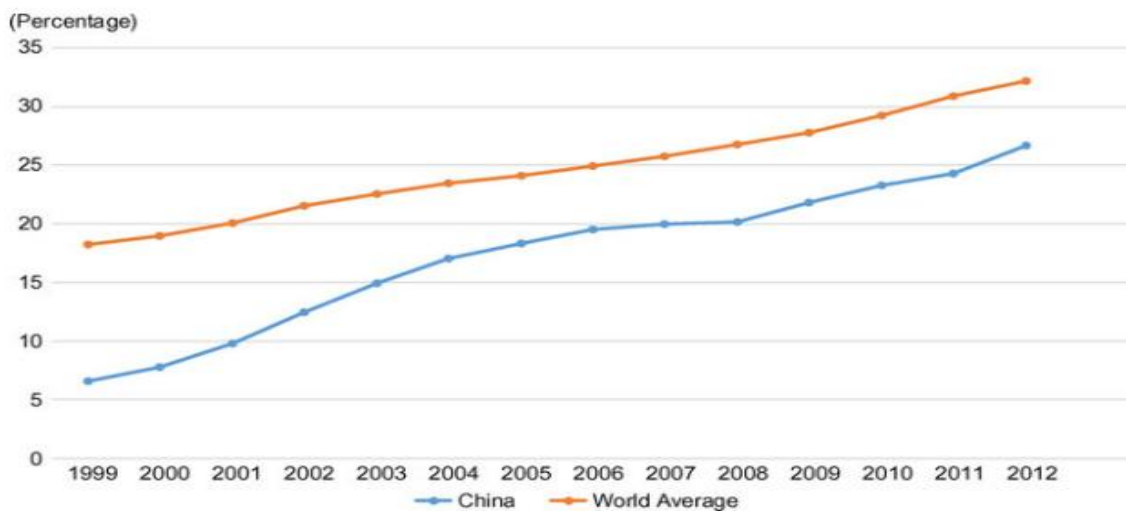


Figure 6. Comparison of literacy rate of China which is nearing the world average

Results and Discussion

The statistics from the famous Hong Kong and Taiwan Province reveals that the count of Chinese students in undergraduate programs is 32,852,900 which includes 9,674,500 newly-enrolled students in the year 2020. Around 3,139,600 students were enrolled in their master's degrees, and a steep raise can be witnessed even in Ph.D programmes. Figure 7 & 8 illustrate the increase in the education level of common people in China. The distributed leadership education establishes entrepreneurial legitimacy to obtain high productivity. Figure 9 shows the increase in productivity after the educational reforms.

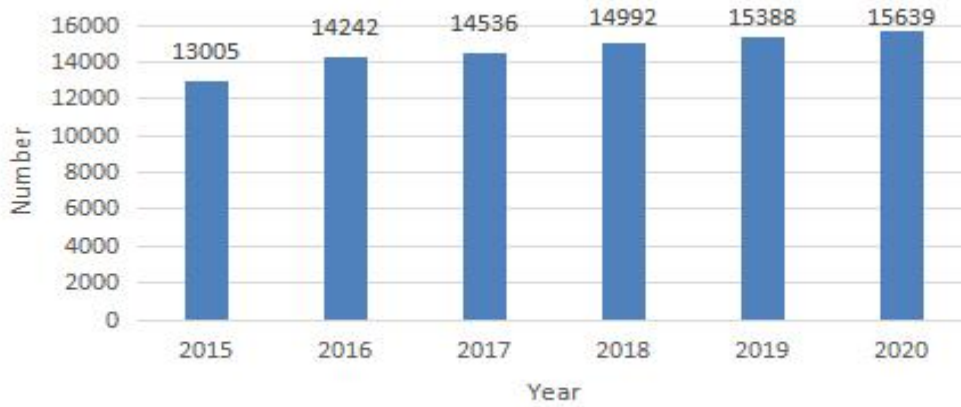


Figure 7. Chart showing students enrolled in compulsory education

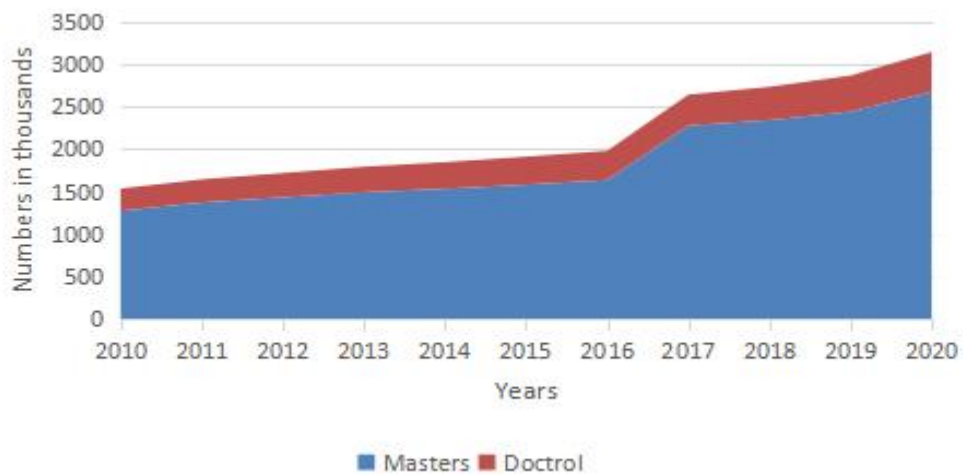


Figure 8. Growth in Master's and Ph.D degree programmes in China

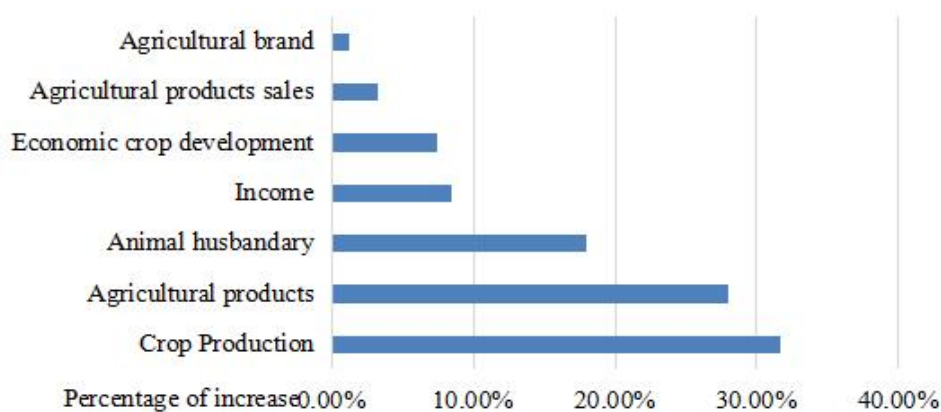


Figure 9. Increase in agricultural productivity in China

The education policies transformed the agricultural market from commodity farming to agricultural branding. The increase in the education level of customers, agri-based patents and entrepreneurial ventures are closely correlated. The relationship between the education level of customers and the development of agricultural brand leadership is analysed using the OLS method. The explanatory variables, correlation values and the regression coefficient are given in

Figure 7.

Testing Methodology:

Hypothesis 1 is validated using the Ordinary Least Squares (OLS) method with p explanatory variables as given in Equation 2.

$$= \beta_0 + \sum_{j=1}^p \beta_j X_j + \varepsilon \tag{2}$$

The dependent variable Y is the average of the past ten years' Total Factor Productivity (TFP) and Xj is the variable in distributed leadership in agricultural education variables. The data is obtained from US economic research services. β0 is the intercept of the model with ε as a residue of the model. (Table 2) gives the explanatory variables and their correlations. The correlation (Cor) between the variables is found using Equation 3.

$$or = \frac{n(\sum py) - (\sum p)(\sum y)}{((n\sum p^2 - (\sum p)^2)(n\sum y^2 - (\sum y)^2)^{0.5}} \tag{3}$$

Table 2. Explanatory variables, their correlation coefficients and the OLS coefficient

Variables	Correlation Coefficient					OLS method
	Mean years of schooling index	Expected years of schooling index	Graduates entering college	Master's Degree	Doctoral Degree	
Mean years of schooling index	1					0.003
Expected years of schooling index	0.075	1				0.004
Graduates entering college	0.64	0.58	1			0.005
Master's Degree	0.48	0.46	0.42	1		0.0062
Doctoral Degree	0.12	0.28	0.34	0.356	1	0.004

In Figure 8, the Average Years of Schooling Index (AYSI) and the Expected Years of Schooling Index (EYSI) are calculated using Equation 5 and 6.

$$YSI = \frac{\text{Average years of schooling}}{15} \tag{5}$$

$$YSI = \frac{\text{Expected years of schooling}}{18} \tag{6}$$

The maximum number of years of schooling in China is assumed to be (15), projected to its maximum value by the year 2025 whereas the maximum number of expected years of schooling is (18).

The detailed studies show that there is a positive correlation existing between the explanatory variables as mentioned in Table 3. All of the variables exhibit a strong positive correlation. A strong coexistence can be witnessed between students entering the master's level and MYSI, which confirms that most of the students are able to access high education levels. Also, the OLS regression coefficient delineates a positive relationship between the increase in customers' education level and agricultural brand leadership. The master's degree variable shows the highest regression coefficient of (0.0062) followed by graduates with (0.005). As the number of students pursuing a doctoral degree is very meagre, it does not show any improved trend. Thus, this study confirms Hypothesis 1.

Hypothesis 2: Fostering distributed leadership in agricultural educational systems in HEIs has accelerated the increase in the number of innovations in agricultural trade.

An agricultural brand may be a unique combination of name, products, processes, words, or specific symbols that help the customers to identify the product from its competitors. Branding is a more feasible and viable way for consumers to discriminate quality products from substandard ones. A product or a brand ranked number 1 maintains around a 10% price premium over the same product that has been ranked number two (Georgantzas, Katsamakas, & Solowiej, 2009). This gap is further widened to about (40%) over a generic store brand.

Table 3. Total Agricultural patents in China and patents held by private ventures

Field	1985		1993		2001		2005		1985-2005	
	All	Private	All	Private	All	Private	All	Private	All	Private
Agronomy and Forestry	46	26	108	63	289	181	956	469	4991	1223
Fisheries	4	3	20	19	34	24	124	54	677	410
Livestock	15	8	77	51	172	136	442	276	2481	1637
Plant products	34	4	217	123	432	263	899	459	5828	3282
Fertilizer and pesticides	15	4	94	63	167	115	345	211	2655	1717

Table 3 elucidates the year-wise agricultural patents of Chinese enterprises that foster branding of products from the last decade extracted from the SIPO database and Figure 10 gives a more detailed view. It can be seen that, after the year 2001, a surge in agricultural patenting is observed and the same trend line is witnessed even in the after years. Also, the rampant increase in patenting levels is a clear indicator of the construction of effective leadership of the

entrepreneurs as well as their educational qualifications. In addition to this, China is now focusing on multiple business models like B2C, C2C, C2B and O2O apart from agricultural e-commerce tools like micro-blogs, cloud computing, IoT, micro-messaging, etc. Fresh agricultural products with ensured quality have emerged as a hot spot of many large-scale e-commerce websites.

The leadership building of agricultural brands and their sustainable development have been assessed based on the evaluation indicators and relatively weighing them. Table 4 summarizes the factors that constitute the agricultural brand management and their Relative Importance Index (RII) based on the e-commerce activity of the customers as given in Equation 1.

$$RII = \frac{\sum W}{H \times N} \tag{1}$$

Table 4. Factors that dominate the development and sustenance of brand leadership in agricultural brands and their relative weight

Brand Management and Sustenance Activity	Metric	RII
Number of visits to the Website	Website click rate	0.19
Capital amount spent on promotion	Amount invested in advertising the product	0.35
Awareness level	Number of people visiting the website/ 100 customers	0.48
Recognition	Licensing, awards and quality certifications	0.2
Customer evaluation	Opinion of customers and feedback	0.46
Media	Annual count of reports and articles	0.31
Return rate of customers	Number of customers who regularly buy the product	0.48
Visitor rate	Number of visitors who visit the web page	0.64
Visitor evaluation	Recommendation or rating	0.53

The computation of RII considers is based on W (weight given by the customer for every factor of interest while H is the highest weight value that is achieved. N signifies the number of customer opinions that were actually taken into consideration to build the RII (Figure 10).

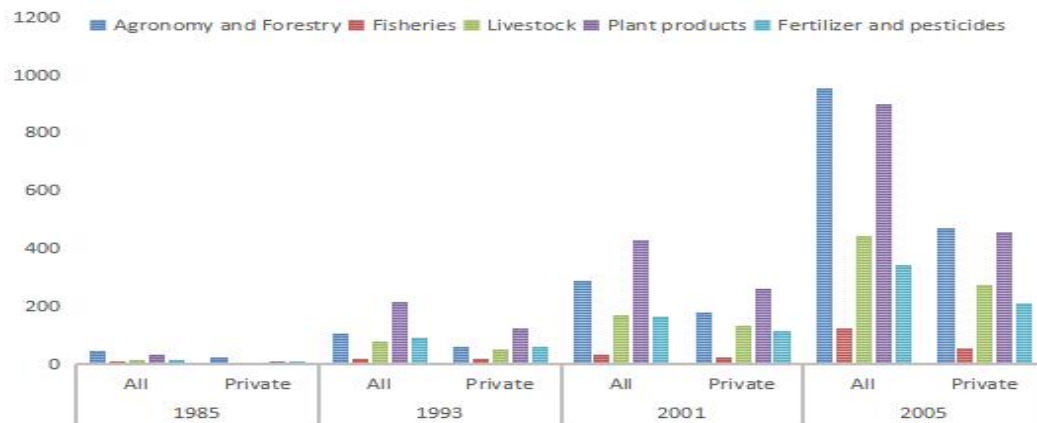


Figure 10. Data showing the innovations in branding various agricultural and its allied products

It is important to inculcate awareness about the brands which has a score of (0.48) measured as a number of visitors per 100 people on the website (Table 4). Visitors' click rate and brand promotion are equally important for sustenance. Most importantly the visitor rate and recommendations by the visitors are holding more significance. In today's digital era, media involvement and acquiring quality accreditation are viewed as important criteria for customers to choose a particular brand.

The OLS regression is done in a Python environment. The results are tabulated in Table 5, 6 & 7. The main purpose of this study is to predict the influence of the explanatory variables on the leadership qualities of agricultural entrepreneurs. These variables are given as input to the OLS model to validate Hypothesis 1. The increased activity in social networks is proof of evidence for this. The network interactions between the leading brands and the investors could help the public to gain trust, by building Corporate Social Responsibility (CSR) which is well-acknowledged by customers with higher educational levels.

Table 5. Explanatory variables for the study

Variable	Comments
Innovations	Possession or non-possession of patents by the product
Leadership	Leadership strategies followed or not
Experience	Previous experience of leaders or entrepreneurs
Feedback	Customer feedback for a brand
Visitor rate	Indicator of loyal customers for a brand

Table 6. Pearson's Correlation coefficient values for various explanatory variables

	Innovations	Leadership	Experience	Feedback	Visitor rate
Innovations	1				
Leadership	0.987	1			
Experience	0.657	0.876	1		
Feedback	0.546	0.765	0.765	1	
Visitor rate	0.789	0.345	0.432	0.567	1

Table 7. Output from the OLS method

Variables	OLS method
Innovations	0.003
Leadership	0.016
Experience	0.002
Feedback	0.032
Visitor rate	0.003

The results in Table 5 reveal that explanatory variables chosen in this work have a notable regression impact on agricultural leadership. The positive regression coefficient can be noticed in all the explanatory variables.

Hypothesis 3: The increase in the number of agricultural brands due to distributed leadership agricultural educational policy is positively impacted by the raise of consumers' educational level and new educational reforms in China.

The statistics show that there is a steep increase in the entrepreneurial culture. Among the various factors, the delegation of educational reforms through distributed leadership policy holds a high priority. These educational reforms change the perception of producers (farmers), entrepreneurs (brands) and consumers (customers) of society. The entrepreneurial ecosystem of the country is measured through Global Entrepreneurship Index (GEI) which is a comprehensive indicator of the health, extent, depth and quality of the entrepreneurship and its support. The following are the services rendered by the entrepreneurial ecosystems:

- (1) Optimal resource allocation towards the intended uses.
- (2) Novel, innovative, high-growth ventures and brands that drive the process.

China holds 43rd position out of 137 countries in its GEI with its strongest product innovation. The GEI of China in the year 2017 is 41.1 against 36.1 in the previous year. The country is steadily making its progress up to 5 points every year because of the entrepreneurial ecosystem constituted by the DL. The explanatory variables and their percentage of contribution to estimating GEI of China are given in Figure 11.

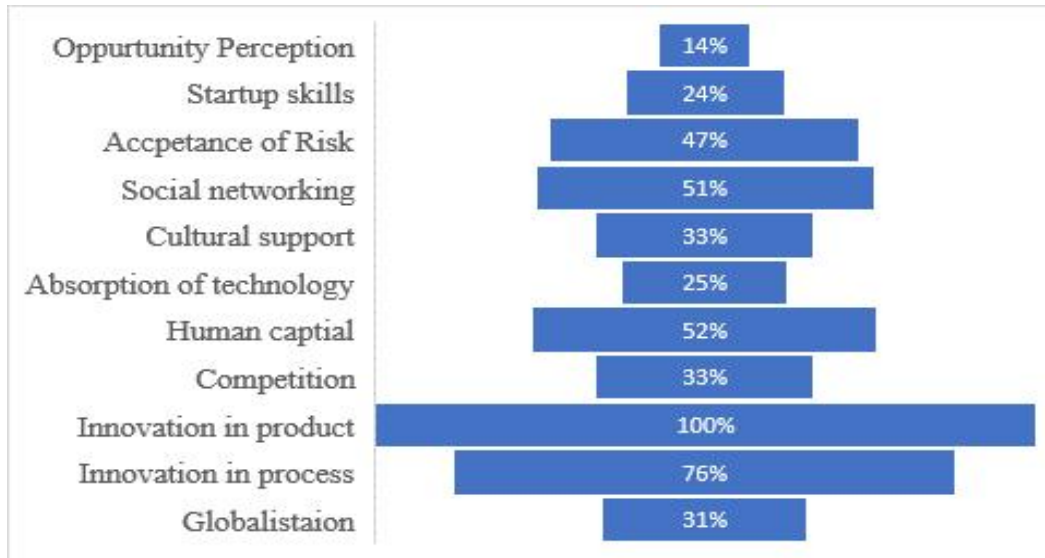


Figure 11. Factors affecting GEI of China

The coefficient of regression between the educational institutions and the GEI is found by OLS method. The result of the study is presented in Table 8. There is a strong positive correlation between schooling years and GEI. As the ratio of the population entering HEI for research and doctoral programmes is relatively low, the coefficient value is also low. The agricultural brands and entrepreneurial ecosystem of China are greatly nurtured by the educational transformations in bringing compulsory education, ATMs, AVMs and other agricultural education policies. This confirms Hypothesis 3.

Table 8. Results of study from OLS method

Variable	OLS method
Mean years of schooling index	0.054
Expected years of schooling index	0.067
Graduates entering college	0.053
Master's Degree	0.045
Doctoral Degree	0.003

All of the hypotheses formulated in this work are verified based on the empirical evidence collected from various reliable sources. The models used in the work are highly robust and can be extended to consider an increasing number of explanatory variables. These hypotheses were verified by considering the rural, urban and entrepreneurial roots of China and its global competency in distributed educational leadership confined to the agricultural sector.

Conclusion

This article investigates the impact of distributed educational leadership in fostering agricultural branding and entrepreneurial activity based on the analysis of crowdfunding data and education statistics in China. The implementation of DL agricultural education has first resulted in an increase in crop yields. As a progressive step, branding agricultural products through new entrepreneurial ventures has shown a steep increase in the past years due to the increase in educated farmers and customers. E-Commerce activity deserves special mention, as the world has migrated to online activity in the post-Covid era. The results of the study indicate that there is a development in the branding of agricultural products after the implementation of nationwide distributed leadership programmes confined to the farming sector. A sharp development is sensed not only in agriculture but also in horticulture, fisheries and other farming-related activities. The explanatory variables considered in this study confirm our hypothesis. The study indicates that entrepreneurial leaders in agricultural brands progress as the customers and farmers are well-informed, educated and aware of the innovative products and processes. Therefore, the study reveals that the entrepreneurial leaders in fostering agricultural brands were positively influenced by improvement in the educational status of Chinese society. This article uses statistical methodologies to ascertain the formulated hypothesis which necessitates the further nurturing of the distributed educational leadership skills of the country to sustain global competency for the country's agricultural development.

References

- Ares, G., Giménez, A., & Deliza, R. (2010). Influence of three non-sensory factors on consumer choice of functional yogurts over regular ones. *Food quality and preference*, 21(4), 361-367.
- Bai, S., & Koong, K. S. (2017). Financial and other frauds in the United States: a panel analysis approach. *International Journal of Accounting & Information Management*, 25(4), 413-433.
- Betta, M., Jones, R., & Latham, J. (2010). Entrepreneurship and the innovative self: a Schumpeterian reflection. *International Journal of Entrepreneurial Behavior & Research*, 16(3), 229-244.
- Brosnan, K. (2014). *Leadership Development Pathways for Irish Agriculture*. Retrieved from <https://nuffield.ie/wp-content/uploads/2015/06/Leadership-Development-Pathways-for-Irish-Agriculture.pdf>
- Dobermann, A., & Nelson, R. (2013). *Opportunities and solutions for sustainable food production*. Paris, France: Sustainable Development Solutions Network.
- Feldmann, C., & Hamm, U. (2015). Consumers' perceptions and preferences for local food: A review. *Food quality and preference*, 40, 152-164.
- Georgantzias, N. C., Katsamakos, E., & Solowiej, D. (2009). Exploring dynamic implications. *Systems Research and Behavioral Science*, 27(6), 622-638.
- Goleman, D. (2018). What makes a leader?. In *Military Leadership* (pp. 39-52). London, UK: Routledge.
- Harris, A., Leithwood, K., Day, C., Sammons, P., & Hopkins, D. (2007). Distributed leadership and organizational change: Reviewing the evidence. *Journal of educational change*, 8(4), 337-347. Retrieved from https://thegedi.org/wp-content/uploads/dlm_uploads/2017/11/GEI-2018-1.pdf
- Huang, J., Cai, G. N., & Mai, Y. Y. (2010). Rural Micro Enterprise: entrepreneurs' social capital and initial enterprise performance. *Chin. Rural Econ*, 5, 65-73.
- Iazzi, A., & Santovito, S. (2016). Branded versus non-branded: Differences in consumer preferences. *International Journal of Marketing Studies*, 8(1), 57.
- Alias, N. A., & Jamaludin, H. (1997). Quality student support: A learner's perspective. In *11th AAOU Annual Conference, Kuala Lumpur, November* (pp. 11-14).
- Kecheng, Z., & Yuanyuan, H. (2012, October). The Information Economic analysis of Agricultural Product Brand in consumer's view. In *2012 3rd International Conference on System Science, Engineering Design and Manufacturing Informatization*, 1, 175-179.
- Keller, K. L., & Lehmann, D. R., 2006. Brands and branding: Research findings and future priorities. *Marketing science*, 25(6), 740-759.
- Lans, T., Van Galen, M. A., Verstegen, J. A. A. M., Biemans, H. J. A., & Mulder, M. (2014). Searching for entrepreneurs among small business ownermanagers in agriculture. *NJAS-Wageningen Journal of Life Sciences*, 68, 41-51.
- Leischnig, A., & Enke, M. (2011). Brand stability as a signaling phenomenon-An empirical investigation in industrial markets. *Industrial Marketing Management*, 40(7), 1116-1122.
- Lewis, K. E., Grebitus, C., & Nayga Jr, R. M. (2016). The impact of brand and attention on consumers' willingness to pay: Evidence from an eye tracking experiment. *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie*, 64(4), 753-777.
- Ma, C. C., & Chang, H. P. (2022). Consumers' perception of food and agriculture education in farmers' markets in Taiwan. *Foods*, 11(5), 630.
- Monroe-Lord, L. (2020). Food Safety Knowledge and Socio-Demographic Factors of Participants in DC Farmers Markets. *Journal of the Academy of Nutrition and Dietetics*, 120(9), A52.
- Raggio, R. D., & Leone, R. P. (2007). The theoretical separation of brand equity and brand value: Managerial implications for strategic planning. *Journal of Brand Management*, 14, 380-395.

- Rambo, E. (1995). Conceiving best outcomes within a theory of utility maximization: a culture-level critique. *Sociological theory*, 145-162.
- Shava, G. N., & Tlou, F. N. (2018). Distributed Leadership in Education, Contemporary Issues in Educational Leadership. *African Educational Research Journal*, 6(4), 279-287.
- Solanki, S., & Inumula, K. M. (2021). Farmers markets: an analysis of the determinants of consumers attitudes and behavior. *Asian Journal of Agriculture and Rural Development*, 11(1), 63-70.
- Sui, Y., & Zhao, J. (2022). Optimization Simulation of Supply-Side Structure of Agricultural Economy Based on Big Data Analysis in Data Sharing Environment. *Journal of environmental and public health*, 2022, 1497357.
- Swanson, B. E. (2006). Extension strategies for poverty alleviation: lessons from China and India. *Journal of Agricultural Education and Extension*, 12(4), 285-299.
- Walls, K. C. (2008). Distance learning in graduate music teacher education: Promoting professional development and satisfaction of music teachers. *Journal of Music Teacher Education*, 18(1), 55-66.
- Yue, C., & Tong, C. (2011). Consumer preferences and willingness to pay for existing and new apple varieties: Evidence from apple tasting choice experiments. *Hort Technology*, 21(3), 376-383.