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Educating the Agri Entrepreneurs: Innovation and Improved Agricultural Performance through Risk Management

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Pakistan depends intensely upon the agriculture sector. The risks have been prevailing in the agriculture sector since the beginning. These risks are classified as production, market, financial, technological, political, other natural, and burglary risk which causing a decline in the agriculture sector. The purpose of the research is to determine how risk management; an important aspect of the continuous innovation process helps in improving agriculture performance. We took crop insurance as a mediator in our study to measure the relationship between risk management and agriculture performance. The data was collected from 250 agriculturalists (farmers) through a questionnaire and the response rate was 87%. Statistical analysis was performed on SPSS. Pearson correlation was applied to determine the relationship between independent, dependent, and mediator. Regression analysis was performed to measure the impact of risk management on agriculture performance. To analyze the mediating effect of crop insurance, we conducted the Hayes process. The results of this study conclude that risk management has a positive relationship with agriculture performance in Punjab, Pakistan. Furthermore, the research clarifies that risk management has a significant impact on agriculture performance through crop insurance. This paper also discusses the implications from the government's perspective in making decisions to improve the agriculture sector and eventually making it a win-win situation for the agriculture entrepreneurs and the country's economy at large.

Keyword: Agriculture sector, agriculture performance, risk management, crop insurance, agriculture entrepreneurs

INTRODUCTION

The farming zone keeps on accepting a major sector in Pakistan's economy. It is the second greatest portion, speaking to more than 24 percent of GDP, and remains by an extensive report the greatest business, holding 42.3 percent of the nation's total work. Around 62 percent of the country stays in provincial zones and is associated with agriculture for their livelihood control (Ministry of Finance, 2017-18; Pakistan Bureau of Statistics, 2018; Khan & Gull, 2013).

It supports Pakistan to combine approaches to life and business revolution. The agriculture sector plays a vital role in the economy by providing food security, poverty reduction, and the industrial revolution (Azam & Shafique, 2017). The importance of the agriculture sector in the economy can be observed through three perspectives such as 1) provides food security to the nation 2) source of making foreign exchange 3) provide goods and services in the domestic and international market (Ministry of Finance, 2013-14).

Open Innovation

Nowadays, open innovation is an important factor for the growth of the business environment. This business environment compelling the organizations to adopt the new philosophy of innovation in the terms of model, design, and procedure to compete in the competitive environment (Pullen et al., 2012). The innovative procedures help to achieve the short and long-term objectives of the organization. In large-scale organizations, open innovation is being considered as an encouragement for all investigators. However, the literature for small and micro-entrepreneurs is not well inspected (Bigliardi et al., 2016).

A significant amount of managerial literature has emerged from the present tempestuous economic environment that discusses the forms in which the latest paradigm of innovation has developed. "Open innovation" has been called this modern model (Soto-Acosta and Cegarra-Navarro, 2016). As an innovation for individual companies is becoming increasingly difficult and costly, there is a current need for companies to transition to a model in which collaborators, information agencies, government bodies, and even rivals work together to rapidly and efficiently create new products and processes (Chesbrough, 2003).

Open innovation has also been increasingly relevant in the Agriculture sector in recent times (Santoro et al., 2017). The agriculture sector shows rapid growth in the integer of open innovation plans happening inside it (Sarkar & Costa, 2008; Huizingh, 2011). Indeed, the food requirements of consumers are evolving and changing continuously in an increasingly globalized economy. Consumers today prefer to search for targeted deals to provide them with a customized experience in consumption (Bruce, Quan & Wang, 2004). The agriculture sector has been considered as the slowest growing and mature sector relatively. The Agri-entrepreneurs relatively demonstrate a low level of R&D investment and conservative types of innovation introduced to the market (Costa & Jongen, 2006).

Backwardness in terms of technology is one of the key reasons behind the collapse in Pakistan's agricultural productivity. Farmers are also using conventional techniques that are increasingly causing low productivity. The development process of this aforementioned sector needs to be renewed urgently to cope with the changing patterns and demands of the market at large. Chesbrough (2003) first used the term, open innovation, when describing erosion factors that demoralize the conventional research and development model.

A group of instruments, such as the growth of the world population (FAO, 2009), the extreme financial rivalry (Lapple, 2015), the impediment of fossil assets (Preschitschek et al., 2011), climate change and its possible impacts on food security is influenced by the current agribusiness situation. This paper

also offers details on how risk management by crop insurance contributes to increased agricultural productivity.

Nowadays, with technology more available, it is not easy to access or exchange information relevant to personal or commercial insurance policies. This kind of practice is undoubtedly being transformed. To foster economic and social growth, governments and regulatory bodies around the world are closely monitoring how financial data can support consumers and businesses (MJV Team, 2019). Crop insurance has a safer way of improving Pakistan's agriculture market.

Agriculture Performance

The performance of the agriculture sector is measured with the scale of agricultural productivity. agricultural productivity and crop yield are the closest apparatuses to measure the performance of agriculture (Amone, 2013). Performance is described as: "yield per unit" has to be considered to determine the agriculture performance (Singh & Dhillon, 2000).

It has already been studied that agricultural productivity in Pakistan has the gap productivity in major crops as 57, 67, 45, 81, and 84 %. The foremost crops are cotton, wheat, rice, maize, and sugarcane. The existing productivity of major crops is 1.87, 2.26, 2.88, 1.77, and 48.06 tons per hectare against 4.30, 6.80, 5.20, 9.20, and 300 tons per hectare respectively (Aslam, 2016). This is huge which clearly defining the low performance of the agriculture sector, so the contribution to GDP also declined.

According to the Pakistan Bureau of Statistics (2017-18) in 1949-50, the agriculture sector was contributing 53.2 % in GDP and presently the contribution is 24%. This comprises five subsectors as livestock, fisheries, forestry, major and minor crops. The major crops contributing 25.6%, what is more, the commitment of major crops in GDP is 5.4% according to the financial outline of Pakistan. Wheat is contributing 10.3% of agriculture sector performance and in GDP is 2.2%. Rice is contributing to our farming 3.1% and GDP is 0.7%. Cotton is a cash crop and contributing 1.4 % of GDP. The contribution of the farming sector is 3.4% and GDP is 0.7%. the contribution of minor crops agriculture sector is 11.6% (Usman, 2016; Pakistan Bureau of Statistics, 2015-16)

Risk Management

Risk management has a system that includes four steps first identification, second is assessment, third treatment, and last observing. The risk management process (RMP) is a coherently predictable and organized way to deal with counting and understanding potential risk factors and assessing results and vulnerabilities related to these identified risk factors (Tummala & Burchett, 1999). There are various risk management techniques in practice such as the diversification of crops, inter adapting, blended equipping, integration of farms, etc. But crop insurance is the foremost strategy of risk management used (Kiran & Umesh, 2012).

According to research, contingency Theory; various determinants influence management practices. The agriculture sector's performance could be improved if the farmers have a positive attitude to adopt risk management strategies (Perrow, 1967). The determinants of risk management have been classified into two kinds as risk attitude and risk-bearing capacity. "Willingness to take the risk is said to be a risk attitude. Risk attitude is the behavior of agriculturists in which they perceive the risk and want to cope up (Van Winsen et al., 2014). Risk attitude can differentiate the farmer's perception about accepting the crop insurance as risk management's strategy to avoid and reduce the loss.

Crop Insurance

Crop insurance is the greatest inspiration for agriculturists to develop more crops indeed those are less secure and to embrace development innovations (Shashi, Kiran & Umesh, 2012). Crop insurance is the risk exchange instrument for farmers (Crane & Gantz, 2013). The misfortunes can rise from intemperate rain, surge, dry seasons, accost, storms, violent wind, bug assaults, wind storms, burglary, fire, and helping (Van Winsen et al., 2014). As a result, crop performance falls which becomes the reason to fall in income. Through crop insurance, the loss is repaid by the insurance company on the off risk that provides budgetary situation to the agriculturist as back up.

Problem Statement

The agriculture sector has been continuously engaged in improving Pakistan's economy since 1947. The performance of the sector goes down due to political, natural, social, and climate conditions (Raza et al., 2012). In 1949-50, the contribution of the sector was 53.2% in GDP at that time it was the major sector of Pakistan's economy but now its contribution is 24% in GDP as per 2018-19 statistics (Pakistan Bureau of Statistics, 2016-17).

As per the current situation of agriculture performance, there is a productivity gap of 67, 57, 45, 81, and 84 % between the normal and prospective yield of wheat, cotton, rice, maize, and sugarcane, respectively (Aslam, 2016). The major reasons for this gap are some production risks such as climate conditions, bugs and pests attack, disease, innovation, genetics, and low quality of inputs causes low performance (Crane et al., 2013).

The agricultural hazards may influence the farmer's choice toward adopting risk management strategies. The risk can't be maintained at a strategic distance, but these can be minimized and decreased by using risk management strategies. The risk management techniques are production arrangements, monetary ways, physical and human capital, and the measure of averse to risk. Crop insurance is the leading methodology of risk management to transfer the risk. It depends on the farmer's choice towards the acknowledgment of risk. It is the farmer's state of mind approximately the readiness of agriculturists known as risk attitude.

Research Gap

The performance of the agriculture sector of Pakistan is declining day by day due to many agricultural risks. The importance of risk management in the agriculture sector has been discussed before by many researchers. Cornagia (2009) has identified that the agricultural sector is appropriate to measure the influences of risk management and considering the US agriculture sector to determine that does risk management improves the agriculture sector? Many other investigators have been studied the role of risk management and crop insurance in a different scenario (Huirne et al., 2000; Wolke, 2007; Glauber, 2013; Crane et al., 2013; Raza et al., 2012; Amone, 2016; Anton J, 2008; De Backer,2008; Aslam, 2016; Mishra and El-Osta, 2002; Froot et al., 1993; Kiran and Umesh, 2012). The risk management in agriculture has also been discussed in the context of Punjab, Pakistan, including a joint study by SDPI, OXFAM, FAO, and Punjab Social Protection authority considering small farmers.

The paper is relatively unique from the other researches because in this research we have identified the relationship of agriculture performance and risk management through crop insurance considering the Agri-entrepreneurs and innovation in the agriculture sector of Punjab, Pakistan. Risk management has considered the independent variable and agriculture performance is considered the dependent variable. Crop insurance has been taken as a mediator in the study. It has been taken as an example to identify the effect of risk management on agriculture performance. So, it is tried to prove that risk management may help to develop the agriculture sector with the mediating effect of crop insurance.

The research questions of this paper: "Is there any relationship between risk management and agriculture performance?" "Is there any indirect relationship between risk management and agriculture performance through crop insurance?"

The research objectives of this paper are: "To determine the relationship between risk management and agriculture performance" "To determine the relationship between risk management and agriculture performance through crop insurance"

LITERATURE REVIEW

Recent shifts like both demand and supply have made innovation an inevitable corporate practice, combined with an ever-degree of competition (Pironti et al., 2010; Arifeen, 2017; Ferraris et al., 2017). Innovation development, however, is a very costly and time-consuming process and academic literature has recognized a new paradigm branded "open innovation" as a consequence of this. According to this paradigm, company partners and stakeholders can participate in processes of innovation. Ideas are then created, taking into account the environment in which the company is based, and all the involved partners and stakeholders share the cost of this development (Gassmann et al., 2010; Fulginiti, 1998).

Businesses can produce successful new products even quicker and at lower costs thanks to open innovation. Besides, in cooperation with partners and stakeholders, goods produced are also seen to be more adherent to the tastes of consumers (Christensen et al., 2005; Soto-Acosta & Cegarra-Navarro, 2016).

There is the potential for many emerging technologies to support (or complement) a wave of successful modern agriculture applications (Manning, 2013; Joseph, 2013). Outside the processing sector, innovations are often created and this shows the value of open innovation. Indeed, these technologies can be more readily embraced by agriculture businesses that keep an open mind concerning innovations coming from outside their industry (Kamal,2012; Bitzer & Bijman, 2015).

Market concerns and the number of contributors from various sectors participating in the production, together with their difficulty in meeting all the heterogeneous 245 agriculture crowdfunding requirements of intermediate consumers, end-users, and legislators in a single-handed manner, determine that it is important to carefully organize innovation activities (Costa & Jongen, 2006). It is worth noting that these issues can be addressed easily by proper information-sharing mechanisms in certain instances (Bresciani, 2017).

Nevertheless, knowledge management skills are necessary for agriculture companies to reap the benefits associated with open innovation, as with any organization operating in any industry (Bresciani, 2017; Tardivo et al., 2017).

Agri-businesses need knowledge management skills to capture, systematize, categorize and process the information they obtain from external sources, consistent with the literature on the value of knowledge management and information (Del Giudice & Peruta, 2016). In particular, these skills are key to identifying the piece of information containing insights into the possible emerging opportunities that agriculture companies should take advantage of (Scuotto et al., 2017). As a result of the importance of new knowledge management in agriculture companies, the next section will discuss how knowledge management skills can be regarded as the key to effective open innovation in agriculture companies.

In developing countries, developments in risk transfer are leading the way to address several social issues. As the democratization of finance and technology promotes global risk pooling, documents progress and maps a path for even more innovation (Shiller, 2003). Developed countries ' financial and reinsurance markets are increasingly evolving index-based instruments that allow for the transfer of systemic risks and even risks to livelihoods. There have been well-recorded developments in risk transfer for natural disasters (Doherty, 1997; Skees, 1999b). In developing countries, the challenge is to make these technologies important and to promote awareness and access.

Risk management can enhance the worth of the agriculture sector. This is a significant survey that what is the importance of risk management to improve the firm value? has been founded that risk management can enhance the firm by avoiding loss (Froot et al., 1993). Due to heavy losses, there is a shortage of capital that occurs than risk management provides sufficient internal finance to finance further production.

The companies are using risk management strategies to have the highest market value than the companies are not using risk management strategies' after analyzing 720 large firms from 1990 to 1995. There are a few more comparative papers published in which various authors found that risk management and firm value have positive relation (Graham & Rogers, 2002; Adam & Fernado 2006; Carter et, al. 2006; Mackay & Moeller). This research has found that risk management helps to improve the value of the agriculture sector by adopting the crop insurance strategy. Cornaggia (2009) has identified that the agricultural industry is appropriate for investigating the impact of risk management. He took crop yield as a dependent variable and applied this to the agriculture sector of the US that how risk management helps to improve firm value through taking risk management as an independent variable. He has identified that risk management has a positive relationship with crop yield.

Hypothesis 1: Risk management has a significant relationship with agriculture performance.

Both the association of crop risks and asymmetric knowledge issues would likely trigger the basic feature of insurance, risk pooling is ineffective. Therefore, the creative recent instruments concentrate on resolving conventional agricultural insurance concerns, such as moral insurance, risk, high transaction costs, negative option, and, most significantly, the systemic issue of weather shocks for the agricultural industry (Goo, 2015).

Crop insurance and hedging the risk are the risk management strategies mainly used by farmers to manage risk (Mishra & El-Osta, 2002). The policies of crop insurance firstly introduced by the federal insurance corporation(FCIC). The policies of

crop insurance have been covered firstly by the risk management authority (RMA).

According to The Federal Crop Insurance Act of 1980 crop insurance had considered the primary form of catastrophic protection available for producers, but its expansion relies on participation, and increasing premiums should be subsidized by the government (Glauber, 2013). The Agricultural Adjustment Act of 1938 authorized Crop insurance primarily. There 26 crops were eligible for catastrophic protection under insurance coverage by 1980 (Chite, 1988). "Risk can be transferred by obtaining crop insurance from an insurance agency" (Crane et al., 2013).

The government ought to encourage the cultivating trade through the arrangement of cutting-edge innovation, environment choices on climate changes, the facility of fertilizers, pesticides, and encouraging the agriculture sector by providing crop insurance (Crane et al., 2013). Crop insurance is the finest strategy for risk management and supports to meet the capital shortage that occurred due to catastrophic losses to the agriculturists. In Pakistan, the State Bank of Pakistan firstly introduced a crop insurance scheme in 2008 with the private and public partnership as national crop insurance loan scheme by and the underwriting of policies was done against a premium ofUS$3.8million and paid claims up to December 2019 with the loss ratio of 73% (Effective execution of crop insurance policy, 2017).

Since its inception, the agriculture sector of Pakistan contributes towards the development of Pakistan's economy and was the major contributor to GDP. However, the performance of the sector has declined gradually due to governmental, social, and climate conditions. Agriculture sector has a great influence on the financial development of Pakistan (Raza et al., Chauvin, 2012). The portion of the employed population is 45% employed in this sector.

It has been analyzed the effect of the agriculture, manufacturing, and service industry on the GDP growth of Pakistan (Zaheer, 2013; Nazish et al., 2013). The findings of their analysis demonstrate that the farming sector is highly significant than the different sectors of the economy of Pakistan. A recent study has been conducted in the view of risk management of small farmers in Panjab Pakistan. In which they founded the holding of the land, agricultural risk, risk coping strategies, and existing social protection and agriculture schemes (Qaiyum et al., 2018). Ahmad et al. (2019), recently studied the agriculture sector of Punjab, Pakistan as agro-ecological zones of Punjab in which they introduced the policies and strategies to use the natural resources to improve the production potential in agriculture.

Hussain et al. (1997), has analyzed the connection between total agricultural productivity and poverty in Pakistan over time and along with evaluated the determinants of production. Their discoveries indicated that expansion in rural area creation reduces poverty in Pakistan however not at the rate at which the populace is expanding. Chebbi (2010) has analyzed the role of cultivation in economic development with the dealings with different sectors. Kawa & Bassoume (2007) have inspected the linkage between agricultural exports and sustainable development.

Analysts had appeared in their model that low farming yield resulted in the low operational activities in the industries side since industries are a lot of reliant on the farming yield that supportive to grow an industry effectively. If the performance of the industries has declined that resulted in a negative development in the economy. Levin & Raut (1997) have investigated the impact of the primary product and manufactured exports on economic growth.

Agriculture sector performance can be measured through crop performance. Crop yield is the closest measure of performance (Feder, 1985). The basic determinants that influence farming performance presented by different authors as human capital, capital, land, and machinery (Gray et al., 2014).

Here, the solution is available in the form of risk management which may be helpful for the farmers to avoid and minimize the risk by following risk management strategies. A risk management system provides different strategies such as choices on-farm, changes in portfolio structure, utilization of market instruments, government investments, and diversification of risk (Huirne et al., 2000)

The risks are prevailing in agriculture sector production, market, financial, technological, political, other natural, and burglary risk those causes a decline in the agriculture sector's performance which leads towards a low budgetary situation (Wolke, 2007). Where the agriculturists are adopting the risk management procedures, in this situation, farmers face the low capital situation, at that point, the crop insurance will reimburse the agriculturists against low capital then the availability of capital encourages further production and this will lead to the high performance of the sector.

Through this program, the investing constrain of agriculturists won't decline, and he can cultivate his farms with these investing arrangements. Assistance to the agriculturist can get a high generation over various a long time in this situation his salary and saving will increase, and he got this situation of high budget.

Hypothesis 2: Risk management has a significant indirect relationship with agriculture performance through crop insurance.

It has been identified from all the above discussion that risk management and agricultural productivity have a positive relationship. This research provides enough information to the farmers about the strategies of risk management to avoid and minimize the farming risk. But the most specific strategy of risk management has crop insurance.it has been tested that agriculture performance can be enhanced through risk management and crop insurance. Crop insurance helps the farmers to diversify the risk. The diversification of the risk relies on the attitude of the farmers. A positive attitude leads to coping with the risk through risk management strategies. So, it has been identified from the research that risk management and crop insurance have a positive impact on the agriculture performance

Open Innovation and Risk Management

In today's business environment, it is often argued that for organizations to achieve a sustainable competitive advantage, they must be able to innovate, so that they can meet complex market demands as they deliver products, solutions, or services (Nunes et al., 2020). If the organizations want to achieve sustainable competitive advantage, they must have to develop strategies that enable them to enhance performance and innovation to meet actual market needs and demands (Nuryakin, 2018; Ng, 2015).

The risks involved in the open innovation are behavioral, risks in assigning tasks to partners, risks in selecting critical partners, process coordination costs, implementation costs, and more faults in routine workflows (Enkel et al., 2009; Müller, 2013; Veer et al., 2013). Therefore, risk management has a necessary element of open innovation. Organizations have to adopt risk management strategies to achieve organizational goals. To achieve the organizational goal, (Nunes et al., 2020) introduced the Open Innovation risk management model. The elements of the OIRM model are collaborative networks, project management, risk management, and social network analysis. The agricultural business is also prone to risks that require the ORIM model while going for innovation in the agriculture sector.

Open Innovation and Agriculture Sector Performance

One of the main reasons behind the decline in the agricultural productivity of Pakistan is backwardness in terms of technology. The farmers are still using traditional methods causing low productivity gradually. There is an urgent need to renew the production process of this aforementioned sector to cope with the changing trends and demands of the market at large. The term, open innovation was first used by (Chesbrough, 2003), while finding erosion factors that demoralize the traditional model of research and development. Using an open innovation model for improved performance is more energetic and less direct since advancements are based on capturing outside information resources through participation; as well as on the outsourcing of resources that are not a portion of the central trade which are created and promoted by others (De Sponsor et al., 2008).

A few studies focus on how innovation may support enhancing the agricultural sector's performance for example, (Botha et al., 2017) in their study highlights that the traditional design of the agriculture sector may adopt more open, decentralized, contextualized, and participatory approaches to design and innovation. Another study by (Elsa et al., 2018) argues that the concept of co-design and co-innovation may be beneficial through cross-fertilization with management perspective, design sciences, technological and organizational studies which would support to enhance the performance of the agriculture sector and sustainability of the agriculture sector

The current agribusiness situation is affected by a group of apparatuses, such as the development of the world populace (Food and agriculture organization of the United Nations, 2009), the intensely financial competition (Läpple et al., 2015), the impediment of fossil assets (Preschitschek et al., 2011), the climate changes and their conceivable impacts on food security (Knickel et al., 2009). According to these conditions, food generation is ought to improve in terms of fiber and vitality with more prominent productivity by using innovative and advanced technology. To realize this objective, it is basic that entrepreneurs of the agriculture sector should promote innovation and technology all through their supply chains (Rouca et al., 2013).

The Pakistan Poverty Alleviation Fund (PPAF) is trying hard to introduce open innovation to transform the country's agriculture sector and rural development. PPAF is providing information to the farmers about providing timely and useful farming variables such as inputs, weather, and market information by offering such mechanisms at a significantly lower cost (PPAF, 2013). One of these mechanisms includes crop insurance. This paper also provides information on how risk management relates to improved agricultural productivity through crop insurance, a risk management tool to not only mitigate and reduce the unforeseen losses in the agricultural sector but also provides a platform for agricultural entrepreneurs to adopt certain risk prevention methods and techniques for improved productivity and sustainable growth, eventually contributing towards the development of agriculture sector of Pakistan.

Open Innovation and Insurance

The saying of this decade is that innovation has rapidly evolved from simply trying to apply new strategies and technologies to becoming a bonafide business model (CIO Review). Unfortunately, the bureaucrats still involved in the insurance market don't pay much attention to the benefits of the consumer. Nowadays, with technology more accessible, information related to personal or commercial insurance policies is not easily accessible or shareable. This kind of practice is certainly in transformation. Governments and regulatory bodies around the world are watching carefully how financial data can benefit consumers and companies, to promote economic and social development (MJV Team, 2019). If we consider Pakistan's economy, insurance is not easily accessible to consumers mostly because of the unawareness and communication gap. There is a need to innovate the insurance plans, abridge the communication gaps to provide the insurance services to the whole public at large and the agricultural entrepreneurs in specific. The agricultural entrepreneurs have a common feeling that crop insurance is quite an expensive product and least needed while ignoring all the financial benefit, the policy provides in terms of a catastrophe or unlikely event such as floods, hurricanes, storms, drought, etc. Although. mall agricultural entrepreneurs can't bear the expenses of insurance services. Crop insurance is a better way to develop the agriculture sector of Pakistan. There is a need to provide easy access at a large level and lowest rate as well as awareness about this risk management tool. This is indeed the responsibility of the insurance companies and also of the state government to offer such risk management tools with easy access to develop the agricultural economy at large.

METHODOLOGY AND DATA COLLECTION

The purpose of our study is to determine the impact of risk management and crop insurance on agriculture performance. Figure 1 presented the research model of the study. H1 shows the relationship between risk management and agriculture performance and the H2 shows the indirect relationship between risk management and agriculture performance through innovation factor (crop insurance).

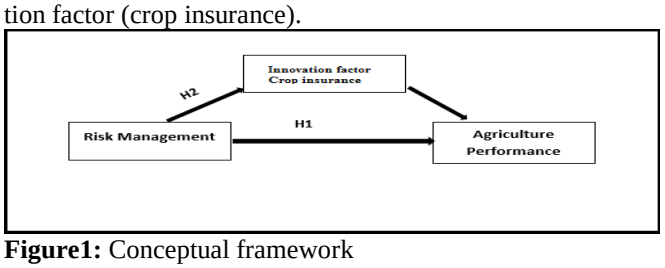

Figure1: Conceptual framework

This quantitative research is being conducted to examine how risk management can support improving the agriculture sector's performance of Pakistan by adopting risk management's strategy i.e. crop insurance. A non-probability sampling method is utilized to collect information. Data has been collected through primary and secondary information. The primary data for the investigation reason has been collected through the adopted

questionnaire which was distributed among N 250 farmers. The questionnaire was distributed among farmers, the owners of farmers, the Agri-institutes, and the farmer's union members. The response rate of the research was 87.5%. The questionnaire used in the research is divided into four sections. The first section includes descriptive statistics, the second, productivity, the third risk management, and the last includes crop insurance. To calculate agricultural productivity 17 item-scale are used which are presented by (Amone, 2013). This section included the items related to features of the farm, the input used for production, and farm productivity. The 12 item-scale is utilized to quantify the risk management presented by (K. bard & J. Barry, 2000). The 12 item-scale are used to quantify the crop insurance presented by (Branstrand & Wester, 2014). At long last, the investigation was completed to demonstrate the relationship of factors. The research has been conducted within Punjab, Pakistan.

RESULTS AND DISCUSSION

Statistical methods are utilized for the valuation of information such as correlation, regression line, and Hayes process of mediation. Model 4 of the Hays Process has been used for better results.

Descriptive Statistics

In Pakistan, only males are interested in the farms' development process. Females are, however, still active in the practice of weeding, plowing, and harvesting. As per information, the owners of farms or managers, men are primarily involved in the production process. The entire research sample is gathered from the males.

This study found that most of the farmers are adults aged 20-40 years, most of them are married. The following table indicates the highest number of smallholder farmers is among the ages of 20-40 (speaking at 49.9%). 39.6% is the number of respondents between 40-60 years of age. The table reveals that there are not many farmers over the age of 60 (10.8%). As most elderly people fall short of the requisite vitality for cultivation, this is conceivable.

A major portion of Pakistan's population lives in rural zones (65%), consequently, the biggest portion of the population is uneducated. The results are based on the primary data that is gathered with a questionnaire, as the 52.8 percent population of farmers who have no education, 22.0 percent, and 18.8 percent respectively are the farmers who got admission in primary and higher. While the percentage of young people in the agricultural sector are interested, 6.4 percent have been trained to grow their farms scientifically. These are the farmers that have been admitted to college. The World Bank, (2008) has shown an affirmative association between farm productivity and farmers' structured planning.

According to the information collected, 60% of farmers own a farm of fewer than 30 acres. As per the table, 57.2 percent of farmers showed that for each month they earn under Rs. 100,000, 35.2 percent of the respondents indicated that each month they receive under Rs. 400,000. In the population of the sample, there are very few farmers who own more than 50 acres (7.2 percent). Since they own a large farm, they receive an enormous amount from the output of the fields. 4.8 percent of individuals earn under Rs.700000 / month as per the table, while 2.8 percent of farmers earn more than Rs.700000 / month.

They hold extremely small ranches, as per the findings of the exploration in Punjab people groups who run the homestead for development purposes. A large proportion of Punjab farmers are smallholders, with 29.2 percent of farmers keeping under 10 acres, which is only helpful for running a household. While 30.8% of other farmers possess fewer than 30 acres. Under 50 acres are owned by farmers who can handle the cost of the preferred way of life over the previous one. Very few farmers (7%) are landlords who own more than 50 acres. Better input to their farms (such as improved seeds, improved fertilizers, pesticides, and advanced technology) can be easily applied by large smallholders. In Punjab, overall 92.8 percent of farmers hold under 50 acres of farm and 57.2 percent of farmers earn under 100,000 / month.

Farmers Access to The Farm

The respondents of this analysis were given the farmland they used and whether or not they claimed the land. As shown in the table, 90.0% of the respondents clarified that they own their farmland in detail. Just 10.0% of the respondents showed that they were leasing the farmland they were using.

Descriptive Statistics

Age	Frequency	%age	Cumulative Percent
2 20-40	124	49.6	49.6
40-60	99	39.6	89.2
60 or above	27	10.8	100.0
Total	250	100.0	
Education of the Farmers:			
No education	132	52.8	52.8
Primary	55	22.0	74.8
Higher	47	18.8	93.6
University	16	6.4	100.0
Total	250	100.0	
Monthly income of Farmers:			
Less than 100k	143	57.2	57.2
100k to 400k	88	35.2	92.4
400k to 700k	12	4.8	97.2
700k to 1000k	7	2.8	100.0
Total	250	100.0	
Farm Size			
< 10 acres	73	29.2	29.2
10 to 30	77	30.8	60.0
30 to 50	82	32.8	92.8
above 50	18	7.2	100.0
Total	250	100.0	
How Farmer gain access to farms?			
Own	22590.0		90.0
Renting	25 10.0		100.0
Total	250100.0		

The relationship of the variables has been measured through the Pearson Correlation. The correlation of three variables for illustration AP, RM, and CI among the agriculturist in Punjab was assessed. AP stands for agriculture performance, RM stands for risk management and CI stands for crop insurance. The purpose of correlation analysis was to assess the relationship between risk management, agriculture performance, and crop insurance. The results from correlation show the significant relationship between risk management and agricultural performance and crop insurance Table 2.

Table 2: Correlation

	CI	**RM**	**AP**
CI	1		
RM	0.58	1	
AP	0.46	0.52	1

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

The above table ought to be self-evident Pearson Correlation of CI and RM is 0.580, which illustrates that CI and RM significantly correlated with each other. The value of Pearson Correlation of CI with AP is 0.460, which establishes that CI and AP significantly correlated. The value of the Pearson Correlation of RM with AP is 0.520, which is critically demonstrates that there's a significant correlation between RM and AP. The correlation of the variables is certain which suggests the variables increases and reduces together in the same way. (AP stands for Agriculture performance, RM stands for Risk management, and CI stands for Crop insurance).

The results of regression analysis show that there a positive impact of risk management and crop insurance on agriculture performance. The results are shown in Tables 3 & 4.

Table 3: Regression analysis

Model	R	R Square	Adjusted Square	RStd. The error of the Estimate
1	.782[a]	.563	.562	.22620

a. Predictors: (Constant), CI, RM
b. Dependent Variable: AP

Table 4: Regression analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	AP	.560	.064		2.071	.000
	RM	.470	.030	.183	2.925	.004
	CI	.220	.020	.067	1.071	.002

a. Dependent Variable: AP

The regression analysis has been applied to measure the impact of variables on one another.

Above table 3 shows that the value of R is .782 shows the strength and closeness of the linear relationships of variables. The value of the R Square is 0.563, which is 56% and expresses the variance between the variables. The adjusted r squares value shows the impact of the independent variable on the dependent variable.

Below table 4 illustrates that the impact of RM on AP is 47.0 %. whereas CI contributes 22.0%. The significant value of the variables is lower than .05 and T is 2.071%, 2.925, and 1.071% for the three components independently which appears that they are immensely critical components. The Independent variable has an affiliation with AP". The risk of standard error falls between 2 to 6 %. (AP stands for Agriculture performance, RM stands for Risk management, and CI stands for Crop insurance).

Hayes process mediation

Hayes process has been used to analyze the mediating role of crop insurance. Results from Hayes Process show the direct positive impact of risk management on agricultural performance and the indirect influence of risk management on agricultural performance and indirect table 5 & 6. Table # 5 shows the direct impact of the independent variable (Risk management) on the dependent variable (agriculture performance) and Table # 6 shows the impact of crop insurance on agriculture performance. The results show that there is a positive impact of risk management and crop insurance on agriculture performance.

Table 5: Hayes Process. Direct effects of X on Y

Model	Effect	Se	T	P	LLCI	ULCI
Constant	2867	.1296	4.9246	.0000	.1283	.2851

Table 6: Hayes Process. The indirect effect of X on Y

Model	Effect	Se	LLCI	ULCI
CI	.4122	.0348	.1951	.3145

Risk management and agriculture performance have positive relationship. **H1 is accepted**

The above table 5 shows X (RM) has a direct influence of 28.67% on Y (AP). The value of the T is 4.9246 which is interesting in connection top-esteem. A p-estimation of beneath 0.05 suggests that the hypothesis is satisfactory and will be accepted. the significant value of the lower measurement is 12.83 and the upper measurement is 28.51. This appears there is a direct effect of RM on AP. Table 7

Risk management and agriculture performance have a positive indirect relationship through crop insurance. **H2 is accepted**

Above table 6 shows X (RM) has a direct impact of 28.67% on Y (AP) and in table 5 indirect influence speaks to 41.22%. The value of the Tis 4.9246 which isn't quite the same as p-esteem. The P-value is less than 0.05 prescribe the hypothesis is satisfactory and will be accepted. the significance value of the Lower measurement is 19.51% and the upper measurement intervals are 31.45%. This illustrates there is a tremendous indirect effect of RM on AP.

AP stands for Agriculture performance, RM stands for Risk management, and CI stands for Crop insurance).

The possibility for an insurance market to arise decreases if Agri-entrepreneurs suffer cognitive impairment in identifying and preparing for low-frequency, high-consequence incidents. The customer may have difficulty evaluating the value of the contract or, more precisely, the likelihood and extent of loss compared to the premium when making an insurance purchasing decision (Kunreuther & Pauly, 2001). The government should have to introduce innovative techniques for measuring the frequency and severity of losses which would also helpful for considering better crop insurance products.

There is evidence of serious low-yield events being overlooked by agricultural producers. The general result is that agricultural producers appear to overestimate the mean yield and underestimate the variance in subjective crop-yield distributions (Buzby et al., 1994; Pease, 1993; Dismukes et al., 1989). On the other hand, for low-frequency, high-consequence events, insurers usually load insurance rates heavily when there is significant uncertainty surrounding the actual probability of the occurrence (Schade et al., 2002; Kunreuther et al., 1995; Rabbinge,1995). When considering highly skewed probability distributions with long tails, uncertainty is particularly severe, as is typical of crop yields. The government may co-finance the purchase of insurance through direct premium subsidies, or may reimburse the administrative or product creation costs of primary insurers, or may provide reinsurance at rates below the market premium. Whatever the form, government incentives are usually intended to increase the purchasing of insurance by reducing the premiums paid to purchasers of agricultural insurance.

This study indicated that risk management could boost agricultural performance. This research could be useful for farmers to acquire thorough information to understand the value of risk management in agriculture. While farming, risk management techniques to boost farming output can be considered by understanding that a budgetary situation for further production will

be given in the event of a loss and low productivity. This study is also useful for insurance companies who can use this manuscript to recognize the need for crop insurance in Pakistan's agricultural sector. They should create new innovative crop insurance products and services to make it easier for farmers to face financial tragedies. While innovation insurance companies should also consider the interests of small-scale farming and large-scale farming. Innovation in the insurance policies may helpful for Agri-entrepreneurs to improve farming production on small and large-scale.

Implications

This research adds up to the literature on agriculture performance and risk management. It also brings knowledge to the insurance practitioners, insurance companies' government institutions, and the farmers that risk management tools can be used to minimize the risk. The results may be considered for other agricultural economies. This research is additionally supportive of the revolution of agriculture performance.

This paper is important for agriculturists, they can get enough knowledge about the strategies of risk management and implementation of the strategies to improve the performance of the agriculture sector. The government of Pakistan may take this study to know about the importance of risk management and crop insurance and introduce subsidized crop insurance schemes to encourage agriculturists.

Limitations and Future Instructions

As per the research, there were few restrictions on the study. Sample measures the test estimate of populace 250 since there are financial and time imperatives to reach the whole populace related to the agriculture of Pakistan. The research doesn't incorporate large-scale agriculturists due to geographical restrictions of the research. It was only concentrated in Punjab, Pakistan due to time and financial restrictions.

The research paper emphasized a few areas as the limited scope of the research, insufficient data, and literature. While the research endeavored to address a few of them in this paper. For further research, estimation of risk management, crop insurance, and performance, there's a need for strong and more information to measure agriculture performance in Pakistan.

Though recognizing the restrictions of this investigation, especially the methodologies of the research, this paper highlights the areas in which research may be valuable: - Agricultural sector is the backbone of Pakistan's Economy This study direct the analysts to research on agriculture performance of large-scale farmers considering the whole Pakistan. It has been considered from this research that the Government can affect the development of the agriculture sector. In the future, there may be a significant relationship between government role and agriculture performance and the relationship between financial development and agriculture performance may also be significant.

CONCLUSION

This examination has come approximately to the basic result: Farmers face low performance from the events that happen, such as production, market, financial, technological, political, other natural, and burglary risk which causing a decline in the agriculture sector. The event creates a low budgetary situation for further production, to defeat the low-performance issue agriculturists got to get risk management courses of action, the foremost fundamental is crop insurance. Crop insurance is the finest strategy of risk management which can be useful to overcome the low budgetary situation. Reimbursement of loss may provide enough capital for further products to the farmers. Crop insurance discourages restrict production due to financial losses and leads towards the improvement of the agriculture sector. The research is rather distinctive from the other studies as discussed in the research gap. In this research, we found that risk management has a positive relationship agriculture performance through crop insurance considering the Agri-entrepreneurs and innovation in the agriculture sector of Punjab, Pakistan. So, through the research, it has proved that risk management may help to develop the agriculture sector with the mediating effect of crop insurance. The research concluded that risk management may contribute to improving the agriculture sector's performance through crop insurance.

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