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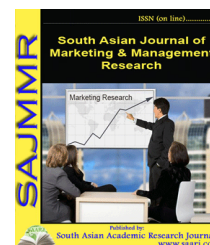
INVESTIGATING THE COOPERATION BETWEEN UNIVERSITY AND INDUSTRY: WITH A FOCUS ON UNIVERSITY SPIN OFFS

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ABSTRACT

The main purpose of this research is to describe the process of the technological cooperation between academic spin-offs and the industry sector. This is a fundamental research in terms of the purpose and a kind of interpretive research. Due to the development policy of academia in the country, one of the challenges of this policy success is due to the inherent risks and specific features of the management, commercialization and resource requirements. Despite the considerable effectiveness of these companies, statistics show that most of these companies either disappear over time or stay small and few survive and grow larger. Research has shown that the main reason SMEs fail in their early years is the lack of sufficient management and capital experience. Therefore, managers of different types of companies need to be more and more familiar with the success factors of organizations in order to manage their organization more consciously in order to achieve the intended goals. In the modern age we are witnessing significant changes in the economic situation of countries. The main reason for this is the rapid change in technology that has changed the traditional economy. In this era, economies that will be able to develop a creative and innovative atmosphere in their society with science and knowledge will be more successful. Therefore, in the present study, we discuss the University Spin Offs and their relation to industry and other related issues.

KEYWORDS: *Effective Factors in Technological Cooperation, Academic Spin-Offs and Industries, Environmental and Institutional Factors, Success of Technological Cooperation*

INTRODUCTION

In recent years, partnerships between businesses with a specific framework for technology development have been growing rapidly and have always been supported by governments. Research centers, including universities, play an important role in this regard. Although some of these researches are applied and have many implications for the process of daily social and

economic life, some of these projects have failed economically. They end without profitability, and only a few of them have succeeded and can continue to operate as private sector-based knowledge corporations and as part of academic knowledge activities, known as university generating companies [1]. Creating a university company is important, growth and development of these companies requires a lot of effort, study, creativity and risk, which, if combined with economic understanding and a good understanding of market positions, will also be a great place to start. To this end, this article reviews the literature on research in university and industry collaboration, academic partnerships, technological collaborations, and the views expressed in this field [2].

University Spin Offs

Spin offs are corporations that evolve through universities through the commercialization of intellectual property and the transfer of advanced technologieswithin academic institutions [3]. Despite their importance as a source of wealth generation and job opportunities in economics, the number of studies that explicitly emphasize these academic activities is relatively small. In Europe and in the United States, the nature of universities has changed dramatically since the mid-1990s. The role of the university is gradually shifting "from a knowledge environment to a knowledge producer and exploiter for local economic development." For this reason, more attention has been given to the creation of new companies around the world, including the use of technology and knowledge produced by universities [4-8]. Governments are raising capital in universities, with the goal of transforming them into economic growth drivers through the formation of university-based companies.
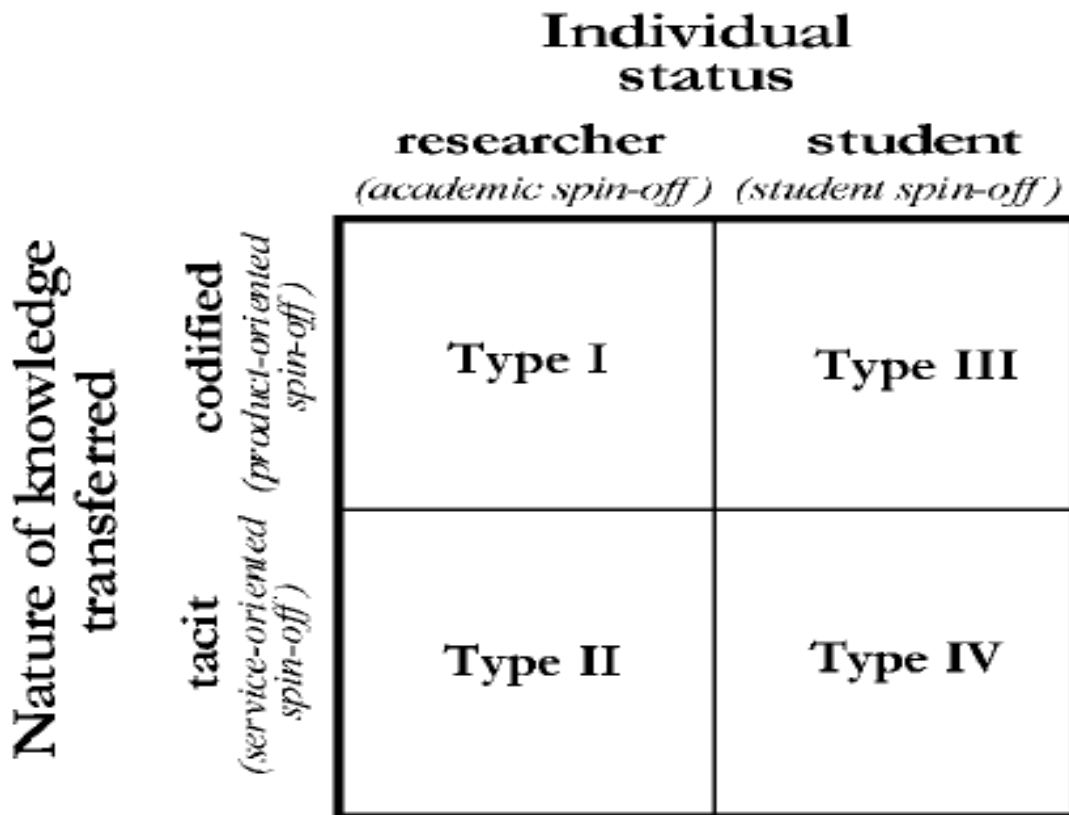

Figure 1. A typology of university spin-offs

However, the academic work of academic researchers is not a completely new phenomenon. But the social and economic importance of entrepreneurship development from the science sector has increased dramatically since the early 1980s. In Europe, the phenomenon of birth companies in universities is still in its infancy. Although the first university-born companies appeared in most European universities in the mid-1970s, governments were indifferent and even opposed to their development [9-12]. Thus, only European universities have realized the strategic role of public research organizations, including universities, in economic development [13]. Recently, the emergence of entrepreneurial universities has increased research and interest in this phenomenon has led to the emergence of a new field in entrepreneurial research, namely academic entrepreneurship. The existing literature can be divided into three areas depending on the level of analysis: macro level, industry level and micro level. Macro level studies: Focused on different levels of technology for separating and analyzing the role of government and industry in its rotation process. At this level of analysis, researchers look at academia at the following levels: support policies and mechanisms, emphasis on the regional economy, as well as favorable industry and market environment conditions [14-18].

Industry-level studies: Focused on campus and technology transfer office. In these studies, we have tried to use support mechanisms. Scientific institutions identify the university as a mechanism for transferring technology, as well as discovering the effectiveness of academia as a technology transfer mechanism.

Micro-level studies (micro): This level focuses on companies and individual employers, academia networks, as well as human relationships and interactions during the process of academia formation and their founders [19-22].

Entrepreneurial Universities and University Spin Offs

In the process of academia, Entrepreneurial University plays an important role in transforming knowledge production into knowledge utilization to improve regional and national economic performance. In response to public policy changes, universities around the world have tangible supportive mechanisms [23]. (Such as technology transfer offices, incubators, science parks) and have developed software programs to support university entrepreneurship activities. In spite of these efforts to enhance the activities of university affiliates, researchers have played the role of university organizational designers. Controlling or enhancing the activities of academic affiliates Put. The focus of the research is on the determinants of university parenting activities, organizational culture, and the extent to which university-specific norms, rules, conventions, and values contribute to entrepreneurship. Research shows that universities that support business activities with cultural norms achieve higher levels of commercialization and higher rates than the activities of academic affiliates. Research shows that despite therelative lack of formal mechanisms to support academia, the university is entrepreneurial in nature, and universities are committed to creating a culture of entrepreneurship support. Culture is an unrealistic feature of organizations that cannot be measured, but it does affect the patterns of behavior of individuals in an organization [24-27]. Organizational culture can be defined in terms of different levels or layers, which are different in their formal form. Within a culture, the university plays an important role in promoting the formation of academic ventures, formal or visible elements of corporate culture, including mission and goals, policies and rules, and the reward system.

Researchers' studies prove that modeling in organizations that do not consider positive entrepreneurship seems unlikely [28]. Among the official expressions of university culture,

mission statement is one of the goals that explicitly includes commercializing research through the formation of new companies. In this regard [29-33], he argues that the purpose of establishing MIT and institutional support for entrepreneurial activities have played an important role in the development of academic entrepreneurship at MIT. Successful features of a national research laboratory in the activities of academic companies lead to changing corporate goals and supporting the formation of new companies. A support system that provides financial, business planning, consulting and training for public and private support groups. It helps researchers looking for academic startups to identify and evaluate business prospects. Entrepreneurship research shows that people with previous businesses and industry experience have had a greater role in shaping new companies. Being with university entrepreneurship researchers can accelerate the creation of new academic ventures. Universities can influence the participation of academics in collaborating with industry and gaining a credible experience through policies and regulations regarding the cost of time and the control of extra work. These rules also reflect how the organization relates to industry and trust in individual research [34]. For example, in Sweden, where communication between universities and industry is well developed, university researchers have a negative view of the university environment [35-38].

These authors attribute this fact to the Swedish top-down strategy of universities and their tendency to institutionalize entrepreneurship. They warn that, despite significant successes in the activities of university parent companies, over time these policies may have an adverse effect and reduce the activities of these companies. Another side activity in universities can express entrepreneurial value through a reward system that reflects the organization's position in the commercialization of research and, above all, determine the researcher's role and the value of research work [39]. Although some studies have shown that monetary reward has a positive effect on entrepreneurial activities of academic researchers [18], there is considerable evidence to the contrary that the researchers' motivation for activities is Entrepreneurship becomes negative [40-41]. This can be attributed to the fundamental difference between academic and scientific culture and the ambiguous relationship of researchers to money and the unparalleled nature of scientific research in the industry [42-43]. It is licensed and thereby reduces the activities of academic companies [44]. It should be noted that the effectiveness of all of these policies should be addressed in relation to

"other elements of corporate culture and, above all, to the informal strategy thatentrepreneurs carry out with their peer groups." [45]. According to a survey by University of Turin academic corporations, they reported that academic entrepreneurs felt fearful of their colleagues' hostile reactions and that they committed a crime when planning their business. Faculty members are more exposed to entrepreneurship, while the relevance of the academic colleges in which they work to different sectors of industry and business is one of the most important priorities [46]. By examining the impact of entrepreneurial activity at MIT, Atzkowitz found models that emphasize the creation of a company based on research by faculty members. To this end, successful academic entrepreneurs can become a business supporter and invest in science and technology. Provide a theoretical framework for helping young colleagues [47]. Universities that do not have a business supportive culture may take actions that are not in line with business policies. It is suggested that, in order to enhance the entrepreneurial environment in educational institutions, the following will be considered: (1) Technology transfer reward system (2) how to manage technology in technology transfer offices; (3) university policies to facilitate technology transfer; (4) increasing the level of resources devoted to technology and university technology transfer;

(5) trying to eliminate cultural and information barriers that hinder The technology transfer process follows [48].

The Importance of Generation Companies. In recent decades, there has been a growing awareness of the importance of birth companies as a source of new ideas and inventions. Innovative policies [49] in the United States and European countries to develop commercial exploitation of inventions have been the result of their research and funding [50-51]. This commercialization of academic knowledge can be accomplished in a number of ways. One of these is academic entrepreneurship, which involves the creation of a university, and have been created and defined as new companies established to exploit intellectual property in academic institutions. In order to accelerate technological advances, many institutes around the world have established technology transfer offices that facilitate the process of transferring research from universities to commercial markets. Academic partnerships have the ability to play a role in at least five of the following ways [52].

1- Academic Parenting encourages economic development (they create significant economic value, and create jobs, increase investment in technology in universities, and promote local economic development).

2-Academic Producers are enhancing the commercialization of university technologies (they are a commercial vehicle for uncertain technologies and are used to encourage the participation of inventors).

3- Academic partnerships assist universities in accomplishing their mission (additional research, recruitment and retention of students, and assistance in student education).

**4-** The University Generating Company are high performing companies.

5-Creating an academic venture company is more profitable than licensing established companies.

In short, the existence of such companies highlights the foundations and importance of universities. In this regard, the following section pays particular attention to academic definitions and other similar terms and is the result of the accepted definition for this study.

Industry demand and the formation of University Spin Offs

The creation of new academic companies depends on many factors. Part of the research focuses on technologies and market factors that are useful for creating academic ventures. According to [53], alternative ways of exploiting scientific research, such as index companies, licensing, collaboration, or consulting, depend on the nature of the technology, intellectual property protection, and the need for additional assets to assist in the commercialization process. Shane suggested that the propensity to invent through company creation varies with technological features (eg technical age of the domain, market orientation toward segmentation, patent effectiveness, and the importance of complementary assets). Company Formation When the technical fields are younger, the market tends to be segmented into a business area where invention is more effective. "The nature of technology, on the basis of more important inventions, is that of a broad range of patent protection through the creation of new enterprises" [54].
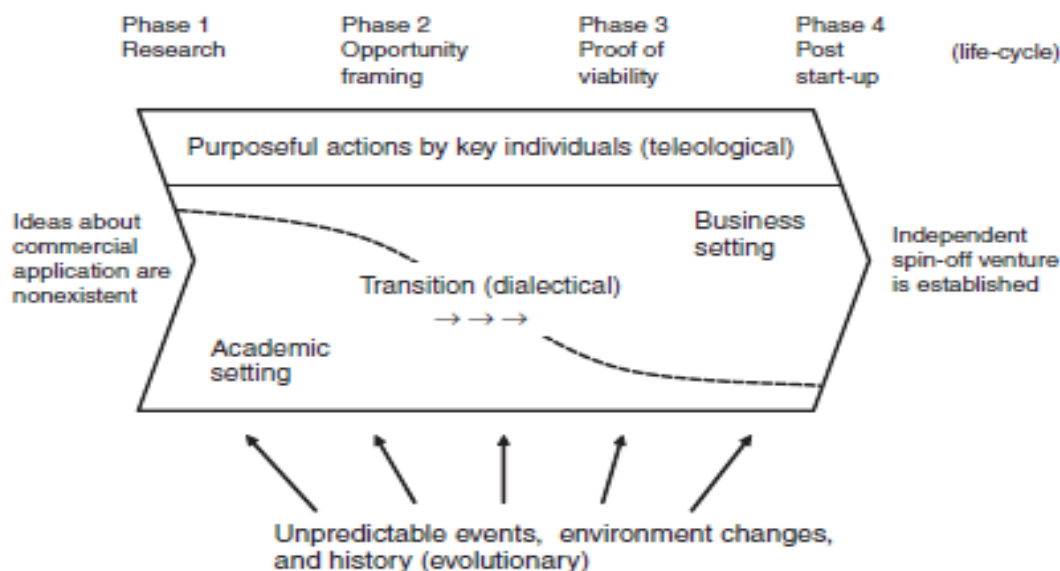
Figure 2. Conceptual Framework of the University Spin-off Venturing Process

Based on the above arguments, it seems that academic companies are more likely to emerge in emerging industries where technical developments are still evolving. Academic partnerships are formed when complementary assets are available to the university or inventor and the technology used is legally and technically supported.

University Spin Offs as a technology transfer mechanism

Creating a new company to commercialize research results is one way of transferring technology that, along with licensing, creates the highest commercial value [55]. The scope of research favorable for universities to develop new entrepreneurial technologies is limited to those where universities are positioning themselves in new firms, thus focusing on licensing instead of investing. Traditionally, universities have been reluctant to take advantage of the opportunities for maximum participation by academic companies [51-52].

Despite recognizing the investment to create new ventures, the university's motivation for licensing as a technology transfer strategy is limited [45]. They presented a dynamic model; they showed that business models can be changed from licensing to forming a new company. Recent research has argued that more universities are in the process of qualifying to grant intellectual property rights [48]. For example, Feldman et al. Found that in 2000, 70% of the universities surveyed (active technology research and transfer) participated in equity trading. In addition, in terms of long-term business returns, technology transfer interoperability is much more effective than licensing and generates ten times more revenue. Other than the financial return, there are other benefits to investing equity in a new venture. Firstly, patent and license technology may be easy. Thus forming a new company is a way to market this technology faster [24]. Secondly, the right choice in a flagship company may "reduce the ownership dispute between the university and industry". Third, the equity stake in the university increases the credibility of the technology and legitimizes the new academic venture. Such legitimacy increases the likelihood of additional taxes, access to key distribution channels, suppliers and customers, and ultimately, these activities show the outside world that the university is an entrepreneur.

DISCUSSION

According to [14], academia companies are sold 108 times more publicly than new companies and also create more jobs than new businesses in the United States. In addition, the survival rate of Spanish companies in universities is very high. [23] Found that only 16% of research-based companies failed during the six year period. Likewise in Sweden, only 13% of academic companies from the Chalmers Institute of Technology in Sweden, which were created between 1960 and 1993, failed by 1993.While the survival rates of Spanish academic firms are much lower than those of other hidden companies, compared to other entrepreneurial firms, given the cash flow and revenue growth performance. It seems that all empirical evidence is based on the fact that academic firms are small, small growth companies with long life span characteristics [10-14].

In recent years, a new stream of research has emerged that has focused on the role of networks before and after the formation of new academic companies. Networks can facilitate the emergence of new firms by offering four notable benefits, such as enhancing the opportunity recognition process, accessing human resources, creating timing benefits, and building a trusted resource [55]. Researchers found that proximity to parent institutions after the formation of a university parent company had a positive impact on corporate reproductive performance, and networked relationships between academic parents and parent organizations based on a limited number of strong relationships with universities and degrees. There is a high level of trust. Authors provide empirical evidence on the relationship of network performance that analyzes the impact of venture capital investors on the probability of three critical outcomes of an academic venture company: attracting venture capital funds; public offering early; and failure. Networks have acknowledged the importance of university-level generating companies; they have found that more successful universities usually have strong working relationships with investors and investment sectors and have better industrial networks.

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RISK MANAGEMENT IN HORTICULTURE: A STUDY IN RAYALASEEMA REGION

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ABSTRACT

The climatic conditions of the region can be divided into four seasons. The period from December to February is dry and comparatively cool season. **Horticulture**, *the branch of plant Agriculture with garden crops, generally fruits, vegetables, and ornamental plants. The word is derived from the Latin hortus, "garden," and colere, "to cultivate." The actual area brought under horticulture in the Rayalaseema Region for the year 2017-18 was 1748380 Ha, accounted for production 30173958 million tones. The red soils in the Rayalaseema region together with soft racy soils are found to be highly suitable for all types of horticultural crops. The red soils promote high productivity of horticulture crops. Each day, farmers confront different types of risk but changes in the risk environment and available tools available to manage the risk make it a compelling reason to engage in risk management education. Many a farmers electrocuted and lost their lives by way of coming into contact with the live-wires of the fence so arranged around the gardens. In addition, snake bites have also resulted in the loss of life of horticulturists. In addition, power supply was more erratic and irregular, often low voltage did not facilitate the horticulrists to provide water to the horticultural fruit bearing plants.*

KEYWORDS: *Engage, Irregular, Horticultural, Unfortunately*

INTRODUCTION

Horticulture, the branch of plant Agriculture with garden crops, generally fruits, vegetables, and ornamental plants. The word is derived from the Latin *hortus*, "garden," and *colere*, "to cultivate." As a general term, it covers all forms of garden management, but in ordinary use it refers to intensive commercial production. In terms of scale, horticulture falls between domestic gardening and field Agriculture, though all forms of cultivation naturally have close links.

India has several advantages in the sector. The country's total horticulture production is estimated to rise marginally to 314.87 million tonne in the 2018-19 crop year. Under the horticulture crops, production of fruits is estimated to be around 97.38 million tonnes in 2018-19 compared to 97.36 million tonnes in the previous year. Vegetables production is estimated to rise 1.6 per cent at around 187.36 million tonnes. Among vegetables, onion Production is estimated to be around 23.28 million tonnes, slightly higher than production in 2017-18. Potato production is estimated to be around 52.96 million tonnes, which is 3.2 per cent higher than 2017-18. Tomato production is estimated to be around 19.66 million tonnes, which is 0.5 per cent lower than 2017-18. As per the data, spices Production is estimated to be around 8.61 million tonnes, which is 6.01 per cent higher than 2017-18.

There is on acute need to diversify agriculture sector as the sector is overburden with to many people resulting in low or sometimes negative marginal productivity. Horticulture emerged as one of the diversifying activities of agriculture.

In the case of backward and drought prone Rayalaseema Region of the Andhra Pradesh, horticulture emerged as the most promising sector covering 18 per cent to the gross cropped area, providing employment to more than five lakh people in the

Rayalaseema Region. The actual area brought under horticulture in the Rayalaseema Region for the year 2017-18 was 1748380 Ha, accounted for production 30173958 million tones. The description of various types of agro-climatic factors like climate, rainfall, soil type, irrigation and cropping pattern is important to understand the nature of agriculture development of the area. Therefore, appraising the agro-econo-climatic factors and infrastructure facilities are quite essential to determine the capital investment for fill up of the Rayalaseema economy. An attempt is made in this chapter to trace out the agronomic resources in Rayalaseema Region. The climate of the region is normally dry sub-humid type. Rayalaseema forms a part of the semiarid region of the interior deccan.

The climatic conditions of the region can be divided into four seasons. The period from December to February is dry and comparatively cool season. Summer spreads from March to May followed by south-west monsoon from June to September, October and November contribute the post-monsoon or retreating monsoon season. The climate of the region is normally dry sub-humid type. Rayalaseema forms a part of the semiarid region of the interior deccan. The climatic conditions of the region can be divided into four seasons. The period from December to February is dry and comparatively cool season. Summer spreads from March to May followed by south-west monsoon from June to September, October and November contribute the post-monsoon or retreating monsoon season.

Suitability of soil types for horticulture crops

The red soil is highly suitable far raising horticulture crops as the red soil's water reduction capacity is low compared to the black soils: high reduction of water by the soils is not good for the horticulture crops because it adversely affects the growth and development of horticulture crops. The red soils in the Rayalaseema region together with soft racy soils are found to be highly suitable for all types of horticultural crops. The red soils promote high productivity of horticulture crops. However, a few horticulture crops like banana, chilli and pomegranate are found to be good in yielding in the black soils. The temperate climate is also suitable to raise all varieties of horticulture crops except apples and spicy horticulture like cardamom pepper areca nut etc.

Horticulture is a wide field and includes a great variety and diversity of crops. The science of horticulture can be divided into several branches depending upon the crops it deals with. The following are the branches.

1. *Pomology*: refers to cultivation of fruit crops.

2. *Olericulture*: refers to cultivation of vegetables.

3. *Floriculture*: refers to cultivation of flower crops.

4. *Plantation Crops*: refers to cultivation of crops like coconut, arecanut, rubber, coffee etc.

5. *Spices Crops*: refers to cultivation of crops like, cardamom, pepper, nutmeg etc.

6. *Pomology*: refers to cultivation of fruit crops.

7. *Olericulture*: refers to cultivation of vegetables.

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9. *Plantation Crops*: refers to cultivation of crops like coconut, arecanut, rubber, coffee etc.

10. *Spices Crops*: refers to cultivation of crops like, cardamom, pepper, nutmeg etc.

11. *Medicinal and Aromatic Crops*: deals with cultivation of medicinal and aromatic crops.

In spite of the fact that, the horticulture sector's fast development, the sector is beset with many risks. Here an attempt is made to focus on risk involvement in horticultural sector of the Rayalaseema Region. For this purposes, field survey was conducted in the four mandals where horticulture is being intensively practiced by the farmers; 600 horticulturists' have been consulted for assessing various types of risks faced by them. And also reported as how risks were managed by the horticulturists' in the Rayalaseema Region.

Risk Management in Horticulture:

Risk is defined as the product of hazard and vulnerability. In other words, it relates to the probability of damaging event. Risk is an integral part of horticulture. Each day, farmers confront different types of risk but changes in the risk environment and available tools available to manage the risk make it a compelling reason to engage in risk management education. The five primary sources of risk in horticulture are as follows:

1. Financial Risk:

The method in which capital is acquired and financed and the firm's ability to pay financial obligations. Over 40 per cent of the sampled horticulturists' who were illiterates, did not venture to a approach banks for financial assistance to support their horticultural activities. As such, over 71.67 per cent of the sampled households could raise the required financial resources from the local money-lenders, paying high rates of interest.

Horticulturists' who availed themselves of institutional loans accounted for 22.50 per cent of the sampled horticulturists' and those horticulturists' who availed themselves of both the sources-institutional and non-institutional put together accounted for six per cent of the sampled horticulturists' vide Table: 1

TABLE – 1 FINANCIAL-RISK FACED BY THE SAMPLED HOUSEHOLDS IN RAYALASEEMA REGION

S. No		No. of House hold	Percent
1	**Source of Loans Taken by the Sample Households**		
A	Institutional	135	22.50
B	Non- Institutional	430	71.67
C	Both Sources	35	5.83
Total		**600**	**100.00**

Source: Field Survey

(II). Production Risk:

Includes weather, insects, disease, technology and any other events that directly affect production quantity and quality. According to Table.2 severity of diseases affected the prospects of 55 per cent sampled households; winds affected over 28 per cent of the households; severity of rains incurred losses to more than four per cent of the households and an equal percentage of households suffered from severity of pests, which destroyed standing crops.

The another cause of concern of horticulturists' seemed to be high cost of labour and high cost of fertilizers. The horticulturists' had purchased fertilizers without any subsidy.

TABLE – 2 RISKS FACED BY SAMPLED HOUSEHOLDS IN RAYALASEEMA REGION

S.No		No. of Sampled Households	Percent
1	**Problems in Agro-Biological Factors of Production**		
	Severity of disease	333	55.5
	Severity of pests	37	6.17
	Severity of winds	170	28.33
	Soil condition	35	5.83
	Severity rains	25	4.17
Total		**600**	**100.00**
2	**Economic and Institutional Factors of Production Problems**		
	High cost of labour	148	24.67
	High cost of fertilizers	60	10.00
	Inadequacy of credit	20	3.33
	Unfavorable Marketing condition	294	49.00

	Inadequate Marketing by facility	78	13.00
Total		**600**	**100.00**
3	**Problems faced in Marketing of Fruits**		
	Fluctuating price	222	37
	Too many middle men	105	17.50
	Financial inadequacy	30	5.00
	Transport bottle necks	103	17.17
	Lack of Market Knowledge	140	23.33
Total		**600**	**100.00**

Source: Field Survey

(III). Price Risk:

Uncertainty in the market for a commodity, such as changes in the prices of inputs and or outputs. It is rather pathetic to note that nearly 50 per cent of the horticulturists' reported unfavorable marketing conditions. No safeguards against their losses-no government assistances and no help from anywhere. Added to this, inadequate marketing facilities compounded the troubles of horticulturists'; there are no cold storage facilities to preserve the fruit crops and sell them when the prices ruling high.

Problems relating to marketing fruit crops felt by one and all. Over 23 per cent of them rather innocently accepted that they did not have any knowledge about marketing situation; 37 per cent of them complained unfavorable pricing situations faced in marketing their produce; 18 per cent of them have complained that there were too many middlemen; 17 per cent of them complained to have faced severe transport bottle-necks while five per cent of them complained to have suffered from inadequacy of the financial resources to cope with the situation, vide Table: 2

As usual here also horticulturists' were subject to exploitation by the middlemen while marketing their fruit crops; with great difficulty over 25 per cent of them could sell fruit crops directly; while over 62 per cent of them could sell their fruit crops through commission agents who exploited the horticulrists'; seven percent horticulrists' who have no knowledge of the markets, sold their fruit crops to their village traders. It is interesting to note that only five per cent of them sampled horticulrists' sold their fruit crops to the wholesalers and the share of retailers was just three per cent.

The terms of trade were quite often not in favour of horticulturists'. Nearly 50 per cent of the horticulturists' sold their fruit crops for part payment and over 28 per cent of them sold their fruit crops to the commission agents for no payment at all and they were and promised payment after the sale of fruit crops in distant markets while 11 per cent of the sampled horticulturists' sold their entire total fruit crops against the earlier advances taken from the commission agents and around 10 per cent of them could sell their total fruit crops in the open market at the existing prices in the markets. Sometimes, the horticulturists' had to sell their fruit crops at 50 per cent cash terms and remaining 50 per cent on terms of deferred payment, vide Table:3

TABLE: 3 PRICE-RISK FACED BY THE HORTICULTURE CROPS IN THE RAYALASEEMA REGION

S.No	Mode of marketing	No. of Sample Households	Percent
1	**Marketed through**		
	Direct sale	150	25.00

	Commission agent	372	62.00
	Village traders	30	5.00
	Wholesalers	28	4.67
	Retailer	20	3.33
Total		**600**	**100.00**
2	**Terms of Trade**		
	Sold against the earlier advances taken	67	11.17
	Sold in the open market	63	10.50
	Sold for part payments	300	50.00
	Sold without making any payment to commissions agents	170	28.33
Total		**600**	**100.00**
3	**Mode of sales proceeds**		
	Getting 100% payment	80	13.33
	Getting 50% payment	300	50.00
	50% cash plus 50% loan	220	36.67
Total		**600**	**100.00**

Source: Field Survey

(IV).Personal Risks:

Risk common to all businesses such as death, divorce, or injury to the proprietor. Under this, the horticulturists' had to run a lot of risks in managing horticultural crops on the fields. In order to protect horticultural fruits crops electric fencing was arranged by the horticulrists', largely, to safeguard from wild beats such as bears and wildpigs which cause of lot of damage to standing horticultural crops. Sometimes the owners' family members fall prey to this and lost lives in the incidents of this sort that have been reported in the district. Many a farmers electrocuted and lost their lives by way of coming into contact with the live-wires of the fence so arranged around the gardens.   In addition, snake bites have also resulted in the loss of life of horticulturists.

The liability position of the horticulturists' is depicted in Table: 4 According to the Table, 41 per cent of the sampled horticulturists' had liability up to Rs.50,000 each; nearly 16 per cent of them had outstanding loans in the range of Rs.50,000 to Rs.1,00,000; 14 per cent of them had debt position raising between Rs.1,00,000 to Rs.1,50,000; nearly 17 per cent of them had loans each, in the range of Rs.1,50,000 to Rs.2,00,000; and 11 per cent of the sampled horticulturists' whose liability position was Rs.2,00,000 and above each, vide Table:4.

TABLE – 4 OUTSTANDING LOANS BY THE SAMPLED HORTICULTURISTS IN THE RAYALASEEMA REGION

S.No		No. of House hold	Percent
1	**Out Stand Loan Amount**		
	Up to Rs.50,000	248	41.33
	Rs.50,000-1,00,000	98	16.33
	Rs.1,00,000-1,50,000	82	13.67
	Rs.1,50,000-2,00,000	104	17.33
	2,00,000 above	68	11.34
Total		**600**	**100.00**

Source: Field Survey

(V).Institutional Risks:

Changes in governmental and / or legal policies and standards that affect agriculture. The government have announced substantial subsidy component in respect of fertilizers and pesticides to the horticulturists'. But, unfortunately, these subsidies more often could not be provided in time to horticulrists'. It was reported that the subsidized pesticides and fertilizers were provided to farmers with a log of 2-3 months. This has troubled the farmers a lot who ran to raise private loans at usurious interest rates to procure pesticides and fertilizers. Had the subsidy components in respect of pesticides and fertilizers provided in time by the agencies concerned a lot of farmers suffering could have been avoided. In addition, power supply was more erratic and irregular, often low voltage did not facilitate the horticulrists to provide water to the horticultural fruit bearing plants.

Risk Management Strategies:

Some of the major sources of production risks – weather, pests, diseases and paucity of required inputs – were somehow managed, based on the field experienced, by the horticulturists themselves. Their acquired knowledge and experience enabled them to effectively manage production related risks; with regard to price risk; horticulturists as no other go willingly accepted to be exploited by the marketing conditions without losing their hearts and thus withstood the vagaries of the market conditions by consoling themselves to have earned many fold returns over the traditional food crops cultivation.

Since, majority of the farmers have a traditional mindset that did not alone them to go in for banks loans; nearly 80 per cent of them opted to raise private loans at 24-30 per cent rate of interests. They reported to have, developed apprehension about bank transactions. As such, most of horticulturists manage their finances by way of raising private loans; the institutional risks, here, refer to mainly power supply to provide water to horticultural crops. Of late, the state government have announced 100 per cent subsidy for drip irrigation. A majority of the horticulturists have adopted drip irrigation systems and thus have largely solved the problem of erratic power supply and also personal risks a great extent.

In order to reduce the production risks some risk management strategies recommended as under:

(i) Crop Insurance

(ii) Contract Production

The horticulturists in the district have not followed both the stated strategies to overcome production risks.

CONCLUDING REMARKS

The policy implications from the above discussion calls for an emphasis on larger crisis. Risk management in horticulture should address yield, price and credit and weather related uncertainties among others; cold storage and preservation centers are the need of the hour since it enables horticulturists to preserve the freshness of fruits during the post-harvest periods; as of now they are forced to sell them at distress prices which often demoralizes them to commit suicides. The price risks and financial risks are to be viewed seriously by the government and immediate response is to be provided by way of providing cold storage facilities to preserve horticultural crops after harvest so as to sell them when market is favorable besides enthusing and encouraging the bankers to forge horticultural friendly relation, by way of providing access

to easy loans and thus promote horticulture which as a vast potential for the development of the backward Rayalaseema Region.

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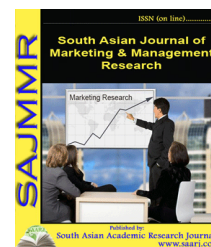
STRATEGIC MANAGING THE DEVELOPMENT OF LIVESTOCK PRODUCTION IN THE REGION

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ABSTRACT

The purpose of the article: to develop economic and mathematical models of the promising development of livestock production, allowing to identify reserves for the growth of meat and dairy products. In this paper, a methodological approach to forecasting is proposed and implemented based on a mathematical model of the promising development of livestock farming on farms. These models take into account the conditions for the implementation of the principle of phased breed conversion of the herd by methods of breeding and purchase of pedigree cattle in order to increase the production and consumption of livestock products per capita. Based on the method of correlation and regression analysis, a mathematical model for predicting milk yield per one feed head and an annual increase in live weight per 1 structural head are constructed. Mathematical models of forecasting and analytical problems are proposed that allow, based on the endogenous parameters of models at the farm level, to integrate to study and predict livestock production at the regional level. According to the results of the study, relevant forward-looking recommendations and suggestions for decision makers have been prepared.

KEYWORDS: *Strategy Retrospective The Region Aspect Cattle, Stud, Prediction, Experiment.*

INTRODUCTION

The development of the economic aspects of the agricultural sector to market relations presupposes the possibility of the existence of various forms of thrift and ownership of the means of production. In these circumstances, the development of effective management decisions is impossible without the use of the appropriate mathematical tools to produce a systematic

analysis and shaping the future development of agriculture as the primary economic units and the whole region. In the economic environment significantly increases the socio–economic importance of the justification of the strategy of agriculture development with the goal of solving the problem of providing the population's needs in food products and non-food products produced from agricultural raw materials.

The study of the market for food products showed that in solving the food problem an important role belongs to the livestock industry. Therefore, in the future, it should be envisaged to increase livestock production both on the basis of deepening specialization, concentration and intensification of production, and through drastic measures to breed the herd and increase the productive qualities of livestock.

Effective implementation of these procedures involve use of the Toolkit, taking into account the qualitative characteristics of individual breeds of cattle, the principles of market relations and new forms of management. One of the rational tools to solve these problems are methods of mathematical modeling. They allow you to carry out multiple calculations on a computer model that makes it possible to identify certain reserves to increase production of meat, dairy and other livestock products.

The solution of such problems is particularly relevant in our country where the actual consumption of livestock products does not meet the requirement for biological standards and lags behind the international level.

The purpose of this topic is to develop economic and mathematical models of prospective development of animal husbandry, which allows to reveal reserves of growth of production of livestock products.

Currently in the Republic providing the population with livestock products is experiencing abnormal condition. In this regard, it is to find the resources and reserves to increase production of meat and milk through the use of scientifically based systems of animal husbandry.

Future development of livestock production leads to a complex predictive and analytical, balance and optimization of the calculations that make up organizational and economic basis of implementation of systems of animal breeding aimed at increasing livestock productivity. This should ensure: a deepening of intraregional specialization and on-farm livestock production; improving the efficiency of livestock through the introduction of reproductive techniques and, concurrently, absorption crossing; rationale the effectiveness of organizational-economic decisions, etc.

The basis for the organization and management system of livestock – various areas of livestock reproduction, taking into account different methods of breeding livestock and range expansion of the species. In General, the productivity of livestock is carried out in two ways: by reproduction purchase of breeding stock; reproductive and parallel-absorptive crossbreeding.

Sale of breeding cattle with reproductive crossbreeding of breeds allows us to improve dairy and beef herd. While the vast majority of cases, there is an intensive reproduction simultaneously with quality improvement in a herd of cattle. When reproductive and parallel absorption crossing expanded reproduction occurs mainly by improving cattle milk and meat production.

The principles of market relations involve the transition of farms to the intensive way of reproduction, which allows to increase the productivity of livestock and reduce production costs for the reproduction of 1 kg of livestock products.

In a market economy there is a real possibility of implementation in livestock systems boost production efficiency. For this to be strengthened internal calculation and external economic ties of the economy, a restructured management system and incentives, which together promote efficiency and increase livestock production.

It should be noted that at the regional level to solve those business problems which are in accordance with the control function included in the competence of the management bodies of regional agriculture. To them include analysis and forecast of demand, production, sale and consumption of the population of the region in livestock production.

Modeling of processes of planning and development management of livestock, including the livestock industry, the subject of many works of scientists. However, despite this, it should be noted some of the issues that can be fully attributed to the insufficiently known category. These include: the achievement of an optimal structure of the herd; providing a more complete account in the calculation of the real capacity of the economy for the production of fodder and economic conditions of farms, zootechnical requirements the content of individual breeds of cattle in the herd; limited ability of agronomists to assess the implications of decisions for development of the livestock taking into account the necessity of realization of principles of market relations and on-farm settlement; accounting differentiated according to structural and species compositions of cattle herds of standards of production costs.

When developing indicators for future development of the livestock occupies an important place differentiated forecast annual milk yield of milk on 1 cow and live weight growth 1 structural head of the herd on the breed. Based on the analysis of retrospective data on the dynamics of development livestock in some farms we have identified the main factors influencing the level of productivity of dairy and beef cattle. Given the need for adequate description of the interaction of these influencing factors and results of production we have chosen the method of least squares to predict the productivity of dairy and beef cattle.

The method was tested with regard to the conditions of the farm of "Muhammadali" Sh.Rashidov district of Jizzakh region for the forecast of productivity of dairy and beef cattle the following breeds: brown Carpathian, Swiss and local cattle. With the help of this method constructed a multivariate prediction model for listed species: 1) the annual milk yield of milk on 1 cow; 2) increase live weight by 1 structural head of cattle.

The first model to have the following form:

   a) Carpathian brown breed

$y = 1269,50 + 1,39x_1 - 12,96x_2 - 14,57x_3 + 0,01x_4 + 0,07x_5 + 1,60x_6$

   b) brown Swiss breed

$y = 13596,69 + 0,30x_1 - 0,55x_2 - 38,53x_3 - 0,01x_4 + 9944,05x_5 + 0,91x_6$

   c) a local cattle

$y = 225,87 + 0,10x_1 + 3,34x_2 + 0,83x_3 - 0,56x_4 + 1918,95x_5 + 0,74x_6$

where y - milk yield per 1 cow per year (in kg); x_1 - annual feed consumption per 1 cow (in kg/food.ed.); x_2 - the average daily live weight gain of heifers of all ages (g); x_3 - the live weight of cows (kg); x_4 - live weight of first-born cows (in kg); x_5- direct labor costs for the production of 1 centner of milk (person-hour); x_6 remuneration in the calculation of the production of 1 kg of milk (sum).

The second model is described as follows:

a) Carpathian brown breed

$$y = - 89,78 + 0,19x_1 - 1,93x_2 + 1,83x_3 + 0,01x_4 + 0,05x_5 - 1,31x_6$$

b) brown Swiss breed

$$y = 21,94 + 0,01x_1 + 0,23x_2 - 0,58x_3 - 0,01x_4 +3,13x_5 +1,10x_6$$

c) a local cattle

$$y = 47,04 + 0,001x_1 + 0,31x_2 - 0,87x_3 - 0,01x_4 + 5,11x_5 + 0,56x_6$$

where y – about products of cultivation per head per year (live weight, kg); x_1 - annual feed consumption for young animals and fattening (in kg / feed.); x_2 - the average daily live weight gain of heifers of all ages (g); x_3 - the live weight of young cattle and fattening (in kg); x_4 - the live weight of calves of all ages (in kg); x_5 - direct labor costs for live weight gain (person-hour); x_6 - remuneration based on live weight gain (sum).

Analysis results of influence factors on the level the productivity of dairy and beef cattle shows that the increase in annual feed consumption per 1 cow (x_1) yield of feed units milk yield for the period 305-ti daily lactation will increase on average 139,1 kg of brown Carpathian breed (model 1), 30,0 per kg from Schwyz breed (model 2), and 10,4 kg for the local breed (model 3). Similarly examines the influence of other factors on growth of milk yield of milk on 1 cow and live weight of 1 head of cattle.

Economic-mathematical model of optimization of the turnover of a herd of cattle allows: to determine the composition and structure species composition and age-sex structure of the herd of cattle in the economy; maximizing profit from the production and sales of livestock. For the record, economic-mathematical model, we introduce the following notation:

index: k – number of channels the implementation of animal products; j - the number of range livestock production; p - number of cattle breeds; room age and sex group of cattle; τ - the number of the maximum and minimum percentages of cattle in the herd ($\tau = 1$ – max; $\tau = 2$ - min); γ - the number of gender groups of livestock ($\gamma = 1$ - gobies; $\gamma = 2$ - heifers); i - the number of types of feed products; μ - the number of types of material, financial, labor and other resources;

factors: U_j^k - the price per unit of animal product; C_j^k- unit cost of production of livestock; $d_{p\omega}^\tau$ - maximum ($\tau = 1$ - max) and minimum ($\tau = 2$ - min) the proportion of species sex-age groups in the herd of cattle; $v_{p\gamma}$ – the proportion of the cattle being selected by gender and age group; $\beta_{p\gamma}$ - the proportion of receiving in the herd breed composition of the calves and heifer; O_{pj} - average annual milk yield from forage-fed cows by breed; F_{pj} - cultivation production counting on one head of cattle of cattle on breeds; $a_{p\omega}$ - standards for feed costs per head of cattle; γ_i - specifications of an exit of fodder units with 1 centre forages; $r_{\mu p\omega}$ - specifications of expenses

of resources on one head of large horned livestock; α_j^k, g_j^k - relative density accordingly milk and meat on distribution channels;

known data: $M_{p\omega}$ – the number of cattle in the herd management; B_i - production and sale of feed products; B - the amount of feed in the feeding units; E_μ - availability of material, financial, labor and other resources; minimum required production volume, respectively, milk and meat;

unknown: x_j^k - the desired volume of products sold via distribution channels; x_p - required the number of cattle by breed; $x_{p\omega}$ - the same by sex and age group of the breed; $x_{p\omega}^{''}$ - the desired size of the remaining herd of cattle by sex and age structure of rocks; $x_{p\omega}^\gamma$ - the desired size of the receipt steers and heifers; $x_{p\omega}^{'}$ - required the number of purchased cattle; $x_{p\omega}^1$ - the number of purchased cattle in the herd farms; $x_{p\omega}^2$ - desired cattle stock;

many: J - a variety of rooms of livestock products; K - a lot of channel numbers distribution of products; N - many rooms age groups of cattle; P - many rooms pedigree composition cattle; I – many rooms feed products; M - many rooms material financial, labor and other resources.

Describe economic-mathematical   model optimizing   turnover herds   of   cattle given its pedigree composition. The criterion of efficiency is to maximize production and sales of livestock products

$$\sum_{j \in J} \sum_{k \in K} \text{Ц}_j^k \, x_j^k - \sum_{j \in J} \sum_{k \in K} C_j^k \, x_j^k \to max$$

Under the following limiting conditions:

1. The number of cattle by sex and age group must not exceed the maximum and minimum limits

$$x_{p\omega} - d_{p\omega}^\tau x_p \geq 0, \qquad\qquad \tau = 1$$
$$x_{p\omega} - d_{p\omega}^\tau x_p \leq 0, \tau = 2, \ p \in P, \ \omega \in N.$$

2. The total number of livestock of a particular breed should not be more than a number by sex and age group

$$\sum_{\omega \in N} x_{p\omega} - x_p \geq 0, \qquad p \in P.$$

3. The prospective structure of a herd of cattle by breed and age group is determined taking into account the number of heads they buy

$$x_{p\omega}^1 \geq M_{p\omega}, \qquad p \in P,$$
$$x_{p\omega}^1 + x_{p\omega}^{'} + \sum_{\gamma = 1,2} x_{p\omega}^\gamma - x_{p\omega} = 0, \qquad \omega \in N.$$

4. The feed used must not exceed the volume of their production and purchase

$$\sum_{p \in P} \sum_{\omega \in N} a_{p\omega} \, x_{p\omega} \leq B, \quad B = \sum \gamma_i B_i.$$

5. Culled and remaining in the main herd of cattle are determined taking into account the standards of culling

$$v_{p\omega} x_{p\omega} - x_{p\omega}^2 \leq 0, \ p \in P,$$

$$\sum_{\gamma = 2,3} (1 - v_{p\omega}) x_{p\omega} - x_{p\omega}'' \leq 0, \qquad \omega \in N.$$

6. The number of incoming offspring is determined on the basis of the proportion of receiving heifers and bulls

$$\beta_{p\omega} x_{p\text{#}}'' - x_{p\omega}^\gamma \leq 0, \qquad \gamma = 1,2; \ p \in P; \ \omega \in N.$$

7. Used material, financial, labor and other resources must not exceed their availability in the economy

$$\sum_{p \epsilon P} \sum_{\omega \epsilon N} r_{\mu p\omega} x_{p\omega} \leq E_\mu, \qquad \mu \in M.$$

8. For the minimum necessary volume of production of livestock products:

a) milk production:

$$\sum_{p \epsilon P} O_{pj} x_{p\omega}'' \geq R_j. \ j \in J; \ \omega \in N$$

б) for the production of meat of cattle:

$$\sum_{p \epsilon P} \sum_{\omega \epsilon N} F_{pj} x_{p\omega} \geq Q_j. \ j \in J; \ \omega \in N.$$

9. Implemented production of cattle for distribution channels should not exceed their produced volume:

a) Milk

$$\alpha_j^k O_{pj} x_{p\omega}'' - x_j^k \leq 0, \quad \sum_{k \epsilon K} \alpha_j^k = 1, \qquad j = 1, k \in K, p \in P$$

б) meat

$$g_j^k F_{pj} x_{p\omega} - x_j^k \leq 0, \quad \sum_{k \epsilon K} g_j^{\text{?}} = 1, \qquad j = 2, k \in K, p \in P$$

10. for nonnegative variables

$$x_{p\omega} \geq 0, x_p \geq 0, x_{p\omega}^1 \geq 0, x_{p\omega}' \geq 0, \ x_{p\omega}^\gamma \geq 0, \ x_{p\omega}'' \geq 0, \ x_j^k \geq 0, x_{p\omega}'' \geq 0$$

The developed models and algorithms were the basis for creating a system that allows you to implement tasks for managing the purposeful development of animal husbandry in farms. The study describes in more detail the characteristics of the software and information base of the

system. The developed software package is implemented using a linear computer programming system.

Controllable parameters of the model to justify the direction for future development of livestock production are: the actual species composition and structure of herds of cattle; the dynamics of productivity of dairy and beef herds farms; regulations and the cost structures of feed of livestock; zoo technical standards of the transition from one age group to another in terms of cattle breeds; the maximum and minimum limits of content in the herd structure of the individual age groups of cattle; the dynamics of the unit cost of production of livestock; differentiated price of milk and meat through the channels of their sale; the share of culling livestock and getting offspring; the total number of cattle in the herd; data characterizing the purchase of breeding cattle by gender and age groups and breeds; labor costs for the production of 1 centre of livestock products, etc.

The output parameters are formed as a result of the implementation of each model and algorithms, some of which are then used as input for solving subsequent predictive and analytical problems. Based on the principle of information and logical communication and the structure of the task system, we have developed an enlarged scheme for their implementation on a computer (Fig. 1).
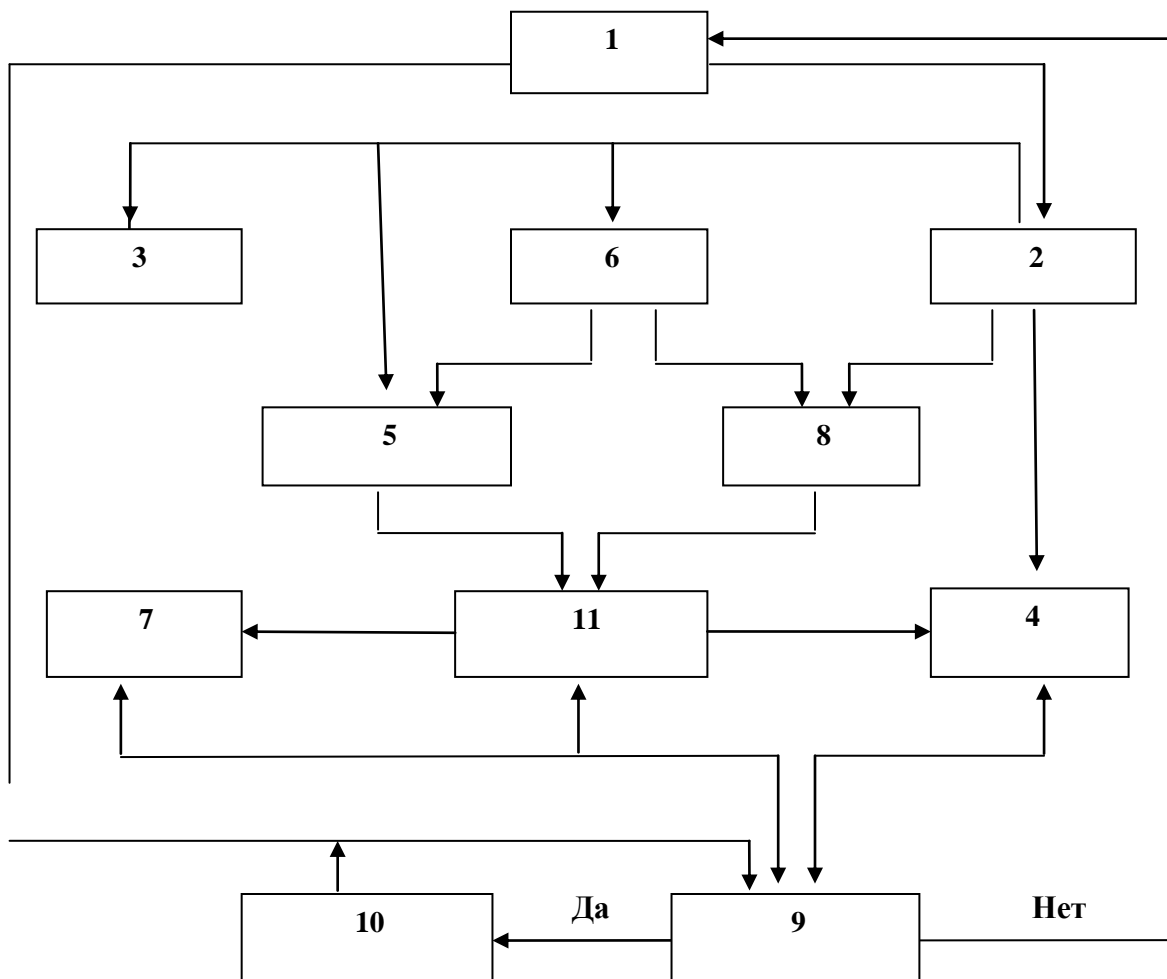
Fig. 1. Mechanism for assessing the future development of livestock production

The following notation is used in the figure: 1 - decision maker (DM); 2 - database; 3 - a set of algorithms for the tasks of analyzing historical data on the development of livestock; 4 - balance model of production and use of feed; 5 - economic-mathematical model of the turnover of a herd of cattle, taking into account the factor of pedigree; 6 is an algorithm for calculating a plan for cattle incidents and offspring; 7 - economic-mathematical model for forecasting livestock production in the region; 8 is a model for predicting livestock productivity by breed groups; 9 - checking the balance and acceptability of the results; 10 - model results for analysis and assessment of the consequences of decisions; 11 - economic-mathematical model for forecasting the needs, production and sales of livestock products in the economy.

On the basis of the implementation of the algorithm for calculating the receipt of the plan of cases, the amount of litter received in the herd is determined. The last indicator, along with the number of livestock purchased, is used as an input for the implementation of the economic-mathematical model for optimizing the herd turnover by livestock breeds.

When implementing the balance model of feed production and use, the results of solving the problem of herd turnover, differentiated standards and the structure of feed costs for each breed of livestock are taken into account. On the basis of a comprehensive account of the influence of the main factors (costs and wages, feed availability, etc.), the forecast of livestock productivity by breed groups is made, which, in turn, is used in the implementation of the economic and mathematical model for forecasting production and sales of products in the economy. This model is directly related to the economic and mathematical model of the same problem solved at the regional level. At the same level, production and sales structures, as well as indices of demand and consumption of meat and dairy products are determined.

After achieving a balance for all indicators, a comparative assessment of the consequences of decisions made on alternative options is made by the decision maker. If none of the alternatives satisfies the decision maker in terms of socio-economic values, then it also re-accesses the database and implements the models with a quantitatively new array of information. This procedure is repeated until a satisfactory calculation is reached. The database structure provides for the possibility to reflect all the necessary data, taking into account the zoo-economic conditions and the system of keeping each breed of livestock on the farm.

The developed models and algorithms are implemented to substantiate possible directions for the future development of livestock production in the farm "Mukhammadali" of the Sh. Rashidov district of the Jizzakh region.

Table 1 shows the data characterizing the parameters of these models and algorithms. As can be seen from this table, the presence of livestock in the herd at the beginning of the planned year was 1514 goals, of which 25,8% are brown Carpathian, 48,9% Schwyz and 25,3% local. On the whole, the structure and number of livestock in the herd differ both in gender and age groups and in breed composition. For example, according to calculations, the purchase of pedigree cattle is 115 goals, of which 75 goals or 65,2% of Schwyz breed, the rest - brown Carpathian.

A similar situation has developed for the remaining sex and age groups and species composition of the herd of large horned herds. So, the total number of cattle transferred from other groups in all breeds was 489 goals, of which 168 goals or 34,4% of the brown Carpathian, 200 goals or 40,9% Shvitskaya and 121 goals or 24,7% local breed.

TABLE 1. CALCULATION OF THE STRUCTURE AND TURNOVER OF THE CATTLE HERD BY BREED COMPOSITION FOR 2019 ON THE FARM "MUKHAMMADALI"

Figure	Breed composition of cattle						Total
	Carpathian brown		Swiss		Local cattle		
	goals	%	goals	%	goals	%	
The presence at the beginning of the year	391	52,9 / 25,3	741	59,7 / 48,9	382	62,5 / 25,3	1514 / 58,5
Coming: live offspring	140	18,9 / 34,1	225	18,1 / 54,9	45	7,4 / 11,0	410 / 15,8
translation of other groups	168	22,7 / 34,4	200	16,1 / 40,9	121	19,8 / 24,7	489 / 18,9
buy tribes-tion of cattle	40	5,5 / 34,8	75	6,1 / 65,2	0	0 / 0	115 / 4,4
the purchase users tional livestock	0	0 / 0	0	0 / 0	63	10,3 / 100	63 / 2,4
Total	739	100 / 28,5	1241	100 / 47,9	611	100 / 23,6	2591 / 100
Consumption: the transfer to anothergroup	168	90,8 / 34,4	200	90,5 / 40,9	121	57,3 / 24,7	489 / 79,3
Implementation meat	10	5,4 / 9,2	13	5,9 / 12,1	85	40,3 / 78,7	108 / 17,5
Other disposal	7	3,8 / 35,0	8	3,6 / 40,0	5	2,4 / 25,0	20 / 3,2
Total	185	100 / 30,0	221	100 / 35,8	211	100 / 34,2	617 / 100
The presence of the end of the year	554	100 / 27,9	1020	100 / 51,4	412	100 / 20,7	1986 / 100
Average annual Livestock	472	85,2 / 27,0	881	86,4 / 50,3	397	96,4 / 22,7	1750 / 100

It is easy to see that all articles of the incoming part of the herd turnover are dominated by cattle of the Schwyz breed. The total number of cattle on the farm at the end of the year was 1986, including the brown Carpathian – 554 goals. or 27,9%, Shvitskaya - 1020 goals or 51,4% and local cattle – 412 head or 20,7% per cent.

Dynamics of changes in the income and expenditure of the cattle population by sex and age group, and breed composition determines the difference in mean annual livestock availability at the beginning and end of the year. Thus, the average annual number of brown Carpathian cattle is lower than the availability at the end of the year – 0,9%, the Shvitskaya – 1,1% and the local breed-higher by 2,0%.

For all breeds of livestock, an increase in the volume of production of livestock products is provided (table 2). Calculation of the increase is achieved due to the influence of factors of intensification, breed transformation of the herd structure and improvement of productive qualities of animal husbandry, which occurs on the basis of various methods of livestock breeding.

TABLE 2. THE CALCULATION RESULTS FOR PC OPTIONS OF PRODUCTION OF LIVESTOCK PRODUCTS AT THE FARM "MUKHAMMADALI"

Figure	Fact for 2019	Variants of model calculation			Calculation options in % to actual for 2019		
		1	2	3	1	2	3
Milk – entire	1143,3	1187,7	1207,1	1229,2	103,9	106,0	107,5
Including rocks							
Carpathian brown	378,3	363,9	342,3	320,5	96,2	90,5	84,7
Swiss	688,5	766,8	828,9	893,7	111,4	120,4	129,8
local cattle	76,5	57,0	36,0	15,0	74,5	47,1	19,6
Meat – whole	262,1	271,6	273,6	276,5	103,6	104,4	105,5
Including rocks							
Carpathian brown	72,5	71,4	68,6	65,7	98,5	94,6	90,6
Swiss	147,3	159,8	169,0	178,3	108,5	114,7	121,1
local cattle	42,3	39,4	36,0	32,5	93,1	85,1	76,8

The results of the calculation of indicators presented in the table 2, and a comparative assessment of them with actual data for 2019 showed the economic efficiency of the proposed methodological approach and a set of models and algorithms. Efficiency is achieved based on surveys of reserves growth in labor productivity, increase livestock production through the efficient use of the potential species composition of herds of cattle on the farm. At the same time, production and use of feed are balanced, which is achieved on the basis of differentiated accounting of feed rations of individual breeds of livestock in the calculation of feed requirements.

CONCLUSIONS

1. The current level of consumption of livestock products by the population of Uzbekistan does not meet biological standards and is significantly behind the international level. This situation in a market economy requires rethinking and changing the structure of agricultural production. The livestock industry is characterized by the need to increase the volume of the product range based on the deepening of specialization, concentration and intensification of production. Moreover, the identification and use of reserves for increasing livestock production through the efficient use of production resources, the application of breeding methods and the purchase of pedigree cattle, a housing system and normalized feeding are of particular importance.

2. The consistent implementation of these measures in the practice of maintaining the livestock system requires that they be substantiated by forecasting, analytical, balance sheet and optimization calculations of indicators for the prospective development of livestock production. The need to maximize the needs of the region's population for meat and dairy products, mainly due to local agriculture, requires an increase in livestock production directly in the public sector and in private farming. To solve these problems, the introduction of new forms of organization and remuneration of labor, improvement of field fodder production, methods of breeding pedigree breeds by reproductive and parallel-absorption crossbreeding, purchase of pedigree cattle, etc.

3. An important role in improving the efficiency of livestock production is given to saving live labor costs per unit volume of meat and milk, improving the productive qualities of cattle, providing organizational and economic measures for the operation of the cost-effective mechanism at each stage of production and distribution of products, etc. the place is occupied by the correct establishment of intraeconomic interindustry proportions taking into account the principles of a market economy.

4. The process of finding reserves for increasing livestock production involves multivariate computer calculations using economic and mathematical models that reproduce, in contrast to other works, in a single system of conditions for breed conversion and keeping several livestock breeds, scientifically based livestock farming, principles for the implementation of commodity-money relations between producers and consumers of products, increasing livestock productivity, etc.

In order to maximize the adaptation of these models to the production and economic conditions of specific farms in the region, they are used in a combination of methods of economic and statistical analysis, optimization and simulation. Coordination of parameters is carried out on the basis of the interaction of these models according to the feedback principle.

5. To predict the productivity of beef and dairy cattle developed economic-mathematical models allowing differentiated to take into account the biological properties of individual species of livestock and basic conditions of detention of the herd.

Developed economic-mathematical models and methods enabled to provide interaction indicators predicting the annual yield of milk of milk cow and live weight growth 1 structural head of cattle with the settings on the resources, summary indicators of development livestock at the level of region etc.

6. The model calculations of the incidence and offspring of farms "Muhammadali" carried out in the study showed that the number of purchased cows and heifers of purchased livestock differ both in breeds and in age and sex groups.

Improving the structure of the breed composition and productivity of livestock herds, ensuring a balance in the production and use of feed should lead to an increase in livestock production.

7. According to the calculations according to the model of structure and turnover of the herd of cattle by breed composition, the presence of cattle at the «Muhammadali» farm at the beginning of the year amounted to 52,9% for brown Carpathian, Schwitz and local cattle, respectively; 59,7% and 62,5% of the total livestock population. Approximately the same situation has developed on the expenditure side of livestock herd turnover. So, under this article, the brown Carpathian breed was 30%, the Schwyz breed – 35,8% and the local cattle –   34,2%.

8. The variant calculations presented in this paper for the volume of livestock production were made on the basis of maneuvering with the values of the model parameters according to the ratio in the herd of individual livestock breeds. An analysis of the results of model calculations made it possible to identify and justify the reserves of growth in milk production at the «Muhammadali» farm, which should be 3,9 - 7,5%, and for meat – 3,6 - 5,5% relative to 2019. Such growth is ensured by improving the structure of the herd and the productive qualities of livestock.

9. The economic and mathematical models developed in this work can be used to justify the directions of breed transformation in the herd of livestock for the promising development of livestock at the farm and region level, and to predict the development of other livestock industries.

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TRENDS IN USAGE OF SHOPPING APPS

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ABSTRACT

At present, e-commerce is booming in India at a very fast pace, with mobile shopping apps being used widely for making purchases. This research focuses on use of shopping apps for making online purchase in Gujarat. The researchers have examined the gender and age on the mobile shopping behavior like no. of apps used, hours spent, no. of times orders placed and the category of items mostly purchased. The primary data is collected using structured questionnaire and interviewing respondents, while the secondary data is collected using literary review. The research result will provide a brief understanding of usage of mobile shopping apps among the consumers in Gujarat (India).

KEYWORDS: *E-Commerce, Online Shopping, Shopping Apps, Consumer Behavior.*

I. INTRODUCTION

With the inclusion of shopping apps on smartphones, e-commerce has been continually increasing in India with an immense growth rate. Shopping is done on finger tips rather than going out in search for the shop or locating a mall, and the best part is this is done without a glitch. A telecom statistic report says that India has 1,026.37 million active mobile users on 2G, 3G and 4G networks in 2018, Mobile customers in urban areas reached 647.52 million while there are 528.48 million mobile users in rural areas. [1] Further adding to it, the volume of total wireless data usage increased from 12,549,891 terabytes during September quarter to 14,283,256 terabytes during December quarter of 2018. [2] This statistic depicts the results of a survey conducted in January 2018 about the share of consumers using mobile apps for online shopping

across India, by age group. During the survey period, around 33 percent of banking consumers aged 27 to 37 stated that they used mobile apps for online shopping payments in India.[13] The current e-commerce penetration in India is only 28 percent, with a boom in India's retail e-commerce industry CAGR is projected to reach 23 percent from 2016 to 2021. Nearly 329.1 million people are expected to buy goods and services online in India by 2020. This means that about 70.7 percent of internet users will purchase products online in India. About 27 percent of digital buyers in the country are making online purchase via their smartphones /mobile on a monthly basis, and 24 percent purchasing online goods and services weekly [14]

Close to no studies have been conducted in Gujarat, (India) considering age and gender profile of the respondents and it shopping apps usage behavior. A very few have been conducted even in India. This paper attempts to study the shopping apps using behavior of the consumers and explore consumers' responsiveness towards shopping apps taking into consideration the impact of demographic factors like age and gender.

II. REVIEW OF LITERATURE

Chunduri and D. Gupta defines online shopping as a place where customers buy the products or services on the internet by using different electronic devices. It evaluates the factors which influence the customer satisfaction towards usage of shopping app(s) in India. The key factors like Design aesthetics, Image appealing, Information quality, Privacy/security were found to have a significant impact on customer satisfaction towards the usage of shopping apps in India. In a shopping app, Image appeals and Information quality are found to be the most important factor. Ease of use, money-saving, time-saving, convenience, 24 hours' accessibility, availability of different brands of products, ease of comparison are some benefits that buyers would avail upon using shopping apps. Mobile application traffic is far ahead of website traffic in engaging the customers. Based on the design aesthetics, image appealing of products, content quality of products, services and privacy/security offered, customers are showing interest to use the apps. A lot of people are spending more time on their mobile phones and applications. Android users have 1.6 billion apps and for Apple"s store 1.5 billion apps.

D.G. Taylor, T.A. Voelker and I. Pentina (2011) Social networks play an important role in consumers' decisions to download and use mobile apps. M. A. Harrisa, R. Brookshire, A.G. Chin (2016) created a research model based on perceived risk, trust, perceived benefit, and intent toinstall. Seven antecedents of trust and risk include perceived security, perceived reputation, application characteristics, familiarity, desensitization, consumer disposition to trust, and consumer disposition to risk. Results show that consumers that perceive more security have greater trust and reduced perceived risk. Furthermore, consumers that feel more familiar with finding, purchasing, downloading, and installing applications have greater trust and reduced perceived risk. Kiseol Yang (2012) examined three consumer characteristics (i.e., technology self-efficacy, level of experience of use, and consumer technology innovativeness) are regarded as significant consumer technology traits generating different consequences of mobile shopping adoption behavior. The three consumer traits are examined with the extended. Theory of Planned Behavior (TPB) to determine the moderating effects of consumer traits among predictors of mobile shopping adoption. Therefore, this study aims to examine: (1) determinants of mobile shopping adoption in the extended Theory of Planned Behavior; and (2) the differential influences of consumer traits among the relationships between determinants and mobile shopping adoption in the extended Theory of Planned Behavior. The results supported that consumers differ in levels of technology traits in mobile shopping adoption behavior.

Implications are provided to assist in predicting potential mobile consumer adoption behavior and in designing favorable mobile shopping environments that can be compatible with the consumer characteristics. C.H. Hsiao, J.J. Chang, K.Y. Tang (2016) integrated customer value perspectives to explore the influential factors in the continuance intention of social App use. The results indicate that the continuance usage of social Apps is driven by users' satisfaction, tight connection with others, and hedonic motivation to use the Apps. In addition, full mediation effects of satisfaction and habit were found between perceived usefulness and intention to continue use.

R. Xu, R.M Frey, E. Fleisch, A. Ilic (2016) confirms that personality traits have significant impact on the adoption of different types of mobile apps. Second, a machine-learning model is developed to automatically determine a user's personality based on her installed apps. The predictive model is implemented in a prototype app and shows a 65% higher precision than a random guess. Additionally, the model can be deployed in a non-intrusive, low privacy-concern, and highly scalable manner as part of any mobile app. C. Kim, R.D. Galliers, N. Shin, J.H. Ryoo, J. Kim (2012) examines the effect of various Internet shopping site qualities on the utilitarian and hedonic values of Internet shopping. The influence of the perceived level of Internet shopping value on customer satisfaction and repurchase intention is also investigated. We perform structural equation analysis with a sample of 293 observations consisting of two different income groups (workforce and student). Our results show that while system and service qualities are critical factors affecting utilitarian shopping value, information and service qualities are the factors most closely associated with hedonic shopping value. These findings suggest that service quality plays a significant role in increasing both utilitarian and hedonic shopping values. Our results also show that the impact of quality factors on Internet shopping values and subsequent repurchase intention differs across the two income groups.

Y.J. Wang, M.D. Hernandez, M.S. Minor (2010) examines the effects of the two dimensions of web aesthetics, aesthetic formality and aesthetic appeal, on consumers' perceived online service quality and satisfaction during service encounter. The findings showed that, between task-oriented and task-free consumers, the patterns of the effects of the two dimensions of web aesthetics on perceived online service quality and satisfaction are dissimilar. However, regardless of the presence or absence of purchase tasks, aesthetic formality significantly influences perceived online service quality, and aesthetic appeal significantly influences satisfaction. In addition, the effect of aesthetic appeal on satisfaction is negative for task-oriented consumers. Managerial implications on how to manipulate web aesthetics to achieve superior online service quality and high consumer satisfaction were presented. V. Ilie, C.V. Slyke, G. Green, H. Lou (2005) aims to deepen our understanding of the underlying phenomena of technology adoption and use by examining whether there are gender differences in the importance of the perceived innovation characteristics on communication technologies use intentions. Specifically, the researchers have investigated whether gender moderates the influence of perceived relative advantage, compatibility, ease of use, visibility, result demonstrability and critical mass on intentions to use a communication technology: instant messaging. Results suggest a strong moderation effect of gender between perceptions of relative advantage, ease of use, visibility, result demonstrability, critical mass and use intentions.

III. Research Methodology

A. Objectives

The objectives of the Study are as follows

- To study the shopping apps usage among consumers.

- To explore the effect of demographic factors like age and gender on consumer behavior of shopping apps.

- To identify the products that are mostly purchased using shopping apps, and examine the gender wise preferences for the items purchased.

B. Hypothesis

H_1: There is no significant association between no. of times items purchased a) Apparel b) Home and Kitchen c) Accessories d) Beauty and Health e) Food and Beverage f) Books and DVDs g) Electronics and gender.

H_2: There is no significant difference between the mean ratings for (a) No. of Apps Used, (b) Hours Spent, (c) duration since use, (d) no. of shopping apps installed; and gender.

H_3: There is no significant difference between (a) No. of Apps Used, (b) Hours Spent, (c) duration since use, (d) no. of shopping apps installed; and age.

C. Research Design

The research design is used for the study is Descriptive research. The data has been collected from major of Gujarat, India; Ahmedabad, Baroda, Surat and Rajkot. A non-probability sampling method i.e. Convenience sampling technique is used for data collection. The sampling unit consists of the Buyers who had made purchase using apps for shopping atleast once in the last 6 months of the age group 25 to 45 years. Sample size is 96 respondents (100 respondents were collected, out of which after screening 96 respondents were used for analysis). The Data collection is done using Survey method wherein primary data is collected using a structured closed-ended questionnaire using interview method.

Data analysis is carried out using SPSS software. Tabular representation of data and various statistical tests were conducted for analysis. Chi Square, Mann- Whitney U and Kruskal Wallis H tests were used for data analysis

IV.RESULT AND DISCUSSION

It is quiet interesting that 63% of the respondents have used 0 to 20 mobile apps including Social media networking, Photo Editor, Shopping, Games, Entertainment, Songs & Movies, GPS, Banking, Lifestyle, Planners, Educational, Utility and News. The research also noted that 74% of the respondents have installed 1 to 4 shopping apps on their Smartphone and 52% spent less than an hour per week on shopping apps. It was found that 43% respondents visit the app on an average once a month, 37% respondents shortlist the items once a month while 38% respondents place the order in less than once a month followed by 33% for once in a month. Consumer electronics with 34% respondents followed by Apparel with 26% respondents were purchased more than 3 times in the past six months. Table I, II and III depicts Demographic profile of the respondents, Shopping apps installed and Items purchased during that last six months respectively.

DEMOGRAPHIC PROFILE OF THE RESPONDENTS [TABLE - I]

Demographic Profile	Frequency	Percentage
Gender		
Male	73	76.05
Female	23	23.95
Age		
25 years and below	48	50.00
26-30 years	28	29.17
31-35 years	9	9.38
36-40 years	7	7.29
41 and Above	4	4.17
Educational Qualification		
Under Graduate	4	4.17
Graduate	30	31.25
Post Graduate	44	45.83
Doctorate	12	12.50
Professional	6	6.25
Occupation		
Student	21	21.88
Salaried	56	58.33
Professional	9	9.38
Self employed	8	8.33
Home Maker	2	2.08
Annual Family Income		
150000 and below	20	20.83
150001 to 250000	17	17.71
250001 to 350000	16	16.67
350001 to 450000	9	9.38
450001 to 550000	11	11.46
550001 and above	23	23.96

SHOPPING APPS INSTALLED [TABLE - II]

Shopping apps installed	Frequency	Percentage
1-4	71	73.96
5-8	22	22.92
9-12	2	2.08
More than 12	1	1.04

ITEMS PURCHASED DURING THAT LAST SIX MONTHS [TABLE - III]

	Apparel	Home & Kitchen	Accessories	Beauty & Health	Food & Beverages	Books & DVDs	Electronics
None	23	52	19	49	65	50	16
1-3 times	47	35	55	31	21	36	47
More than 3 times	26	9	22	16	10	10	33

Chi Square

Chi Square is used to test the significant association between no. of times items purchased like Apparel, Home and Kitchen, Accessories, Beauty and Health, Food and Beverage, Books and DVDs, Electronics; and gender.

CHI-SQUARE TESTS [TABLE - IV]

Pearson Chi-Square	Value	df	Asymptotic Significance (2-sided)
Apparel	2.433	2	.296
Home and Kitchen	3.930	2	.140
Accessories	1.012	2	.603
Beauty and Health	.864	2	.649
Food and Beverage	1.662	2	.436
Books and DVD	.717	2	.699
Electronics	1.135	2	.567

In Table IV, It is observed that p value is greater than 0.05 for all the items purchased. So, H_1 is accepted. It means that there is no significant association between no. of times items purchased a) Apparel b) Home and Kitchen c) Accessories d) Beauty and Health e)Food and Beverage f) Books and DVDs g) Electronics and gender.

B. Mann- Whitney U Test

Mann- Whitney U Test is used to test H_2: There is no significant difference between the mean ratings for No. of Apps Used, Hours Spent, duration since use, no. of shopping apps installed; and gender.

MANN- WHITNEY U TEST STATISTICS[A] [TABLE - V]

	Apps Used in Nos	Hours Spent	Duration Since Use	Shopping Apps installed in Nos
Mann-Whitney U	715.000	773.500	699.500	836.000
Wilcoxon W	991.000	1049.500	3400.500	3537.000
Z	-1.246	-.625	-1.233	-.039
Asymp. Sig. (2-tailed)	.213	.532	.218	.969
a. Grouping Variable: Gender				

Table V shows p>0.05 for all the variables (a) No. of apps used (b)Hours spent (c) Duration since used and (d)Shopping apps installed hence, H_2 is not rejected. It can be said that the mean ratings of men and women are equal i.e. there is no significant difference between the mean ratings for the variables under study and gender.

C. Kruskal Wallis H Test

Kruskal Wallis H Test is used to test the H_3: There is no significant difference between No. of Apps Used, Hours Spent, duration since use, no. of shopping apps installed; and age of respondents.

KRUSKAL WALLIS H TEST STATISTICS[A,B] [TABLE - VI]

	Apps Used in Nos	Hours Spent	Duration Since Use	Shopping Apps installed in Nos
Kruskal-Wallis H	4.496	5.639	7.308	6.634
df	5	5	5	5
Asymp. Sig.	.480	.343	.199	.249
a. Kruskal Wallis Test *b. Grouping Variable: Age*				

Table - VI depicts for all the variables No. of apps used, Hours spent, Duration since used and Shopping apps installed; p>0.05 (hence, H_3 is not rejected. So we conclude that there is no significant difference between the (a) No. of apps used (b)Hours spent (c) Duration since used and (d) Shopping apps installed for grouping variable age.

V. Conclusion

The study determines that majority of the respondents have installed 1-4 shopping apps on their Smartphone and respondents place order less than once a month followed by once in a month. Interestingly, The study establishes that there is no significant difference between the mean ratings for No. of apps used, Hours spent , Duration since used and Shopping apps installed and gender as well as age. It also proves that there is no significant association between no. of times items purchased in categories of Apparel, Home and Kitchen, Accessories, Beauty and Health, Food and Beverage, Books and DVDs, and Electronics; and gender.

VI. LIMITATION OF THE STUDY

The study may not be generalized for whole of India as India is a diverse country having multiple customs, religions, beliefs and preferences. Thus, the current study is restricted to the state of Gujarat. Due to lack of adequate time span, limited respondents were considered for the research which can be improved in further research.

VII. FURTHER RESEARCH

A similar study can be conducted using similar or other demographic variables in other regions of India and abroad. This study aims to examine the physical items / products that are purchased online using shopping apps. Further research could be done on shopping of services using apps.

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