

UTILIZATION PATTERN OF GRAPE MASTER APP BY GRAPE GROWERS

by

Mr. Arbat Sadanand Prakash
(Reg. No.019/183)

A Thesis submitted to the

**MAHATMA PHULE KRISHI VIDYAPEETH
RAHURI – 413 722, DIST. AHMEDNAGAR
MAHARASHTRA, INDIA**

in partial fulfillment of the requirements for the degree

of

MASTER OF SCIENCE (AGRICULTURE)

in

AGRICULTURAL EXTENSION AND COMMUNICATION



**DEPARTMENT OF AGRICULTURAL EXTENSION AND
COMMUNICATION
POST GRADUATE INSTITUTE
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**DEPARTMENT OF AGRICULTURAL EXTENSION AND
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**MAHATMA PHULE KRISHI VIDYAPEETH
RAHURI – 413 722, DIST. AHMEDNAGAR
MAHARASHTRA, INDIA.**

2021

CANDIDATE'S DECLARATION

I hereby declare that this thesis or part
there of has not been submitted
by me or other person to any
other University or Institute
for a Degree or
Diploma

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(S.P. Arbat)

Date : / /2021

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CERTIFICATE

This is to certify that the thesis entitled, **“UTILIZATION PATTERN OF GRAPE MASTER APP BY GRAPE GROWERS”**, submitted to the Faculty of Agriculture, Mahatma Phule Krishi Vidyapeeth, Rahuri Dist. Ahmednagar (M.S.) in partial fulfilment of the requirements for the award of the degree of **MASTER OF SCIENCE (AGRICULTURE)** in **AGRICULTURAL EXTENSION AND COMMUNICATION**, embodies the results of a piece of bonafide research work carried out by **Mr. ARBAT SADANAND PRAKASH**, under my guidance and supervision and that no part of the thesis has been submitted for any other degree or diploma. The assistance and help received during the course of this investigation have been duly acknowledged.

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Place : MPKV, Rahuri

Date : / /2021

(S.P. Arbat)

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LIST OF ABBREVIATIONS AND SYMBOLS

PGI	:	Post Graduate Institute
MPKV	:	Mahatma Phule Krishi Vidyapeeth
Agril.	:	Agricultural
%	:	Percentage
GDP	:	Gross Domestic Product
<i>et al.</i>	:	Etalia (and other)
VNMKV	:	Vasantrao Naik Marathwada Krishi Vidyapeeth
Sr. No.	:	Serial Number
Fig.	:	Figure
Vol.	:	Volume
i.e.	:	That is
J	:	Journal
Unpub	:	Unpublished
Agri.	:	Agriculture
etc.	:	et cetra
M.Sc.	:	Master of Science
Ph.D.	:	Doctor of Philosophy
ICT	:	Information and Communication Technology
TRAI	:	Telecom Regulatory Authority of India
NGO	:	Non-Governmental Organization
KVK	:	Krishi Vigyan Kendra
KCC	:	Kisan Call Centre
WIA	:	Women in Agriculture
<i>viz.</i>	:	Vide licet (Namely)
ha	:	Hectare
VCD	:	Video Compact Disc
DVD	:	Digital Versatile Disc
NRC	:	National Research Centre
PDF	:	Portable Document Format
doc	:	Document

ABSTRACT

UTILIZATION PATTERN OF GRAPE MASTER APP BY GRAPE GROWERS

By

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of

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Information and Communication Technology is revolutionizing agriculture sector as a whole resulting in the overall growth and development of farming community. Every fraction of information is now available on one fingertip of individual only because of development in mobile communication technology. Especially, in developing countries the rapid spread of mobile communication technology is offering prospects for economic growth, social empowerment and grassroots creativity. ICT has potential impact on agriculture and rural development by providing access to information, markets and services. Mobile phone communication technology is now becoming the most important aspect in dissemination of information to millions of farmers.

In India grape is an important horticultural crop grown majorly in Nashik district of Maharashtra and has contributed largely to India's export. The present study is conducted in Nashik district of Maharashtra during 2019-21 on Utilization pattern of Grape Master App by grape growers. Purposive sampling procedure was employed to select 150 registered grape growers on Grape Master App.

The results revealed that majority of grape growers (48.00%) belonged to medium age group (36 to 55 years). More than one-third of grape growers (37.33%) were educated upto higher secondary school (11th to 12th Standard). Majority of users (58.67%) had small (upto 7 members) family size. More than half (56.00%) of grape growers had medium level of annual income. Majority of grape growers (52.67%) had medium knowledge level. Substantial (62.67%) of the grape growers had low social participation. Majority of grape growers (72.67%) had medium sources of information. Majority of grape growers (58.00%) had medium level of innovativeness. Majority of grape growers (50.67%) had high level of techno savviness.

The study revealed that majority of users (73.33%) faced problem of time required for photo uploading on app, followed by clarification of message is difficult (60.00%), registration problems like user name, password (57.33%), time constraints (43.33%) and physical problems such as eye pain, headache (21.33%), decrease in time spent with family (19.33%), age related problems (16.00%), doubts in understanding literature (12.00%), language as a barrier (04.00%) and data storage problems (03.33%), while using the Grape Master App.

The important suggestions made by the grape growers were to provide (70.00%) seasonal market information on daily basis, majority (63.33%) of users suggested to develop other similar apps on different crops, majority of respondents (45.33%) suggested that app should be updated regularly, 42.00 per cent of users suggested to provide user guide information to customers, 40.00 per cent of users suggested that government institutes should make intervention in consultancy services, 37.33 per cent of users suggested that individual focus should be given to each customer, 36.67 per cent of users suggested that export related quality standards of products and the procedures to maintain good quality grapes should be included in app, 32.00 per cent of users suggested that they should provide NRC Grapes data on the same platform on regular basis, 30.00 per cent of users suggested that the app should be made more gender friendly and 28.00 per cent of users suggested that irrigation scheduling should be modified with moisture meter reading.

The important implications drawn from the present study revealed that majority of the respondent had medium to high level of utilization of Grape Master App. Hence, other similar crop specific app can be design by government institutes for onion and other such vegetable crops. The present study highlighted the constraints and suggestions for improvement in Grape Master App. Impact study of app can also be taken up.

1. INTRODUCTION

Agriculture is vital to Indian economy with 58 per cent of rural households rely on it as primary source of income as it contributes significantly to India's Gross Domestic Product (GDP) along with fisheries and forestry. The importance of timely access to information for decision-making in agriculture and related industries cannot be overstated. With this in mind, numerous approaches for providing information to farmers in a timely and cost-effective manner have been investigated. It is clear that Information and Communication Technologies (ICTs) have the potential to enable farmers' access to and exchange of information. Among the ICTs, the use of mobile phones is expanding, which is affecting the agricultural communication process. New services and applications have emerged as a result of the adoption of mobile phones. These include access to market information, weather information, plant health monitoring, education and other services in the agriculture sector. According to the Telecom Regulatory Authority of India, the number of telephone subscribers as of 31 July, 2017 was 1210.71 million (1186.79 million cellular and 23.92 million fixed landline lines) (TRAI, 2017). As of July 2017, the tele-density had reached 93.88 per cent. However, there is a significant difference in tele-density between urban and rural areas, with 173.21 and 57.45, respectively. India is the world's fastest-growing smart phone market, according to IDC, with 27.5 million units sold in the second quarter of 2016, up 17 per cent from the previous quarter. According to the Ericsson Mobility Report from June, 2016, mobile subscribers are predicted to reach 1.4 billion by 2021.

In developing countries, the rise of mobile communication technology is opening up a slew of new prospects for social empowerment and grassroots creativity. The contribution of mobile applications to Agricultural and Rural Development (ARD) through giving access to information, markets and services to rural residents is one of the areas with potential influence. According to studies, mobile phones have a favorable impact on long-term poverty reduction with accessibility being the greatest barrier to realizing their full potential (Bhavnani *et al*, 2008). The issue for the Indian government and policymakers is to boost agricultural output and thereby meet the country's enormous food demand. A fundamental challenge in the current circumstances – rising food costs and an ever-increasing population – is striking a balance between policies to ensure food security and policies to increase farmers income. With land availability constraining agriculture and allied sectors, increasing productivity remains a critical aspect for India's food security in the future.

In the literature, the most important sources of productivity increase have been recognized as research, extension, literacy and infrastructure (Mittal and Kumar, 2000). Market development increases the input-output market interface which is critical for productivity

growth. In agriculture and related sectors, education and access to knowledge establish conditions that enable farmers to successfully acquire and use information for allocative and technical decision-making. This leads to an increase in the adoption of technology, better farming techniques and market assessments among other things. Agriculture extension, according to the World Development Report 2008, plays a significant role in its growth and in fostering sustainable, inclusive and pro-poor economic development. Access to ICT can also have a hugely positive impact on long-term development and poverty reduction. The acceptance of information by the farming community is widely recognized as one of the most important components in achieving efficient and productive agricultural decisions (Galloway and Mochrie, 2005). According to Sasidhar and Sharma (2006), the application of Information and Communication Technology (ICT) tools has the potential to transform India's livestock, agriculture and rural economies. However, recent stagnation as well as the complete disintegration of extension services in some places, has resulted in enormous discrepancies in agricultural production and productivity. The spread of technology at the farm level has been hampered by a lack of extension services and limited access to information. Only 40 per cent of farmer families have access to knowledge about new farm technology, according to the results of a situation assessment study performed by the National Sample Survey Organization, Government of India. There are around 120 million farm holdings in India and the number is increasing year after year. The number of field level extension persons required to supply at least one village extension personnel to 800-1000 farm families is anticipated to be 1.3 million, compared to the current availability of only about 0.1 million (100,000). According to estimates, a farmer spends 40 minutes each year on average with public extension employees. A supplemental service is a non-negotiable demand of the country's farmers with this level of interaction intensity. With the introduction of contemporary technologies, hybrid seeds and changing environmental circumstances, information needs are continuously increasing. As a result, farmers frequently discover that their traditional knowledge, experience and guesswork for making day-to-day decisions are ineffective in changing situations.

In the current context, it is envisaged that integrating ICTs into agricultural extension will give the agricultural industry a much-needed boost and that ICTs will complement the traditional extension system for delivering "Knowledge Resources" to millions of farmers. Mobile phones have changed the agricultural communication process in many developing countries and mobile phones have made personal communications widely accessible, for the first time, to women and men, poor and rich, rural and urban people in developing as well as industrial countries.

Agricultural companies are providing services through payment by contract farming, marketing of high value crops by commercially export companies, value addition and charged based service centers for farmers. Several corporations at present involved in agro-commodity trading, processing, exports have tried to establish systems to ensure timely and consistent

supply of raw material of desired quality and at low cost. Some of the agri-business companies like e-choupal, Mahindra Samriddhi, Mahindra Shubhlabh, Tata Kisan Kendra and Chambal Uttam Bandhan in their unique model are also involved in transfer of technology with market support.

Farmers have increasingly begun to perceive marketing than production as the major constraint in enhancing their farm incomes. It is in this scenario that the other agencies involved in the extension/transfer of technologies like NGOs, farmer organizations and the private sector both corporate and informal can actively supplement the efforts of public extension agency as the extension mechanism will have to be “farmer driven,” location-specific and address farmer demands for diversification. In recent times reform-oriented initiatives have been directed towards a demand driven, broad based and holistic agricultural extension system involving introduction of a multitude of integrated measures that will on the demand side enable service users to voice their needs and hold service providers accountable and on the supply side will influence the capacity of service providers to respond to the needs of the extension service users (i.e. the farmers). Here, the private sector is playing an important task in extension services and policy framework for agricultural extension notes that “public extension by itself cannot meet specific needs of various regions and different classes of farmers”.

Mobile Applications

Software applications designed to operate on smart phones, tablets and other mobile devices are known as mobile apps. Users use a variety of different mobile apps for varied purposes. These smart phone apps are used for a variety of purposes including entertainment, information sharing, agricultural information and much more.

1.1 About Grape Master App

Grape Master is a leading privately owned and paid consulting service firm in the field of grape cultivation throughout Maharashtra started in 2016. Today, more than five thousand of the grape growers use Grape Master App for qualitative grape production. It provides vital information regarding various stages of grape farm about disease management, pest management, nutrient management etc. Grape Master team consists of experienced agribusiness professionals. Initially used by grape growers in Nashik districts has been now used by farmers from various districts of Maharashtra and also used by farmers in Karnataka.

Grape Master App is a paid subscription app having subscription fees of Rs.3000 per year. They provide daily schedule of the registered farm in the app and virtual solution to farm problems in addition to farm visits.

Some features of Grape Master App

1. Schedule
2. *Vichara Tumhi Sangto Aamhi*

3. Weather forecast
4. Nutrient management
5. *Mazi Diary*
6. Question bank
7. My plot
8. Observation result of my plot
9. Video/Audio
10. Graph of harvesting
11. Disease and pest information

1.2 Objectives of the Study

1. To study the personal, socio-economic and communicational characteristics of the respondents.
2. To ascertain the utilization of Grape Master App by grape growers.
3. To find out the relationship between personal, socio-economic and communicational characteristics and utilization of Grape Master App.
4. To elicit the constraints faced by respondents while using Grape Master App.
5. To obtain the suggestions made by the respondents.

1.3 Scope of the Study

Mobile phone advisory services have significant impact on various technology adoptions in agricultural sector. Hence, it made farming more beneficial and more precise while overcoming instabilities and uncertainties of natural forces. Consultancy services are evolving in major crops like grape to transform their production.

The present study is the investigation about the usage of private consultancy services by grape growers in Nashik district. The findings of the study can be utilized for making various policies regarding extension services in both government and private sectors. It will help for further modifications in the used app. The study also consists of constraints and suggestions made by the grape growers and hence will be considered while developing similar tools in farming sector.

1.4 Need and Importance of the Study

In recent years, the use of mobile phones to solve farm problems has been a critical development in the production of numerous crops. Grape Master App is also a renowned private agricultural consultant in the grape growing industry, offering paid farm consulting services via mobile app.

The current analysis is an attempt to learn more about the Grape Master App's usage patterns. In terms of the respondents' personal, socio-economic traits, respondents challenges will aid in increasing the extent to which this mobile app is used by service providers. Identification of the pattern of use in relation to independent variables will necessitate the

development of a similar mobile phone app for other crops.

1.5 Limitations

1. As a student with limitations of time and financial resources the numbers of respondents has been confined to 150 each tahsil having 75 respondents.
2. Because the study was based on the respondents' perspectives, objectivity may be restricted to the level of information provided by the respondents.
3. The ramifications of this study's conclusions are limited to the investigation's area and crop as well as other similar areas.

1.6 Hypothesis

Keeping the above objectives in view, the following hypothesis will be tested in the course of investigation.

The utilization of Grape Master App varies as per their personal, economic and communicational characteristics.

1.7 Organization of thesis

The present thesis consists of five chapters. The first chapter “Introduction” deals with the objectives, need, scope and limitations of the study. The second chapter consist of “Review of literature” consisting of reviews of relevant literature and findings of previous research studies carried out in different locations. The third chapter “Methodology” consist of research methods, techniques and procedures followed in present study. The fourth chapter “Results and discussion” includes the findings of present study alongwith discussion there on. The fifth and the last chapter consists of “Summary, Conclusions and Implications”. The references, interview schedule and other related documents are appended at the end of the thesis.

2. REVIEW OF LITERATURE

A quick review of the literature is an important aspect of any study since it not only provides an overview of previous work but it also serves as the foundation for interpretation and discussion of the findings. The purpose of this study is to identify the personal, socio-economic characteristics and its relationship with utilization of Grape Master App. An attempt was made to review the literature that had a direct or indirect influence on the current investigation.

In this chapter, a quick overview of the available literature was attempted in light of the study's aims. Every effort has been made to review the available literature. The following is the information of the relevant literature.

2.1 Personal, Socio-economic and Communicational Characteristics of the Respondents

2.1.1 Age

According to Agwu *et al.* (2008), 42.50 per cent of extension workers were between the ages of 30-39, while, 32.5 per cent were between the ages of 40 and 49. Only 20.0 per cent of Extension employees were under the age of 30, while, 5.0 per cent were between the ages of 50 and 59.

Salau and Saingbe (2008) found that the average age of agricultural researchers and extension workers was 44.83 and 41.06 years, respectively in their study on access and utilization of information and communication technologies (ICT) among agricultural researchers and extension workers. This means that agricultural researchers and extension workers were in their middle ages.

Sarada *et al.* (2009) found that more than half (56%) of the extensionists were middle aged, followed by above middle aged and young extensionists with 28 per cent and 16 per cent, respectively.

Ghadi and Antwal (2010) revealed that more than half of the respondents (59.17%) were in middle age group (33-57years).

Siddalingayya (2011) reported that 64.67 per cent of the respondents were of middle age group, while, 20.00per centand15.33per cent were from young and old age groups, respectively.

Farruk (2013) reported that 40.00 per cent of the Thai Koi farmers were in the middle age group, while, 32.82 per cent belonged to old age category followed by 27.14 per cent were young.

Tawade (2016) revealed that 53.33 per cent of the respondents were from middle age group. Whereas, 27.50 per cent of the respondents were in old age category and 19.17 per cent of the respondents in young age category.

2.1.2 Education

Shekar and Shenoy (2011) in their research study on ICTs and agricultural knowledge

dissemination found that majority of respondents (47.28%) were post graduates, 38.18 per cent were graduates and 14.54 per cent were doctorates.

Adedeji *et al.* (2012) reported that 32.00 per cent of the respondent farmers have a high school diploma and 32.00 per cent are illiterate, with 20.00 per cent having a higher secondary or higher education. Only 16.00 per cent of those polled had completed primary school.

Pattanashetti and Nithyasree (2012) in their study on awareness and preference of Krishi Community Radio Programmes on women listeners of Dharwad tahsil of Dharwad district reported that majority (48.68%) of the women listeners had college education, followed by high school education (35.53%), middle school education (14.47%) and primary school education (1.32%).

Sharma (2012) found that majority of the respondents were illiterate (60.00%).

Wakle *et al.* (2013) observed that 44.17 per cent of the readers were educated upto high school, whereas, 22.50 per cent of the reader educated upto secondary school. It is also reported that 19.16 per cent of the readers were educated upto college level and 14.17 per cent upto primary school.

Shivappa (2014) found that 30.83 per cent of farmers had completed high school, 25 per cent had completed high school, 24.17 per cent had completed graduate/post graduate education, 13.33 per cent had completed middle school and only 5 per cent of farmers had completed primary school. Only 1.67 per cent of farmers were illiterate.

Raksha (2014) in her study revealed that majority of the respondents (69.00%) were illiterate, followed by primary (22.00%), middle (6.00%) and high school (3.00%).

George and Kumar (2015) had reported that most of the farmers (37.50%) had completed secondary education, followed by 31.60 per cent who completed graduation.

Patel *et al.* (2015) reported that 40 per cent of the respondents had primary level of education, with 34.00 per cent, 18.00 per cent and 8.00 per cent having secondary, illiterate and higher secondary and above education, respectively.

Alam *et al.* (2016) observed that 63.30 per cent respondents were educated secondary and above, followed by 30.00 per cent respondents who can sign only and remaining 6.70 per cent of respondents were educated upto primary education.

Teza (2016) in his study on “Mobile application as an extension services delivery tool among livestock farmers: An exploratory study” found that 38 per cent of the total respondents were educated upto middle school, while, 27 per cent had a high school diploma, followed by elementary school (21%), graduate and above (8%), intermediate (5%) and functionally literate (1%).

Ansari *et al.* (2018) found that most of the respondents were illiterate (30.83%) followed

by intermediate (21.67%), middle level (14.16%), graduate and above (12.5%), primary level (10.83%) and high school level (10.00%).

Raghuvanshi *et al.* (2018) reported that 31.85 per cent farmers were educated upto primary level, 24.53 per cent farmers upto intermediate level, 16.89 per cent upto high school level and 19.45 per cent were illiterate.

2.1.3 Family Size

Minz (2018) reported that more than half (58.33%) of the respondents had small family size followed by 35.83 per cent of the respondents had medium family size and 5.84 per cent of the respondents had large family size.

Gawali (2019) reported that majority (82.50%) of the respondents belonged to medium family size, followed by 5.83 per cent of the respondents had medium family size and 11.67 per cent of the respondents had large family size.

Goswami (2021) found that majority (55%) of the respondents belonged to medium family size.

Jadhav *et.al* (2021) reported that 47.00 per cent of the respondents had medium family size followed by 41.00 per cent and 32.00 per cent of respondents had high and low family size, respectively.

2.1.4 Annual Income

Sonawane *et al.* (2011) found that 23.34 per cent of respondents had an annual income of more than Rs.2 lakhs, 28.33 per cent had an annual income of between Rs.1.01 and 2.0 lakh, and 48.33 per cent had an annual income of less than Rs.1 lakh.

Addeji *et al.* (2012) found that 52.00 per cent respondents had high annual income, while, 36.00 per cent of the respondents had moderate annual income and 12.00 per cent had low annual income.

Shankaraiah and Narayana Swamy (2012) stated that 37.50 per cent of respondents had a medium yearly income, 35.00 per cent had a low annual income and 27.50 per cent of farmers had a high annual income.

Jeeva *et al.* (2013) reported that majority of respondents (60.00%) had low income, followed by 25.00 per cent respondents had medium income and 15.00 per cent had a high income level.

Shivappa (2014) found that 43.33 per cent of the farmers had medium level of annual income, whereas, 30.00 per cent had high annual income and 26.67 per cent had low annual income.

Ghadge (2015) found that 51.87 per cent of scientists belonged to low annual income, followed by 27.50 per cent belonged to medium income group and 20.63 per cent belonged to high annual income group.

Tawade (2016) reported that 47.50 per cent of the respondents had yearly income ranging from Rs. 50,001 to Rs. 1,00,000, while, 33.33 per cent had total annual income of less than Rs.50,000. 7.50 per cent of respondent farmers had an annual income between Rs.1,00,000/- and Rs.1,50,000/-, while, 6.67 per cent and 5.00 per cent had annual incomes above Rs.2,00,001/- and between Rs.1,50,000/- and Rs.2,00,000/-, respectively.

2.1.5 Knowledge

Chakarborty *et al.* (2000) revealed about effect of some important personal and socio-economic factors on gain of knowledge through radio. The knowledge gained by the respondents through the exposure to radio broadcast was medium to high.

Agwu *et al.* (2008) in their study on Use of Information Communication Technologies (ICTs) among Researchers, Extension Workers and Farmers in Abia and Enugu States: Implications for a National Agricultural Extension Policy on ICTs found that the majority (52.5%) of researchers had a high level of ICT knowledge, while, only 7.5 per cent had a low level of ICT knowledge. The majority of extension workers (57.5%) had a moderate level of knowledge, whereas, just 10 per cent had a low level of understanding. The majority of farmers (56.70%) had limited awareness of ICTs. This demonstrates the necessity for ICT training for extension workers and farmers in addition to researchers.

Salau and Saingbe (2008) in their study on access and use of information and communication technologies (ICT) among agricultural researchers and extension workers discovered that researchers have 87.00 per cent access to ICT facilities, whereas, extension workers have 66.00 per cent access. Researchers received an overall score of 85 per cent for their use of ICT in agriculture communication, while, extension workers received a score of 70.30 per cent.

Farruk (2013) found that the majority of respondents (71.43%) had good knowledge, while, 28.57per cent had moderate knowledge.

Bansode and Narfide (2014) revealed in their study that majority (76.92%) of the respondents had a lot of knowledge on electronic information resources, whereas, only 23.08 per cent respondents had a little knowledge and there were no respondents with nil knowledge.

Kabir (2015) reported that half of the respondents (50%) had medium level of knowledge on ICTs, while, 26.7 per cent and 23.3 per cent had low and high knowledge, respectively.

Jadhav *et al.* (2021) revealed that 12.50 per cent of the respondents had high knowledge level, 13.34 per cent of the respondents had low medium knowledge level and 72.50 per cent had medium and 14.16 per cent low knowledge level, respectively.

2.1.6 Social Participation

Hasan *et al.* (2011) found that 57.40 per cent of selected farmers had low social

participation, 42.60 per cent had medium social participation and none had high social participation.

Ahire *et al.* (2014) reported that majority 63.33 per cent of the members and non-members (56.67%) of dairy co-operatives had medium social participation.

Rathod and Damodhar (2015) noted that the majority of respondents (65.00%) were members of multiple social organizations. However, 30.00 per cent of selected respondents were members of one group, while, the remaining 5.00 per cent were not members of any organization.

Verma *et al.* (2016) noticed that 79.16 per cent respondents have medium social participation, while, 13.33 per cent having low social participation and 7.5 per cent of respondents having high social participation.

2.1.7 Sources of Information

In their study on "Information sources to cocoa farmers on cocoa rehabilitation techniques (CRT's) in selected states of Nigeria," Adeogun *et al.* (2010) found that 33.3 per cent learned about new innovations from radio, followed by 27.5 per cent from extension agents, 18.3 per cent from television, 16.7 per cent from group leaders and 4.2 per cent from newspapers.

According to Kameshwari *et al.* (2011) agricultural information is obtained from different sources and channels. District and block level agricultural offices, KVKs, daily local language newspapers, agri portals, friends, relatives, helplines, farmers cooperatives, radio, television, private input agencies dealers and mobile phones were ranked as highly reliable by less than half (48.00 per cent) of those who reported getting information from government agencies.

Farmers got agricultural information through local councils (57.2%), neighbors (56.7%) and extension workers (56.7%), according to Tantisantisom (2011) in his study "Information Dissemination for Farming Communities in Thailand". Some villagers named other government officers and sales representatives as sources, although websites and private companies played minor roles as information providers accounting for less than 1.00 per cent of the total 10 per cent.

According to Tanko *et al.* (2013) majority of respondents (85.71%) had access to newspaper. Respondents who use research bulletins make up the smallest percentage of the sample accounting for only 1.43 percent of the total.

According to Ghadge and Patinge (2014) 64.00 per cent of respondents had a medium level of use of communication sources for agricultural information.

According to Kariuki (2014) mobile phones are the most commonly used ICT devices among rural agricultural extension personnel. The vast majority of them owned their own set of

hand tools. As a result, among extension personnel, mobile phones are an excellent source of agricultural knowledge.

According to Samansiri and Wanigasundera (2014) majority of the respondents (78.2%) used mobile phones for about 4-7 days per week because it is more convenient to get information on a mobile phone. In addition to cell phones, 44.60 percent of respondents (4-7 days a week) utilized fixed telephones to obtain information. 95.00 percent have never used a facsimile, while, the vast majority have never utilized the internet (63.40%), e-mail (61.40%) or VCD/DVD (57.4%) to obtain information.

Tawade (2016) found that the majority of caller farmers (60.83%) had moderate sources of information from various extension agencies, whereas, 26.67 per cent and 12.50 per cent of caller farmers had low and high sources of information, respectively.

Chavan (2017) reported that majority (70.00%) of the respondents had medium sources of information followed by 15.71 per cent of the respondents had low level of sources of information and 14.29 per cent of the respondents had high level of sources of information.

2.1.8 Innovativeness

Neware (2011) reported that 46.00 per cent of the respondents has medium innovativeness, followed by 43.00 per cent who have strong innovativeness and 11.00 per cent who have poor innovativeness.

Rathod *et al.* (2012) revealed that 75.34 per cent dairy farmers belonged to medium level of innovativeness, followed by 13.33 per cent in high level and 11.33 per cent in low level categories of innovativeness.

Rao (2013) found that majority of the farmers (72.22%) were with low innovativeness, followed by medium (22.22%) and high levels (5.56%) of innovativeness.

Lad (2014) revealed that maximum respondents (69.33%) were from medium innovation proneness category; followed by 29.34 per cent respondents were from high innovation proneness category. Whereas, only 1.33 per cent of the respondents were from low innovation proneness category.

Patel *et al.* (2014) revealed that majority (61.25%) of user farmers had medium level of innovativeness; whereas, 23.75 per cent of them had high and 15 per cent had low level of innovativeness.

Teza (2016) in their study found that majority of the WSHG (Women Self Help Group) members had medium innovativeness (83.33%), followed by low (11.11%) and high (5.56%) levels of innovativeness.

Chavan (2017) reported that 34.29 per cent of the respondents had medium level of innovativeness followed by 25.71 per cent of the respondents had low level of innovativeness and 40.00 per cent of the respondents had high level of innovativeness.

Shelke (2020) found that majority (42.85%) of the farmers had medium innovativeness level followed by 29.28 per cent of the farmers who had low innovativeness level and 27.85 per cent of the farmers had high level of innovativeness.

2.1.9 Techno-savviness

Dewan and Pierre (2013) noted that while the two more tech-savvy groups appear to use their mobile devices for a wider range of tasks when travelling domestically, impulsiveness appears to have minimal impact on mobile search behaviour.

Lokuge *et al.* (2016) observed that farmers lack of techno-savviness remains a major problem in exploiting technology in agriculture and information system adoption remains an issue within the farming community.

Devkule (2017) reported that more than two third (67.50%) of the respondents belonged to medium category of techno-savviness. This was followed by 20.83 per cent who were observed under high category of techno- savviness and 11.67 per cent of the respondents in low category of techno-savviness.

Sinare (2019) stated that majority of the respondents (43.75%) belonged to high level of techno-savviness.

2.2 Dependent variable

2.2.1 Utilization Pattern

Ndag *et al.* (2008) in their study of Comparative analysis of ICT use by Agricultural Extension workers in south west and north central Nigeria, found that the majority of respondents (51.43%) in south-west Nigeria had low levels of ICT use, while, the majority in north-central Nigeria had moderate levels of ICT use.

Meena *et al.* (2011) in their study pointed out that farmers expected information on high yielding varieties (35.00%), plant protection (27.50%) and market information (22.50%) and weather forecasting (19.38%) from modern ICT systems.

Vinod (2011) in his study on ‘the role of e-Choupal in marketing of soybean in Vidarbha, Maharashtra’ observed that information on market prices (77.24%), information on weather forecast (75.32%) and improved farm practices (47.16%) were reasons for e-choupal utilization.

Yadav *et al.* (2011) in their study on ‘Utilization pattern of different sources and channels of agriculture information used by the fenugreek growers’ found that farmer mobile advisory (FMA) service is an important tool for need based information delivery on mobile phone. The adoption of rural technologies by farmers through KVKs is a big leap in this direction.

Meshram *et al.* (2014) in their study on ‘Utilization of need based agricultural and allied technologies through Kisan mobile advisory services’ among the farmers in Umaria district of Madhya Pradesh reported that medium (42.50%) utilization of Kisan mobile advisory services followed by high (34.17%) and low (23.33%) utilization, respectively.

Raghava and Rao (2014) reported that majority (70.00%) of scientists were observed under medium category of overall ICT use behavior, while, high use (16.00%) and low use

(15.00%), respectively.

Kavitha (2015) in her study on 'Kisan Call Centre Services: An analysis' reported that little more than three-fourth (76.67%) of KCC beneficiaries had medium utilization followed by low (13.33%) utilization.

Ragul (2016) stated that Extension employees did not use radio as an ICT tool, audio-visual tools, such as television, the internet and mobile phones were used to repress it.

Giridhar *et al.* (2019) reported that more than half (51.67%) of the respondents fall under low category in use of mobile phones for accessing the agriculture information followed by 25.00 per cent and 23.33 per cent respondents who belonged to medium and high category, respectively.

2.3 Relationship Between Personal, Socio-Economic and Communicational Characteristics of Respondents and Utilization of Mobile App

1. Age and utilization

Dabhade (2001) noted that age was not related with utilization of neo-literate readers.

Naganikar (2005) reported that age has significantly negative relationship with utilization of agricultural diary by readers.

Dhaka and Chayal (2010) reported that there exist negative and significant relationship between age and extent of utilization of ICTs among the farmers.

Sharma (2012) reported that there exist positive and non-significant relationship between age and utilization of ICT tools among the women farmers.

2. Education and utilization

Naganikar (2005) reported that education was positively related with utility perception of agricultural diary by readers.

Sobalaje and Adigum (2013), Hanglem *et al.* (2015) and Tomar *et al.* (2016) found that education was positively and significantly related to the utilization pattern of ICTs.

3. Family size and utilization

Sawant and Dakhore (2007) stated that there is no relationship of family size and utilization pattern of information sources by the livestock owners.

Ahire *et al.* (2014) stated that there is significant relationship between family size and extent of use of mass media by cotton growers.

4. Annual income and utilization

Pawar (2013) stated that annual income of the respondent farmers was found to be positively and significantly related with utilization.

Lad (2014) found that annual income is positively related to utilization of mass media.

Chavan (2016) reported that there is negatively significant relationship between annual income and utilization of mobile apps.

5. Knowledge and utilization

Chavan (2017) revealed that correlation between knowledge level and utilization of

irrigation mobile apps is negative and non-significant.

6. Social participation and utilization

Dabhade (2001) revealed that social participation was found to be not related with utilization.

Pawar (2019) revealed that user farmer showed positive and highly significant relationship with utility perception.

7. Sources of information and utilization

Ainlwar (2012) reported that use of information sources of cattle rearers was non-significant and negatively correlated with their utilization level.

Pawar (2013) reported that use of sources of information by the respondents found to be non-significant relationship with utilization.

8. Innovativeness and utilization

Chavan (2017) found that there is negative and non-significant relationship of innovativeness with utilization of irrigation mobile apps.

Shelke (2020) reported that innovativeness had positive and significant correlation with utilization of Krushik app.

9. Techno-savviness and utilization

Devkule (2017) found that techno-savviness had positive significant relationship with utilization of Kisan mobile phone advisory services.

2.4 Constraints Faced by the App Users While Using Grape Master App

Singh *et al.* (2009) discovered problems in searching for information on the internet. Low-speed internet connectivity, inconsistent power supply and a lack of essential full-text journals were discovered to be issues with using internet-based e-resources.

Ajwag (2014) discovered that the M-farm programmed featured a downloadable App that farmers with Android-powered smart phones could use to immediately access information; however, most small-holder farmers were unable to utilize it since they could not afford a smart phone.

Lad (2014) found that viewing farm telecasts is constrained by factors such as a lack of leisure time (88.67%), electricity problems (36.00%), telecast time is inconvenient (16.67%), use of technical terms (8.67%), useful information is not timely (8.00%) and information is not useful (2.00%).

Matuha (2015) found that lack of electricity, poor network connectivity, high maintenance costs, lack of calling credit, lack of understanding and promotion of various services through mobile phones and lack of interest and needs of farmers in utilizing mobile phones in farming were among the challenges noted.

Avilesh *et al.* (2017) in their study on 'Accessibility and relevance of extension methods and ICT among farmers in Mauritius', discovered that farmers' access to technology tools is hampered by a lack of expertise and low literacy.

Belakeri *et al.* (2017) in their study found that the lack of mobile-friendly and regionally relevant digital information in local languages is one of the problems of mobile applications in farming. Limitations in rural mobile infrastructure include network/signal connectivity issues, internet issues, high internet costs, electricity issues, the need for internet for initial app installation, the requirement of an android or supporting smart phone, frequent criticism that the information provided is outdated and routine digital literacy and awareness.

Chavan (2017) found the constraints faced by respondents while using mobile apps were mainly wi-fi unavailability, lack of training, poor internet connection and unavailability of smart phones.

Shelke (2020) found that major constraints while using Krushik app by users were age factor, physiological problems such as eye pain, internet connectivity and low annual income.

2.5 Suggestions Made by Grape Growers for Improvement in Grape Master App utilization

Adetumbi *et al.* (2013) suggested that there should be a periodic review of use of current ICTs in extension service delivery to facilitate effectiveness in the use of ICTs for the extension service and adequate funding of extension service should also be ensured to enhance the maintenance of ICTs made available to the extension persons.

Musa *et al.* (2013) suggested conducting an awareness campaign, improving ICT skills of research staff, providing more localized content relevant to farmers, lowering the relative cost of new ICT, especially internet and improving rural infrastructure in their study on 'Challenges of using ICTs to disseminate agricultural information to farmers in Sudan.'

Agwu and Ogbonnah (2014) recommended that establishment of functional ICT centers, facilitation of modern ICTs by respondents and setting up of projects that would make ICT trainers and training material available for WIA staff would fulfill the needs of training and would improve ICTs utilization by WIA staff.

Hashemi *et al.* (2014) suggested that policy makers and planning programmers should put more efforts to offer and organize pre-service and in-service training courses for improving ICT use.

Sreesha *et al.* (2014) in their research suggested that imparting trainings to the employees, up gradation of ICTs, sufficient funding for ICTs, provision of latest ICT infrastructure, better internet connectivity and availing sufficient number of ICTs would improve utilization of ICT tools.

In their study on 'Availability and accessibility of ICT among dairy farmers in Uttarakhand', India, Tiwari *et al.* (2014) suggested that village knowledge centers, internet cafes and strengthening the ICT infrastructure be established as well as overcoming the power problem and making mobile phones, computers and internet facilities available to people at affordable prices.

In their study on the 'Use of ICT as an extension tool by the farmers in Bangladesh's

Gazipur district', Kafura *et al.* (2016) recommended that necessary measures be taken to encourage farmers to use modern ICT tools such as mobile phones, agricultural mobile applications, e-krishak service, internet and so on to obtain agricultural information.

Extension personnel should motivate and educate the farming community about the use of electronic media (television, radio) for advanced information about agriculture production techniques, according to Aldosari *et al.* (2017) in their study on Farmers perceptions regarding the use of ICT in Khyber Pakhtunkhwa, Northern Pakistan'.

3. METHODOLOGY

This chapter deals with methods and techniques employed to collect and analyze the data. This chapter is divided into twelve sections under following headings;

- 3.1 Research Design
- 3.2 Locale of the study
- 3.3 Brief description of the study area
- 3.4 Selection of the respondents
- 3.5 Consideration of the Mobile Apps
- 3.6 Operationalization and measurement of the variables
- 3.7 Constraints encountered by the respondents
- 3.8 Development of the interview schedule
- 3.9 Pre-testing of the interview schedule
- 3.10 Data Collection
- 3.11 Statistical tools used
- 3.12 Definition of terms and concept

3.1 Research Design

For present study the Ex-post facto research design was adopted. The ex-post facto research is systematic empirical enquiry in which the scientists have direct control of influencing (independent) variable because their manifestations have already occurred or because they are inherently not manipulable.

3.2 Locale of the Study

The study was purposively conducted under the jurisdiction of Mahatma Phule Agricultural University i.e. in Nashik district of Maharashtra state. The tahsils under study were Dindori and Niphad as most farmers from these two tahsils were using this app.

3.3 Brief Description of the Study Area

Maharashtra is ranked first in production of grapes producing about 62.70 per cent of the total production of grapes in the country, while, Nashik district having largest area under grape cultivation in Maharashtra is selected for the study.

3.3.1 Geographical Location

Nashik district is located between 18.33 degree and 20.53 degree north latitude and between 73.16 degree and 75.16 degree east longitude at northwest part of Maharashtra state at 565 meters above mean sea level. Recently two tahsils are created in the district making the total tahsil to 15. Out of 15 blocks in the district, as many as 8 blocks viz., Surgana, Peth, Igatpuri, Kalwan, Baglan, Dindori, Trimbakeswar and Nashik are tribal blocks.

3.3.2 Soil Types

Major soils of Nashik district are coarse shallow soils having area 647255 ha, reddish brown soil having area 496645 ha, medium black soil having 321760 ha and remaining laterite and non-laterite soils having area 70400 ha.

3.3.3 Cropping Pattern

In recent 20 years, grape crop significantly acquired dominance of agricultural economy in Nashik district. However, in addition to these, kharif pulses and cereals are also grown. Shortages in irrigation water in certain regions such as Deola, Kalwan and Malegaon blocks leads to shifting from sugarcane and grapes to floricultural crops in green houses which depicts the technology adoption of these people is faster than any other districts in Maharashtra.

3.4 Selection of Tahsil and Villages

The present study was conducted in Dindori and Niphad tahsils of Nashik district. These two tahsils were purposively selected as exposure to Grape Master App in these tahsils is more. Out of total 158 villages in Dindori and 136 villages from Niphad tahsils, 30 villages were selected, Fifteen villages from Dindori and fifteen villages from Niphad tahsils were selected.

3.4.1 Selection of the Respondents

The list of registered farmers was obtained by contacting Grape Master team. A list of identified farmers was prepared for this study.

Sr. No.	District	Tahsil	Village	No. of respondents
1.	Nashik	Dindori	Ambedindori	05
			Awankhed	05
			Bopegaon	05
			Chinchkhed	05
			Dhakambe	05
			Khedgaon	05
			Materewadi	05
			Mhasrul	05
			Mohadi	05
			Nilwandi	05
			Palkhed	05
			Ramshej	05
			Talegaon Dindori	05
			Valkhed	05
			Varkheda	05
2.	Nashik	Niphad	Chandori	05
			Dongargaon	05
			Gajarwadi	05
			Jivhale	05
			Kasbe Sukene	05
			Kokangaon	05
			Nandur Madhmeshwar	05
			Ozar Mig	05
			Pimpalgaon Baswant	05
			Redgaon	05
			Saykheda	05
			Shirwade Wani	05
			Ugaon	05
			Vanasgaon	05
			Vinchur	05
Total			150	

3.5 Consideration of Mobile App

The mobile app considered for this study was Grape Master App. This app was

developed for precise consultation regarding grape cultivation.

3.6 Operationalization and Measurement of Variables

3.6.1 Measurement of Independent Variables

3.6.1.1 Age

The chronological age of the app users in years, measured in terms of completed years at the time of investigation. A score of '1' was assigned to each completed year. The respondents were classified into three groups as young, middle and old by using statistical tools mean $\pm$ standard deviation.

Sr. No.	Category	Age (Years)
1.	Young	Upto 35
2.	Middle	36 to 55
3.	Old	56 and Above

3.6.1.2 Education

Education refers to the number of years of formal schooling obtained by the farmers. According to the educational qualification, the respondents were grouped into five categories as follows.

Sr. No.	Education	Standard
1.	Illiterate	No formal schooling
2.	Primary School	1 st to 7 th std.
3.	Secondary School	8 th to 10 th std.
4.	Higher Secondary School	11 th and 12 th std.
5.	Graduation and above	13 th and Above

3.6.1.3 Family Size

Family size was measured as the number of individuals living together in one household under one roof. The respondents were classified into three categories based on range.

Sr. No.	Category	Frequency
1.	Small	Upto 7 members
2.	Medium	8 to 10 members
3.	Large	11 members and Above

3.6.1.4 Annual Income

It refers to the income of the respondent farmers from all the sources in a year. It was measured in rupees. Considering annual income, respondents were classified in three categories by the statistical tool of range.

Sr. No.	Category	Annual income (Rs.)
1.	Low	Upto 3.7 lakh
2.	Medium	3.80 to 5.4 lakh
3.	High	5.5 lakh and Above

3.6.1.5 Knowledge

Knowledge is a body of understood information possessed by an individual. Knowledge level of respondent farmers was operationalized as the quantum of scientific information known to the respondents about the Grape Master App.

The knowledge test constituted 12 knowledge questions which were provided with 7 closed questions and another 5 objective questions having 3 or 4 alternative answers including correct answer. The knowledge test was administrated to the respondents and was asked to underline/tick mark to the correct answer.

A quantification knowledge item answer was made by giving ‘two’ score and ‘one’ score for the correct and wrong answer, respectively. The score of all individual items were summed to get knowledge score of the respondent. The summation of the score for a particular respondent indicated his knowledge level about Grape Master App. The maximum score that one should get was 24 and the minimum was 12. This was quantified on the basis of the procedure followed by Chavan (2017) used with certain modifications.

Based on the total score, the respondents were classified into three categories namely; ‘low’, ‘medium’ and ‘high’ by using range as a measure of check.

Sr. No.	Category	Score
1.	Low	Upto 17
2.	Medium	18 to 22
3.	High	23 and Above

3.6.1.6 Social Participation

It refers to association of an individual with any social organization as a member, its office bearer and not at all was considered as social participation. A social participation scale was developed to measure the social participation of farmers. Score of 3, 2 and 1 was given to member, office bearer and not at all, respectively. On the basis of the total score obtained by the respondents they were categorized into Low, Medium and High on the basis of range.

Sr. No.	Category	Score
1.	Low	Upto 14
2.	Medium	15to 17
3.	High	18 and Above

3.6.1.7 Sources of Information

Information sources used referred to the frequency of contact or exposure of the respondents to different information sources for obtaining the Grape Master App information. The extent of use of information sources was assured by taking into consideration all the possible ways available to the respondents for getting information. The scoring procedure used as follows.

Sr. No.	Particulars	Score
1.	Regular	3
2.	Occasional	2
3.	Never	1

Thus, total score was worked out using the procedure followed by Chavan (2017) with some modifications and the respondent's categorization was done on the basis of range into following categories.

Sr. No.	Category	Score
1.	Low	Upto 21
2.	Medium	22 to 24
3.	High	25 and Above

3.6.1.8 Innovativeness

It refers to the degree to which an individual is relatively earlier in adopting the new ideas when compared to the other members in the society. The scale consists of 10 statements; of which nine positive and one negative statement. The responses were recorded on three point continuum namely; 'agree', 'disagree' and 'undecided'. The score 3, 2, and 1 was assigned to the positive statements and 1, 2, 3 for negative statements. The maximum and the minimum scores obtainable by an individual on the scale were 30 and 10, respectively. The maximum score revealed high degree of innovativeness. Further, the respondents were grouped into three categories by using range as a measure of check.

Sr. No.	Innovativeness Category	Score
1.	Low	Upto 16
2.	Medium	17 to 22
3.	High	23 and Above

3.6.1.9 Techno savviness

Techno savviness on Grape Master App services of the respondent farmers was measured by asking ten statement questions to the respondents and the questions were related with how smartly farmers used the technology in daily farming practices. The total assigned score for all

the questions was 30 in which there were seven positive and three negative statements. Score of 3, 2 and 1 was given to agree, disagree and undecided, respectively for positive statements and 1, 2 and 3 for negative statements. Maximum and minimum scores obtainable by the respondent were 30 and 10, respectively. Obtained score were then categorized into Low, Medium and High as follows.

Sr. No.	Category	Score
1.	Low	Upto 18
2.	Medium	19 to 23
3.	High	24 and Above

3.6.2 Utilization pattern of Grape Master App

Utilization pattern of the respondent was calculated by adding the scores of extent of utilization of an individual and its utilization purpose. Combined score then was correlated with the independent variables. It was categorized into following table.

Sr. No.	Category	Score
1.	Low	Upto 41
2.	Medium	42 to 52
3.	High	53 and Above

3.6.2.1 Extent of Utilization

This part consisted of total nine questions in which question number one to seven were close end questions. Scores of 2 and 1 was given to correct and wrong questions, respectively. Question number eight consisted of information sources through which Grape Master App provide information to its users for which scores of 3, 2 and 1 were given to ‘always’, ‘frequently’ and ‘never’, respectively. Similarly, question number ninth was employed to analyze the duration of utilization of Grape Master App by users. Scores of 1, 2, 3 and 4 were given to the answers, respectively.

The possible obtainable scores ranged between 44 and 11 for the app. Based on the total scores, the respondents were classified into three categories namely, ‘low’, ‘medium’ and ‘high’ by considering range.

3.6.2.2 Utilization Purpose of Grape Master App by grape growers

Utilization purpose of Grape Master App grape growers were classified into eleven categories and each category consisted of very frequently, frequently, less frequently and not at all options. Scores of 4, 3, 2 and 1 were given to them.

Sr. No.	Category	Score
1.	Very frequently	4
2.	Frequently	3
3.	Less frequently	2
4.	Not at all	1

3.7 Constraints Encountered in Using Grape Master App by Respondents

Respondents were asked to indicate the problems faced by them during the usage of the Grape Master App. The problems were open ended and respondents were enabled to provide their individual constraints.

3.8 Development of an Interview Schedule

The interview schedule was drafted so as to collect the information in line with the objectives of the study. The schedule was developed in four parts. In the first part, questions related to selected personal and economic characteristics of the respondent's viz., age, education, family size and annual income were included. The second part of schedule consisted of the questions related sources of information, social participation and the knowledge of the respondents about mobile app. In the third part, questions related to extent of utilization and the utilization pattern of the Grape Master App were listed. In the fourth part, the constraints faced by respondents and suggestions by them were included.

3.9 Pre-testing of Interview Schedule

The interview schedule so developed was pre-tested for its accuracy, simplicity and practicability with the experience of pre-testing, related questions were put together to have consistency in response. Number of copies of the interview schedule were then zeroxed and used for the data collection.

3.10 Data collection

The final data was collected with the help of a pre-tested interview schedule incorporating all the items on which information was required. The respondents were contacted in person mostly on their farms or residential area. The importance and the objectives of the study were clearly explained to them and they were assured that the information furnished by them would be kept confidential and would be used for the research purpose only.

3.11 Statistical tools used

The data collected from the respondents was scored, tabulated and analyzed using frequency, percentage, mean and range. Frequency and percentage were used for making the simple comparison and to interpret the socio-economic profile, knowledge level and utilization pattern of the Grape Master App by the respondents. They were also used for eliciting the problems faced by the respondents.

Statistical methods used in the present study are as described below;

1. **Frequency:** This measure was used to know the distribution pattern of the farmers and to categorize the problems perceived by the respondents in order of importance.
2. **Percentage:** This measure was used for the simple comparison and to know the utilization pattern of the mobile app.
3. **Mean:** The arithmetic mean is the sum of the scores divided by their number. This measure was used to categorize the dependent and independent variables into low, medium and high categories.

The mean was calculated by the following formula,

$$\bar{X} = \frac{\sum_{i=1}^n Xi}{n}$$

Where,

$\bar{X}$ = Arithmetic mean

$\sum Xi$ = Value of observations

n = Number of respondents

4. **Range:** A range is difference between highest (maximum) value and lowest (minimum) value in given data.

The formula was used as follows.

Range = Highest value – Lowest Value

H.V. – L.V.

r' value = $\frac{\text{H.V.} - \text{L.V.}}{\text{No. of categories}}$

Low = r value + L.V.

Medium = r value + 1st value

High = r value + 2nd value

5. Karl Pearson's Coefficient of Correlation

Coefficient of correlation was calculated to find out the relationship between each of the independent variables and dependent variables. This technique was used to find out the relationship between two variables and the following formula was used for computation of 'r' value.

$$r = \frac{n\sum XY - (\sum X)(\sum Y)}{\sqrt{[\sum X^2 - (\sum X)^2/n][\sum Y^2 - (\sum Y)^2/n]}}$$

Where,

r = Correlation Coefficient

X = Independent variable

Y = Dependent variable

n = Total number of respondents

3.12 Definitions of the Terms and Concepts

1. **Age** : Chronological age of the respondents in the years at the time of interview.
2. **Education** : It is number of school grades successfully completed by the respondents.
3. **Sources of Information** : The source of information refers to the use of different sources of information communication channels used by any individual.
4. **Knowledge** : Knowledge is a body of understood information possessed by an individual.
5. **Utility** : The state of being useful, profitable or beneficial.
6. **Mobile App** : Software applications designed to run on smart phones and tabs and other mobile devices.
7. **Innovativeness** : It is the degree to which an individual is early to adopt something as compared to others.
8. **Techno-savviness** : It is quality of an individual about proficient in use of modern technology.

4. RESULTS AND DISCUSSION

The present study was done with a view to study the utilization pattern of Grape Master App by grape growers. As the set objectives of the study, the findings are prepared under the following heads.

- 4.1 To study the personal, socio-economic and communicational characteristics of the respondents.
- 4.2 To ascertain the utilization of Grape Master App by grape growers.
- 4.3 To find out the relationship between personal, socio-economic and communicational characteristics and utilization of Grape Master App.
- 4.4 To elicit the constraints faced by respondents while using Grape Master App.
- 4.5 To obtain the suggestions made by the respondents.

4.1 Personal, Socio-economic and Communicational Characteristics of the Respondents

4.1.1 Age

Age indicates the chronologically completed years by the respondents. Age factor is essential in the overall development of the individual. It affects the exposure of an individual to different circumstances. Accordingly, the age of grape growers was collected, analyzed and tabulated in following Table 4.1 and Fig.3.

Table 4.1. Distribution of grape growers according to their Age

Sr. No.	Age group (in years)	Frequency (N=150)	Percentage
1.	Young (Upto 35)	60	40.00
2.	Middle (36 to 55)	72	48.00
3.	Old (56 and Above)	18	12.00
	Total	150	100.00

The data in Table 4.1 showed that 48.00 per cent of the respondents were in the middle age group (36 to 55 years), while, 40.00 per cent in the young age group (upto 35 years) and 12.00 per cent of the respondents were in old age group (above 55 years).

Young and middle aged group respondents have high utilization as compared to the old age respondents. The possible justification about that is more farmers in these age groups are enthusiastic about new experiments.

These findings are supported with the findings of Shekhar and Shenoy (2011).

4.1.2 Education

Education improves the thinking and analytical ability of an individual. Educated person can think rationally and interpret the situations in proper manner thereby identifying the cause and effect relationship. Hence, education is considered an important factor in the present study. Accordingly, the formal education received by the respondents was collected and analyzed in the

below Table 4.2 and Fig.4.

Table 4.2. Distribution of grape growers according to their education

Sr. No.	Category	Frequency (N=150)	Percentage
1.	Primary (1 st -7 th)	15	10.00
2.	Secondary (8 th -10 th)	45	30.00
3.	Higher secondary (11 th -12 th)	56	37.33
4.	Graduation and Above	34	22.67
	Total	150	100.00

The findings from the above Table 4.2 revealed that 37.33 per cent of the respondents had received higher secondary education, while, 30.00 per cent of the respondents had received secondary education, 10.00 per cent of the respondents had received primary education and 22.67 per cent of the respondents had graduation and above education and none was illiterate.

Above findings revealed that all respondents received formal education in their life time. These findings are in tune with the findings Devkule (2017).

4.1.3 Family Size

Family size is the number of members living under one roof. Family size influences the thought and decision making ability of the individuals. Generally, large family finds it difficult to take bold decisions in comparison to small families. Hence, family size was considered an important factor in the present study. Accordingly, the data about family size of an individual was collected and then categorized as follows.

Table 4.3. Distribution of grape growers according to their family size

Sr. No.	Category	Frequency (N=150)	Percentage
1.	Small (Upto 7 members)	88	58.67
2.	Medium (8 to 10 members)	46	30.66
3.	Large (11 and Above)	16	10.67
	Total	150	100.00
R=2.66		H.V.=12	L.V.=4

The above Table 4.3 and Fig.5 pointed out that more than half (58.67%) of the respondents had small family size, whereas, 30.66 per cent of the respondents had medium family size and 10.67 per cent of the individuals had large family size. These findings are in line with the findings of Totare (2016).

4.1.4 Annual Income

Annual income denotes the economic status of an individual. Financial condition of an individual enables him to take risk in certain circumstances. Hence, annual income provides individual the base to adopt new technological advancements in agrarian sector. Better financial position enables the farmers to apply new management strategies in his field. The information regarding the annual income of the respondents is shown in the below Table 4.4 and Fig.6.

Table 4.4. Distribution of grape growers according to their annual income

Sr. No.	Category	Frequency (N=150)	Percentage
1.	Low (Upto Rs. 3.7 lakh)	39	26.00
2.	Medium (Rs. 3.8 to 5.4 lakh)	84	56.00
3.	High (Above Rs.5.4 lakh)	27	18.00
Total		150	100.00
R=1.7		H.V.=7.1	L.V.=2

Above Table 4.4 showed that 26.00 per cent of the respondents had low annual income, whereas, 56.00 per cent of the respondents had medium annual income and 18.00 per cent of the respondents had high annual income.

From the above findings, it can be concluded that majority of the respondent farmers had medium annual income and hence can take economic risk by trying Grape Master App consultancy as a new tool to counter loss in their output.

The above findings support the findings of Patil (2007), Ghadi and Antwal (2010), Lad (2014) and Pawar (2019).

4.1.5 Knowledge

In present study, knowledge was considered to be the knowledge of the respondents about Grape Master App. Knowledge about the app revealed the understanding of an individual about its various features. Though knowledge acquisition is long term process, it can be improved by continuous research, experiments and experience with new things. It also improves by training individuals on various technological developments. The respondents having more knowledge about the mobile app can utilize it in more precise manner. Hence, knowledge is considered to be the vital aspect of mobile app utilization. Accordingly, the information with respect to the knowledge of an individual was collected, categorized and tabulated as follows in Table 4.5 and Fig.7.

Table 4.5. Distribution of grape growers according to their knowledge level

Sr. No.	Category	Frequency (N=150)	Percentage
1.	Low (Upto 17)	28	18.67
2.	Medium (18 to 22)	79	52.67
3.	High (Above 22)	43	28.66
Total		150	100.00
R=5.33		H.V.=28	L.V.=12

The data in above Table 4.5 revealed that more than half (52.67%) of the respondents had medium knowledge about the app, while, 28.66 per cent of the individuals had high knowledge and 18.67 per cent of the respondents had low knowledge level about the app.

These findings are in line with the findings of Dhumal (2017).

4.1.6 Social Participation

Social participation of an individual is the association with various social organizations as a member, office bearer or not at all. Accordingly, the data about the level of social participation of an individual was collected, analyzed and tabulated as below in Table 4.6 and Fig.8.

Table 4.6. Distribution of grape growers according to their level of social participation

Sr. No.	Category	Frequency (N=150)	Percentage
1.	Low (Upto 14)	94	62.67
2.	Medium (15 to 17)	49	32.67
3.	High (18 and Above)	07	4.66
Total		150	100.00
R=2.33		H.V.=19	L.V.=12

The data in Table 4.6 revealed that 62.67 per cent of the respondents had low social participation, while, 32.67 per cent of the respondents had medium level of social participation and 4.66 per cent of the respondents had high level of social participation. These findings are in line with the findings of Hasan *et al.* (2011).

The frequency-wise distribution of grape growers according to their social participation is presented in Table 4.6.1.

Table 4.6.1. Distribution of grape growers according to their social participation

Sr. No.	Social Organization	Position		
		Member	Office Bearer	Not at all
A.	Formal Organization			
1.	Gram Panchayat	04 (02.67)	00 (00.00)	146 (97.33)
2.	Panchayat Samiti	00 (00.00)	00 (00.00)	150 (100.00)
3.	Zilla Parishad	00 (00.00)	00 (00.00)	150 (100.00)
4.	Cooperative society	10 (06.67)	02 (01.33)	138 (92.00)
5.	School committee	25 (16.66)	22 (14.67)	103 (68.67)
B.	Informal Organization			
1.	Farmer Producer Organization (FPOs)	11 (07.33)	03 (02.00)	136 (90.67)
2.	Grape Growers Association	13 (08.67)	07 (04.66)	130 (86.67)
3.	Sahyadri Farms (Nashik)	12 (08.00)	02 (01.33)	136 (90.67)
4.	Farmers association	18 (12.00)	05 (03.33)	127 (84.67)
5.	Self-help groups	17 (11.33)	14 (09.33)	119 (79.34)
6.	<i>Bhajani mandal</i>	11 (07.33)	00 (00.00)	139 (92.67)
7.	Other	17 (11.33)	06 (04.00)	127 (84.67)

(Figure in parentheses indicate the percentage)

From Table 4.6.1 it was observed that 16.66 per cent of the grape growers were members of school committees followed by 12.00 per cent were members of farmers association, 11.33 per cent were members of self-help groups, 11.33 per cent were members of organizations other than above listed. It can be inferred from the above results that the social participation of majority of the grape growers was very less. It might be due to their personal reason. This findings are in line with the findings of Hasan *et al.* (2011).

4.1.7 Sources of Information

In present study, sources of information refers to the frequency of contacts of an individual to different information sources for obtaining information about Grape Master App. Source of information is the key point from the perspective of awareness of an individual to new technological developments. Source of information strikes the initial idea of adoption in mind of an individual. Hence, it becomes vital to study which sources of information are available to an individual. Accordingly, the information about the sources of an individual were collected, analyzed and tabulated as in given below table.

By collecting the individual scores of an individual, the level of sources of information were categorized into categories given below in Table 4.7 and Fig.9.

Table 4.7. Distribution of grape growers according to their level of sources of information

Sr. No.	Category	Frequency (N=150)	Percentage
1.	Low (Upto 21)	18	12.00
2.	Medium (22 to 24)	109	72.67
3.	High (25 and Above)	23	15.33
Total		150	100.00
R=3		H.V.=27	L.V.=18

The above Table 4.7 revealed that majority (72.67%) of respondents had medium sources of information, while, 15.33 per cent of the respondents had high and 12.00 per cent had low level of sources of information. These findings are consistent with the research findings of Pawar (2019).

Further, the detailed distribution of respondents according to their sources of information is presented in Table 4.7.1.

The data in Table 4.7.1 pointed out that social media and internet sources are the prominent sources of information for getting information about Grape Master App. About, 51.33 per cent of the individual “Regularly” get information about new technological developments through social media and 50.67 per cent of the individual “Regularly” get information from internet sources. It may be due to the increase in the usage of mobile phones by grape growers.

Table 4.7.1. Distribution of grape growers according to their Sources of Information

Sr. No.	Sources of Information	Frequency		
		Regular	Occasional	Never
1.	Friends	71 (47.33)	64 (42.67)	15 (10.00)
2.	Neighbors	63 (42.00)	74 (49.33)	13 (08.67)
3.	Relatives	66 (44.00)	79 (52.67)	05 (03.33)
4.	Progressive farmer	17 (11.33)	77 (51.33)	56 (37.34)
5.	Meeting	16 (10.67)	91 (60.66)	43 (28.67)
6.	Demonstration	18 (12.00)	96 (64.00)	36 (24.00)
7.	Newspaper	27 (18.00)	95 (63.33)	28 (18.67)
8.	Advertisement	17 (11.33)	77 (51.33)	56 (37.34)
9.	Direct from the developers	13 (08.67)	97 (64.66)	40 (26.67)
10.	Internet	76 (50.67)	64 (42.67)	10 (06.66)
11.	Social media	77 (51.33)	63 (42.00)	10 (06.67)

(Figure in parentheses indicate the percentage)

Further, it was observed that 64.66 per cent of grape growers get information “Occasionally” from the developers of app, whereas, 64.00 per cent of the grape growers “Occasionally” get information through demonstration sources, 63.33 per cent of the grape growers get information “Occasionally” through newspaper sources, 60.66 per cent of the grape growers get information “Occasionally” through meetings, 52.67 per cent of individuals get information “Occasionally” from their relatives and 51.33 per cent of the individuals get information “Occasionally” through advertisements and progressive farmers. Similarly, 49.33 per cent of the individual get information “Occasionally” through neighbors and 47.33 per cent of the individuals get “Regular” information through their friends. These findings are partially in line with the findings of Patil (2016).

4.1.8 Innovativeness

Innovativeness denotes the degree to which an individual adopt new ideas as compared to the other members of society. It significantly affects the adoption of new techniques and methods developed in the farming sector. As Grape Master App consultancy service is a new way to overcome previous hurdles in cultivation of grapes, it requires considerable innovative thinking for its adoption. Accordingly, the innovativeness level of an individual was collected and categorized and tabulated in Table 4.8 and Fig. 10.

Table 4.8. Distribution of grape growers according to their level of Innovativeness

Sr. No.	Category	Frequency (N=150)	Percentage
1.	Low (Upto 16)	35	23.33
2.	Medium (17 to 22)	87	58.00
3.	High (23 and Above)	28	18.67
	Total	150	100.00
R=6		H.V.=28	L.V.=10

The data in Table 4.8 revealed that more than half (58.00%) of the respondents were having medium level of innovativeness, followed by 23.33 per cent of the respondents had low level of innovativeness and 18.67 per cent of the respondents had high level of innovativeness.

Majority of the respondents insist that farmers should be receptive to change and most of the farmers want to take part in new initiatives that will be developed through this app. Majority of the respondents agreed that sufficient training regarding modern apps will develop confidence among the farmers.

These findings are partially in line with the findings of Chavan (2017).

The frequency-wise innovativeness presented in three-point continuums i.e. agree, disagree and undecided. The nature of innovativeness of the respondents is presented in Table 4.8.1.

Table 4.8.1. Distribution of grape growers according to their Innovativeness

Sr. No.	Statements	Agree	Disagree	Undecided
1.	Should farmers be upto date about knowledge of latest technology	137 (91.33)	00 (00.00)	13 (08.67)
2.	Farmers should be receptive to change	58 (38.67)	00 (00.00)	92 (60.67)
3.	They should be innovator or early adopters	63 (42.00)	15 (10.00)	72 (48.00)
4.	Sufficient training regarding modern apps brings confidence among farmers	100 (66.67)	11 (07.33)	39 (26.00)
5.	One should wait to see the results other than obtain before trying new app	26 (17.33)	56 (37.33)	68 (45.34)
6.	One should help others to adopt new technology	30 (20.00)	00 (00.00)	120 (80.00)
7.	If any new platform like e-learning launched by any private consultants I will take part in it	111 (74.00)	00 (00.00)	39 (26.00)
8.	Farmers should adopt new technology by deliberating pros and cons of it	124 (82.66)	01 (0.67)	25 (16.67)
9.	I want to overcome problems of grape cultivation by traditional ways	10 (06.67)	135 (90.00)	05 (03.33)
10.	If any such new app developed by organization or individual I will take part in it	89 (59.33)	43 (28.67)	18 (12.00)

(Figure in parentheses indicate the percentage)

It was observed from Table 4.8.1 that majority (91.33%) of the grape growers were agree followed by 8.67 per cent undecided and none was disagree with the statement that “Should

farmers be upto date about knowledge of latest technology”.

More than half (60.67%) of the grape growers were undecided followed by 38.67 per cent agree and none was disagree with the statement that “Farmers should be receptive to change”.

About 48.00 per cent of the grape growers were undecided followed by 42.00 per cent agree and 10.00 per cent were disagree with the statement that “They should be innovator or early adopters”.

More than two third (66.67%) of the grape growers were agree, followed by 26.00 per cent undecided and 7.33 per cent disagree with the statement that “Sufficient training regarding modern apps bring confidence among farmers”.

About 45.34 per cent of the grape growers were undecided followed by 37.33 per cent who disagreed and 17.33 per cent of the grape growers agree with the statement that “One should wait to see the results other than obtain before trying new app”.

Majority (80.00%) of the grape growers were undecided followed by 20.00 per cent were agree and none was disagree with the statement that “One should help others to adopt new technology”.

About three fourth (74.00%) of the grape growers were agree followed by 26.00 per cent undecided and none was disagree with the statement that “If any new platform like e-learning launched by any private consultants I will take part in it”.

About 82.66 per cent of the grape growers were agree, followed by 16.67 per cent undecided and 0.67 per cent of the grape growers were disagree with the statement that “Farmers should adopt new technology by deliberating pros and cons of it”.

Majority (90.00%) of the grape growers were disagree, followed by 6.67 per cent were agree and 3.33 per cent of the grape growers were undecided with the statement that “I want to overcome problems of grape cultivation by traditional ways”.

Majority (59.33%) of grape growers were agree followed by 28.67 per cent disagree and 12.00 per cent of the grape growers were undecided with the statement that “If any such new app developed by organization or individual I will take part in it”. These findings are in line with findings of Rao (2013).

4.1.9 Techno savviness

In the present study techno savviness denotes how the respondent is proficient in adoption of new technology. Information regarding techno savviness of an individual is presented in Table 4.9 and Fig.11.

The data in Table.4.9 revealed that more than half (50.67%) of the respondents were having high level of techno savviness, followed by 41.33 per cent of the respondents having medium level of techno savviness and 8.00 per cent of the respondents having low level of techno savviness.

Table 4.9. Distribution of grape growers according to their level of techno savviness

Sr. No.	Category	Frequency (N=150)	Percentage
1.	Low (upto 18)	12	08.00
2.	Medium (19 to 23)	62	41.33
3.	High (24 and above)	76	50.67
	Total	150	100.00
R=5.33		H.V.=29	L.V.=13

This finding is partially in line with the findings of Devkule (2017).

The frequency-wise distribution of innovativeness is presented in three-point continuum i.e., agree, disagree and undecided. The nature of innovativeness of the respondents is presented in Table 4.9.1.

Table 4.9.1. Distribution of grape growers according to their Techno savviness

Sr. No.	Statements	Agree	Disagree	Undecided
1.	I am always eager to know about new farm technologies.	129 (86.00)	01 (0.67)	20 (13.33)
2.	I efficiently use modern technology in daily life.	91 (60.67)	03 (02.00)	56 (37.33)
3.	I don't believe in new farm technology.	00 (00.00)	123 (82.00)	27 (18.00)
4.	Doesn't hesitate to adopt new farm technology.	116 (77.33)	00 (00.00)	34 (22.67)
5.	Want to stick to traditional farm practices.	00 (00.00)	130 (86.67)	20 (13.33)
6.	Use modern techniques to encounter farm problems.	120 (80.00)	00 (00.00)	30 (20.00)
7.	Not ready to take risk regarding the adoption of new technological developments.	00 (00.00)	126 (84.00)	24 (16.00)
8.	I regularly use different modified information and suggestions made by experts.	81 (54.00)	02 (01.33)	67 (44.67)
9.	Want to share technological developments to others.	74 (49.33)	01 (0.67)	75 (50.00)
10.	I am satisfied by the use of new technological development.	76 (50.67)	40 (26.67)	34 (22.66)

(Figure in parentheses indicate the percentage)

It was observed from the Table 4.9.1 that a large majority (86.00%) of the grape growers were agree, followed by 13.33 per cent undecided and 0.67 per cent were disagree with the statement that “I am always eager to know about new farm technologies”.

It was observed from the above table that more than half (60.67%) of the grape growers were agree, followed by 37.33 per cent undecided and 2.00 per cent were disagree with the statement that “I efficiently use modern technology in daily life”.

Majority (82.00%) of the grape growers were disagree, followed by 18.00 per cent were undecided and none was agree with the statement that “I want to overcome problems of grape

cultivation by traditional ways”.

More than three fourth (77.33%) of the grape growers were agree, followed by 22.67 per cent undecided and none was disagree with the statement that “Doesn’t hesitate to adopt new farm technology”.

A large majority (86.67%) of the grape growers were disagree followed by 13.33 per cent were undecided and none was agree with the statement that “Want to stick to traditional farm practices”.

It was observed from the above table that majority (80.00%) of the grape growers were agree followed by 20.00 per cent undecided and none was disagree with the statement that “Used modern techniques to encounter farm problems”.

A large majority (84.00%) of the grape growers were disagree, followed by 16.00 per cent were undecided and none was agree with the statement that “Not ready to take risk regarding the adoption of new technological developments”.

More than half (54.00%) of the grape growers were agree followed by 44.67 per cent undecided and 1.33 per cent were disagree with the statement that “I regularly use different modified information and suggestions made by experts”.

An half (50.00%) of the grape growers were undecided, followed by 49.33 per cent agree and 0.67 per cent of the grape growers were disagree with the statement that “Want to share technological developments to others”.

About 50.67 per cent of the grape growers were agree followed by 26.67 per cent disagree and 22.66 per cent of the grape growers were undecided with the statement that “I am satisfied by the use of new technological development”. These findings are in line with Devkule (2017).

4.2 Utilization of Grape Master App by grape growers

Utilization refers to the extent and purpose of utilization of Grape Master App by grape growers. Accordingly, the information pertaining to the level of utilization of Grape Master App by grape growers was collected, analyzed and tabulated in Table 4.10 and Fig. 12.

Table 4.10. Distribution of grape growers according to their utilization pattern

Sr. No.	Category	Frequency (N=150)	Percentage
1.	Low (Upto 41)	13	8.67
2.	Medium (42 to 52)	70	46.66
3.	High (53 and Above)	67	44.67
	Total	150	100.00
	R=11.33	H.V.=64	L.V.=30

The results obtained from the Table 4.10 revealed that 46.67 per cent of the respondents had medium level of utilization, while, 44.66 per cent of the individuals had high and 8.67 per cent of them had low utilization pattern.

From the above results it may be concluded that majority of the respondents had medium level of utilization. The possible reason might be that as it is paid subscription app seriousness among the grape growers may be high. These findings are partially in line with the findings of Shelke (2020).

4.2.1 Extent of utilization of Grape Master App by grape growers

It refers to utilization of Grape Master App by grape growers for various purposes. The data is presented in Table 4.11.

Table 4.11. Distribution of grape growers according to Utilization Extent of Grape Master App

Sr. No.	Utilization extent	Frequency (N=150)	
		Yes	No
1.	Get information about weather forecasting from Grape Master App.	144 (96.00)	6 (04.00)
2.	Get information about disease management of grapes.	143 (95.33)	7 (04.67)
3.	Get information about pest management of Grapes.	131 (87.33)	19 (12.67)
4.	Get information about nutrient management of grapes.	134 (89.33)	16 (10.67)
5.	Get daily updates regarding grape farming.	135 (90.00)	15 (10.00)
6.	Grape Master App provide suggestions after observation of grape plot.	143 (95.33)	7 (04.67)
7.	Grape Master App provide schedule and package of practices for grapes.	146 (97.33)	4 (02.67)

(Figure in parentheses indicate the percentage)

The data in Table 4.11 revealed that a large majority (96.00%) of the grape growers gets information about maximum and minimum temperatures, humidity, wind speed and atmospheric pressure related information. They also replied that they get five days early weather updates of their area in which Grape Master App provide wind speed and humidity related information which is essential in grape farming.

Further, a large majority (95.33%) of the respondents reported that they get information regarding disease management through chemical measures, biological measures and cultural measures in grape cultivation. In chemical measures they also provide information about new chemicals available in the market. While, grape growers use this information by applying this measures to their plots. They also said that Grape Master App provide the feature of sending field photos of infected crop plot and thereby they get their solutions. They added that Grape Master App team visit their farms on various occasions and provide necessary solutions immediately on the field.

The data in Table 4.11 pointed that majority (87.33%) of the grape growers get information about major pests in grape such as mealy bugs, thrips and mites in PDF format. Occasionally the updates from NRC Grapes are also provided. They also provide information

regarding biological control through preservation of natural enemies and egg parasitoids and also suggest about cultural control such as clearing the field residues and soil solarisation.

The data in above table revealed that a large majority (89.33%) of the grape growers after submitting the soil report on Grape Master App, they provide the guidance on the basis of requirements of soil. Hence, minimizing the extra expenditure on fertilizers. They also provide information about integrated nutrient management. Grape growers used this guidance by making changes to their traditional methods of farming by accepting the suggestions of Grape Master App.

A large majority (90.00%) of the grape growers pointed that they get regular updates regarding grape cultivation such as daily scheduling of spraying, irrigating field, harvesting stages and information before damage in crop. They provide market information and also provide information from National Research Centre of Grapes occasionally.

The data from above Table 4.11 revealed that large majority (95.33%) of the respondents get to know about precise solution on their crop damages as well as deficiencies of certain nutrients and information about how to maintain standard quality grapes after observation of their plot by subject matter specialist.

Finally, it was observed from utilization of Grape Master App that majority (97.33%) of the grape growers get schedule of their farm practices on daily basis starting from day one. After registration of plot daily schedule is updated on the app providing information about which operations needs to be done on that day. Majority of the grape growers use this schedule by doing those operations on particular day. These findings are in line with Shelke (2020).

4.2.2 Forms of information dissemination on Grape Master App

It refers to the forms in which Grape Master App provides consultancy services information to its users. Accordingly, the information was collected, analyzed and tabulated in Table 4.12 and Fig. 13.

Table 4.12. Distribution of grape growers according to forms of information dissemination they get from Grape Master App

Sr. No.	Statement	Always	Frequently	Never
1.	Audio messages	33 (22.00)	85 (56.67)	32 (21.33)
2.	Videos	100 (66.67)	32 (21.33)	18 (12.00)
3.	PDF's, doc. etc.	07 (04.66)	26 (17.33)	117 (78.00)
4.	Images	07 (04.66)	66 (44.00)	77 (51.33)
5.	Written messages	27 (18.00)	00 (00.00)	123 (82.00)

(Figure in parentheses indicate the percentage)

Above results in Table 4.12 revealed that 56.67 per cent of the grape growers got

information ‘Frequently’ followed by 22.00 per cent of the grape growers who got information ‘Always’ through audio message and 21.33 per cent of them ‘Never’ got information in audio message form.

Further, 66.67 per cent of the grape growers ‘Always’ got information in ‘Video’ form followed by 21.33 per cent of them got information ‘Frequently’ and 12.00 per cent of them ‘Never’ got information in video forms.

The data in Table 4.12 also revealed that 78.00 per cent of the grape growers ‘Never’ got information in the forms of PDF’s, doc etc. followed by 17.33 per cent who got information ‘Frequently’ and 4.66 per cent of them ‘Always’ got information in the forms of PDF’s, doc etc.

The data further revealed that 51.33 per cent of the grape growers ‘Never’ got information in the forms of images followed by 44.00 per cent who got information ‘Frequently’ and 4.66 per cent of them ‘Always’ got information in the forms of images.

Finally, it was observed from the above Table that 82.00 per cent of the grape growers ‘Never’ got information through written messages followed by 18.00 per cent of them ‘Always’ got information through written messages. These findings are partially in line with the findings of Patil (2016).

4.2.3 Duration of utilization of Grape Master App per week

It refers to the amount of time spent by grape growers per week on Grape Master App for its various features. Accordingly, the information pertaining to duration of utilization of Grape Master App by grape growers is presented in Table 4.13 and Fig. 14.

Table 4.13. Distribution of grape growers according to their duration of utilization of Grape Master App

Sr. No.	Duration of utilization	Frequency (N=150)	Percentage
1.	30 min	12	08.00
2.	30 min to 1 hrs.	20	13.33
3.	1 to 2 hrs.	55	36.67
4.	2 to 3 hrs.	63	42.00
	Total	150	100.00

It was observed from Table 4.13 that 42.00 per cent of the grape growers spent around 2 to 3 hours followed by 36.67 per cent of the individuals spend 1 to 2 hrs, 13.33 per cent of the individuals spend 30 min to 1 hrs and 8.00 per cent of the individuals spend around 30 minutes for Grape Master App in a week. These findings are in line with Aboh (2008).

4.2.4 Utilization purpose of Grape Master App

It refers to the utilization of Grape Master App according to its features. Various features of Grape Master App are classified into eleven parts. The information regarding the purpose of utilization of Grape Master App is given in Table 4.14 and Fig. 15.

Table 4.14. Distribution of grape growers according to their utilization purpose

Sr. No.	Features in Grape Master App	Very Frequently	Frequently	Less Frequently	Not At All
1.	For disease management	26 (17.33)	83 (55.33)	40 (26.67)	1 (0.67)
2.	For pest management	35 (23.33)	50 (33.33)	64 (42.67)	1 (0.67)
3.	For nutrient management	36 (24.00)	64 (42.67)	47 (31.33)	3 (02.00)
4.	Daily working schedule	11 (07.33)	47 (31.33)	76 (50.67)	16 (10.67)
5.	For obtaining daily updates regarding grape cultivation	9 (06.00)	46 (30.67)	83 (55.33)	12 (08.00)
6.	For grafting schedule	7 (04.67)	27 (18.00)	101 (67.33)	15 (10.00)
7.	Obtaining observation report of grape plot	6 (04.00)	36 (24.00)	93 (62.00)	15 (10.00)
8.	For obtaining weather Forecast	3 (02.00)	31 (20.67)	96 (64.00)	20 (13.33)
9.	For watching farm Videos	10 (6.67)	38 (25.33)	72 (48.00)	30 (20.00)
10.	Obtaining feedback	7 (04.67)	53 (35.33)	70 (46.67)	20 (13.33)
11.	Maintaining daily diary	0 (00.00)	33 (22.00)	36 (24.00)	81 (54.00)

(Figure in parentheses indicate the percentage)

The results obtained from Table 4.14 revealed that frequently used features of Grape Master App by the respondents were disease management (55.33%) and nutrient management (42.67%).

It was observed that the less frequently used features of Grape Master App by the respondents were grafting schedule (67.33%), followed by weather forecast (64.00%), obtaining report of their plot (62.00%), obtaining daily updates regarding grapes cultivation (55.33%), daily working schedule (50.67%), for watching farm videos (48.00%), obtaining feedback (46.67%) and pest management (42.67%).

Among very frequently used features nutrient management (24.00%), pest management (23.33%) and disease management (17.33%) were mostly used.

Further, 54.00 per cent of the grape growers used Grape Master App for maintaining daily diary. These findings are partially in line with the findings of Shelke (2020).

4.3 Relationship Between Personal, Socio-economic and Communicational Characteristics and Utilization of Grape Master App

The relationship of each independent variable with the utilization pattern of Grape Master App is presented in Table 4.15.

Table 4.15. Relationship between dependent and independent variables

Sr. No.	Independent variables	Correlation coefficient (r) value
1.	Age	-0.161*
2.	Education	0.217**
3.	Family size	0.143 ^{NS}
4.	Annual income	0.212**
5.	Knowledge	0.186*
6.	Social participation	0.022 ^{NS}
7.	Sources of information	0.213**
8.	Innovativeness	0.237**
9.	Techno savviness	0.182*

** Significant at 0.01 level

* Significant at 0.05 level

NS = Non-Significant

4.3.1 Age and utilization of Grape Master App

The correlation between age and utilization pattern of Grape Master App was found to be negative which can be interpreted as with increase in the age of the respondent utilization of Grape Master App is decreasing and hence age is influencing the utilization of Grape Master App. Therefore, the hypothesis that age is related to utilization is accepted. These findings are in line with the findings of Pawar (2019) and Shelke (2020).

4.3.2 Education and utilization of Grape Master App

The correlation between education and utilization pattern of Grape Master App was found to be positively significant. Hence, it can be concluded from the correlation value that with increase in education there is increase in utilization of Grape Master App. Hence, the respondents having more educational status are using the app to greater extent as compared to those who had low education status. Hence, hypothesis that education is related to utilization of Grape Master App is accepted. These findings are in tune with the findings of Meena *et al.* (2011).

4.3.3 Family size and utilization of Grape Master App

The correlation between family size and utilization of Grape Master App is found to be non-significant. Hence, it can be concluded from the above table that family size has no relation with utilization of Grape Master App by users. Hence, hypothesis that family size is related to utilization of Grape Master App is rejected. These findings are in line with the findings of Totare (2016).

4.3.4 Annual income and utilization of Grape Master App

The correlation between annual income and utilization of Grape Master App is positive

and significant. Hence, it can be concluded that respondents having more income are using the app more as compared to the respondents having low annual income. It means that annual income of the respondent is significantly affecting the utilization of this app. Hence, hypothesis that annual income is related to utilization of Grape Master App is accepted. These findings are in line with findings of Pawar (2019).

4.3.5 Knowledge and utilization of Grape Master App

The correlation between the knowledge level and utilization pattern of Grape Master App is positive and significant. Hence, it can be concluded that as knowledge level of an individual increases its utilization also increases. We can also conclude from the above table that utilization of Grape Master App requires its knowledge by the respondents. Therefore, the hypothesis that knowledge level of respondents is related to utilization of Grape Master App is accepted. These findings are in line with the findings of Ajayi *et al.* (2013).

4.3.6 Social participation and utilization of Grape Master App

The correlation between social participation and utilization of Grape Master App is positive which shows that utilization of Grape Master App is not dependent on social participation of an individual. Hence, hypothesis that social participation is related to utilization of Grape Master App is rejected. These findings did not match other findings.

4.3.7 Sources of information and utilization of Grape Master App

The relationship between sources of information and utilization is positive and significant. Hence, it can be concluded from the above table that there is increase in utilization of Grape Master App as the information sources increases. It can also be concluded from the relationship that sources of information significantly affects the utilization as the awareness about the use of information is timely received by the respondents. Hence, hypothesis that sources of information are related to utilization of Grape Master App is accepted. These findings are in tune with the findings of Dhaka and Chayal (2010).

4.3.8 Innovativeness and utilization of Grape Master App

The relationship between innovativeness and utilization is positive and significant. Hence, it can be concluded from the above table that as innovativeness increases there is increase in the utilization of Grape Master App. Hence, hypothesis that innovativeness is related to utilization of Grape Master App is accepted. These findings supported the findings of Kafura *et al.* (2016).

4.3.9 Techno savviness and utilization of Grape Master App

From the above Table it was found that the correlation between techno savviness and utilization is positive and significant. This means that utilization depends on techno savviness. Higher the individual proficient in technology adoption higher is the utilization. Hence, hypothesis that techno savviness is related to utilization of Grape Master App is accepted. These findings are in line with the findings of Devkule (2017).

4.4 Constraints faced by the respondents while using Grape Master App

Constraints in adoption of new technological developments never end. As this app is new for users there are certain constraints while using this app. However they can be minimized to certain extent. Hence, it is important to consider constraints faced by users while using Grape Master App. The grape growers were requested to express the constraints faced by them. Accordingly, the data is presented in Table 4.16 and Fig. 16.

Table 4.16. Constraints faced by the respondents while using Grape Master App

Sr. No.	Constraints	Frequency (N=150)	Percentage	Rank
1.	Time required for photo uploading on app	110	73.33	I
2.	Clarification of message is difficult	90	60.00	II
3.	Registration problems like user name, password etc.	86	57.33	III
4.	Time constraints	65	43.33	IV
5.	Physical problems such as eye pain, headache.	32	21.33	V
6.	Decrease in time spent with family	29	19.33	VI
7.	Age	24	16.00	VII
8.	Doubts in understanding literature	18	12.00	VIII
9.	Language as a barrier	06	04.00	IX
10.	Data storage problems	05	03.33	X

The data in Table 4.16 indicated that nearly three fourth (73.33%) of the grape growers had the constraint of time required for photo uploading on app followed by clarification of message is difficult (60.00%), registration problems like user name, password etc. (57.33%), time constraints (43.33%), physical problems such as eye pain, headache (21.33%), decrease in time spent with family (19.33%), Age (16.00%), doubts in understanding literature (12.00%), language as a barrier (4.00%) and data storage problems (3.33%). These findings are partially in line with the findings of Patil (2016).

4.5 Suggestions made by grape growers for further modification in Grape Master App

The grape growers were asked to provide suggestions in response to the limitations they faced in making changes to the mobile apps. These suggestions are presented in Table 4.17 and Fig. 17.

It was found from Table 4.17 that majority (70.00%) of the grape growers suggested to provide seasonal market information on daily basis, 63.33 per cent of the grape growers suggested to develop other similar consultancy apps for different crops. 45.33 per cent of the grape growers suggested that app should be updated regularly. Also, 42.00 per cent of the grape growers suggested that user guide information should be provided to customers and 40.00 per

cent of them suggested that government institutes should make intervention in consultancy services.

Table 4.17. Suggestions made by respondents for further modification in Grape Master App

Sr. No.	Suggestions	Frequency (N=150)	Percentage	Rank
1.	Provide seasonal market information on daily basis.	105	70.00	I
2.	Other similar apps on different crops should be designed by the developers.	95	63.33	II
3.	App should be updated regularly.	68	45.33	III
4.	User guide information should be provided to customers.	63	42.00	IV
5.	Government institutes should make intervention in consultancy services.	60	40.00	V
6.	Individual focus should be given to each customer.	56	37.33	VI
7.	Export related quality standards of products and the procedures to maintain good quality grapes.	55	36.67	VII
8.	App should provide NRC Grapes data on the same plat form on regular basis.	48	32.00	VIII
9.	It should be made more user friendly.	45	30.00	IX
10.	Irrigation scheduling should be modified with moisture meter reading.	42	28.00	X

Further, it was found that 37.33 per cent of the grape growers suggested for individual focus on customer ensuring quality production. 36.67 per cent of the grape growers suggested for export related quality standards of products and the procedures to maintain good quality grapes, 32.00 per cent respondents suggested that the app should provide NRC Grapes data on regular basis, 30.00 per cent respondents suggested to make this App as more gender friendly and 28.00 per cent of the grape growers suggested that irrigation scheduling in the Grape Master App should be modified with moisture meter reading. These findings are in line with findings of Sinare (2019).

5. SUMMARY, CONCLUSIONS AND IMPLICATIONS

In the present situation of changing climate, fragmented and small land holdings, non-judicious use/limited water availability, indiscriminate application of fertilizers and pesticides, increasing fuel costs, lack of efficient market opportunities, farmers need is access to timely, reliable and relevant information which can support the complexity of their farming systems, which, in present system is difficult for public extension system so there is need to develop “need-based” capacity building of small-scale men and women farmers as well as gaining access to reliable information in increasing their productivity and profitability for livelihoods improvements.

Agriculture accounts for nearly 17 per cent of India's GDP, making agriculture and its related industries a lucrative venture. As a result, it requires powerful tools and technology such as robust connectivity and e-mobility. Information is power in the realm of ICTs. Farmers benefit from information regarding policies, appropriate agricultural practises, market prices of commodities, current demand for commodities and many agricultural useful schemes. As a result, it is critical for farmers to have all of this information at their fingertips. Even though all information is available in the public domain, accessing it is a time-consuming effort for farmers. Apps, which are mobile or smartphone applications could provide all of this information as seasons and climate change. One of the platforms where a farmer can get all solutions and information in one touch is the mobile app. Smartphone apps have transformed connectivity and are now being used to distribute agricultural information to farmers. Thus, keeping in view the increasing use of mobile apps by the farmers, the present investigation was conducted with the following objectives:

1. To study the profile of users of Grape Master App.
2. To find the utilization of Grape Master App by the users.
3. To delineate the relationship between profile of users with utilization of Grape Master App.
4. To find out problems faced by users of Grape Master App.
5. To obtain the suggestions made by users.

The present study was conducted in Nashik district of Maharashtra. A list of users from Dindori and Niphad tahsils was obtained from Grape Master App team. Purposive sampling technique was used to draw sample of 150 user farmers.

In the light of the objectives set for the study, an interview schedule was prepared which included relevant questions for seeking information about all the aspects related to profile of users and also consisted items related to utilization of Grape Master App, their extent and purpose of use towards contents in a app, problems faced by them while using the app and suggestions given by them. The data was collected through personal interview of user farmers of Grape Master App. The data collected was scored, tabulated and analysed by using statistical

tools such as frequency, percentage, range and correlation coefficient.

5.1 Summary

The salient findings of current research were as follows:

- 5.1.1 Profile of users of Grape Master App.
- 5.1.2 Utilization of Grape Master App by the users.
- 5.1.3 Relationship between profiles of users with utilization of Grape Master App.
- 5.1.4 Problems faced by users regarding use of Grape Master App.
- 5.1.5 Suggestions given by the respondents for modifications in Grape Master App.

5.1.1 Profile of Users of Grape Master App

1. Majority of users (48.00%) belonged to medium age group (36 to 55 years).
2. More than one-third of users (37.33%) were educated upto higher secondary school (11th to 12th Standard).
3. Majority of users (58.67%) had small (upto 7 members) family size.
4. More than half (56.00%) of users had medium level of annual income.
5. Majority of users (52.67%) had medium knowledge level.
6. Substantial (62.67%) of the users had low social participation.
7. Majority of users (72.67%) had medium sources of information.
8. Majority of users (58.00%) had medium level of innovativeness.
9. Majority of users (50.67%) had high level of techno savviness.

5.1.2 Utilization of Grape Master App by the users

Regarding utilization of Grape Master App results shown that majority of the (46.66%) of respondents had medium level of utilization of app.

5.1.3 Relationship Between Profile of Users with Utilization of Grape Master App

The variables namely education, annual income, knowledge, sources of information, innovativeness and techno savviness were positively related to the utilization of Grape Master App. Whereas, family size and social participation did not show any significant relation with utilization of Grape Master App. However, age of the respondents had showed negative relationship with utilization of Grape Master App.

5.1.4 Problems Faced By Users Regarding Use of Grape Master App

The study revealed that majority of users (73.33%) faced problem of time required for photo uploading on app, followed by clarification of message is difficult (60.00%), registration problems like user name, password etc., (57.33%), time constraints (43.33%) and physical problems such as eye pain, headache (21.33%), decrease in time spent with family (19.33%), age related problems (16.00%), doubts in understanding literature (12.00%), language as a barrier (04.00%) and data storage problems (03.33%).

5.1.5 Suggestions for Improvement in Grape Master App

1. Study showed that majority of users (70.00%) had suggested to provide seasonal market information on daily basis.

2. Majority (63.33%) of users suggested to develop other similar apps on different crops.
3. Majority of respondents (45.33%) suggested that app should be updated regularly.
4. 42.00 per cent of users suggested to provide user guide information to customers.
5. 40.00 per cent of users suggested that government institutes should make intervention in consultancy services.
6. 37.33 per cent of users suggested that individual focus should be given to each customer.
7. 36.67 per cent of users suggested that export related quality standards of products and the procedures to maintain good quality grapes should be included in app.
8. 32.00 per cent of users suggested that app should provide NRC Grapes data on the same platform on regular basis.
9. 30.00 per cent of users suggested that the app should be made more user friendly.
10. 28.00 per cent of users suggested that irrigation scheduling should be modified with moisture meter reading.

5.2 Conclusions

The present investigation tried to detect the utilization of Grape Master App by grape growers. The conclusions of present study are as follows.

1. It was observed that majority of users belonged to middle age group, most of them were educated upto higher secondary school, had small family size, medium level of annual income and medium knowledge level. Majority of respondents were had medium level sources of information, low level of social participation and had medium level of innovativeness and majority of them having high level of techno savviness.
2. The study revealed that majority of the respondents had medium level utilization of Grape Master App.
3. It was observed from present investigation that utilization purpose for disease management was most preferred feature among users followed by nutrient management, grafting schedule, weather forecast, obtaining observation report of their plot, for obtaining daily updates regarding grapes cultivation, for daily working schedule, for watching farm videos, obtaining feedback, for pest management and for maintaining daily diary.
4. Present investigation revealed that the variables namely, education, annual income, knowledge level, sources of information, innovativeness and techno savviness were positively related with the utilization of Grape Master App. Whereas, family size and social participation did not show any significant relation with utilization of Grape Master App. However, age of the respondents had showed negative relationship with utilization of Grape Master App.
5. It was observed that majority of users faced problems of time required for photo uploading on app, clarification of message is difficult, physical problem such as eye pain, headache, decrease

in time spent with family, registration problems like user name, password, doubts in understanding literature, language as a barrier and age constraint.

6. Majority of users suggested to provide seasonal market information on daily basis, to develop other similar apps on different crops, app should be updated regularly, user guide information should be provided, government institutes should make intervention in consultancy services, individual focus should be given to each customer, export related quality standards of products and the procedures to maintain good quality grapes should be included in app, app should provide NRC Grapes data on the same platform on regular basis, the app should be made more user friendly and irrigation scheduling should be modified with moisture meter reading.

5.3 Implications

The present research will help the grape growers and app developers. The findings will help them to make mobile apps more qualitative and useful. The findings of the present investigation led to following implications.

5.3.1 Action Implications

1. Grape Master App is providing private consultancy services in grape cultivation. Its usage by user farmers has benefited the farmers and its medium to high utilization indicates that other similar crop specific apps can be designed by government institution free of cost for consultancy in Nashik district such as for onion and other vegetables crop which are prone to heavy post-harvest and management losses. This will enhance the participation of small and marginal farmers in farm consultancy services.
2. Present study revealed that features in Grape Master App such as daily diary, farm videos are least utilized by user farmers. Hence, there is a need to enhance the quality of content provided in these features. Otherwise, these features can also be replaced by other features such as marketing features and raisin production features.
3. Constraints faced by users such as difficulty in understanding literature, photo uploading on app, registration problems such as user name, password etc. should be taken into account while designing mobile applications for farmers. Similarly, new updates should be provided in Grape Master App by developers so as to make it more user friendly.
4. Important suggestions made by user farmers such as provide daily market information, individual focus should be given to each customer, availability of NRC grape data on regular basis, irrigation scheduling modification by providing moisture meter reading should be addressed by app developers to enhance the utilization of Grape Master App.

5.3.2 Research Implications

1. As current investigation was confined to small size of geographical area of Nashik, the similar study needs to be replicated in covering the other areas so that the drawn inferences can be generalized to a greater extent.
2. Similar studies can be conducted after conclusive period to access the extent of utilization and benefits obtained by user farmers. Impact study of app can also be taken up.
3. However, present investigation will be beneficial as benchmark for further probe in similar types of studies.

6. LITERATURE CITED

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7. APPENDICES

**DEPARTMENT OF AGRICULTURAL EXTENSION AND COMMUNICATION
POST GRADUATE INSTITUTE
MAHATMA PHULE KRISHI VIDYAPEETH,
RAHURI-413722**

Researcher - Arbat Sadanand Prakash
Reg. No. - 019/183
Research Topic - Utilization pattern of Grape Master App by grape growers.
Research Guide - Dr. P. B. Kharde
 Associate Professor of Agril. Extension,
 Dept. of Agril. Extension and Communication and
 Officer Incharge, Communication Centre, MPKV, Rahuri

INTERVIEW SCHEDULE (PART I)

A. General Information

1. Name of the respondent-
2. Mobile No.-
3. Name of Village-
4. Name of Tahsil-
5. Name of District-

B. Personal, Socio-economic and Communicational Characteristics

1. Age-
2. Education-
3. Family Size-
4. Annual Income-

Sr. No.	Occupation	Income
1.	Crop Production	
2.	Dairy Farming	
3.	Poultry Farming	
4.	Goat Farming	
5.	Service	
6.	Other	
	Total	

(PART II)**5. Knowledge level of users about Grape Master App-**

- | | | |
|-------|---|---------------|
| i. | Does Grape Master App provide weather forecast? | Yes/No |
| ii. | For subscription registration fee required? | Yes/No |
| iii. | Do they provide visit for problems? | Yes/No |
| iv. | Do they provide information and suggestions regarding nutrient management of grape? | Yes/No |
| v. | Can we ask questions and get their feedback? | Yes/No |
| vi. | Is it necessary to have internet connectivity for its use? | Yes/No |
| vii. | What is the annual subscription fee of Grape Master App for registration? | |
| | a) Rs.2500 b) Rs.3000 c) Rs.5000 | |
| viii. | How we can access Grape Master App? | |
| | a) Online Mode b) Offline Mode c) Both | |
| ix. | Which services are provided by Grape Master App? | |
| | a) Nutrient management b) Disease management | |
| | c) Pest management d) All of the above | |
| x. | Do you get information about grafting? | Yes/No |
| xi. | Which months are recommended for pruning in grapes? | |
| | a) April-October b) Jan-July | |
| | c) Feb-August d) March-Sep | |
| xii. | How many languages are provided in Grape Master App? | |
| | a) 2 b) 3 c) 4 d) 5 | |

6. Social Participation

Sr. No.	Social Organization	Position		
		Member	Office Bearer	Not at all
A)	Formal Organization			
1)	Gram Panchayat			
2)	Panchayat Samiti			
3)	Zilla Parishad			
4)	Co-operative society			
5)	School committee			
B)	Informal Organization			
1)	Farmer Producer Organization (FPO's)			
2)	Grape Growers Association			
3)	Sahyadri Farms, Nashik.			
4)	Farmers association			
5)	Self-help groups			
6)	<i>Bhajani mandal</i>			
7)	Other			

7. Sources of Information

From whom you have received the information of Grape Master App?

Sr. No.	Social Organization	Frequency		
		Regular	Occasional	Never
1)	Friends			
2)	Neighbors			
3)	Relatives			
4)	Progressive farmer			
5)	Meeting			
6)	Demonstration			
7)	Newspaper			
8)	Advertisement			
9)	Direct from the developers			
10)	Internet			
11)	Social Media			

8. Innovativeness

Sr. No.	Statements	Agree	Disagree	Undecided
1.	Should farmers be upto date about knowledge of latest technology?			
2.	Farmers should be receptive to change.			
3.	They should be innovator or early adopters.			
4.	Sufficient training regarding modern apps brings confidence among farmers.			
5.	One should wait to see the results other than obtain before trying new app.			
6.	One should help others to adopt new technology.			
7.	If any new platform like e-learning launched by any private consultants I will take part in it.			
8.	Farmers should adopt new technology by deliberating pros and cons of it.			
9.	I want to overcome problems of grape cultivation by tradition always.			
10.	If any such new app developed by organization or individual I will take part in it.			

9. Techno-savviness

Sr. No.	Statements	Agree	Disagree	Undecided
1.	I am always eager to know about new farm technologies.			
2.	I efficiently use modern technology in daily life.			
3.	I don't believe in new farm technology.			
4.	Doesn't hesitate to adopt new farm technology.			
5.	Want to stick to traditional farm practices.			
6.	Use modern techniques to encounter farm problems.			
7.	Not ready to take risk regarding the adoption of new technological developments.			
8.	I regularly use different modified information and suggestions made by experts.			
9.	Want to share technological developments to others.			
10.	I am satisfied by the use of new technological development.			

(PART III)**10. A] Extent of Utilization of Grape Master App**

- i. Do you get information about weather forecasting from Grape Master App?

Yes/No

- a. If yes, what kind of information do you get? Describe in detail.

Response:

- b. What kind of information do you get about off season rainfall? Describe in detail.

Response:

- c. Do you get any weather updates? Describe in detail.

Response:

- d. Do you get information about heavy winds or storm that may be harmful for grapes? Describe.

Response:

- ii. Do you get information about disease management of grapes?

Yes/No

- a. What information do you get about disease management? Describe in detail.

Response:

- b. Do you get information regarding chemical control measures? Describe.

Response:

- c. Which options are provided by Grape Master App for effective disease management?

Response:

- d. Does they provide visit to your grape plot for your plot problems? If yes, how they solve your problems.

Response:

- iii. Do you get information about pest management of grapes?

Yes/No

- a. What information do you get about pest management? Describe in detail.

Response:

- b. How do you utilize it?

Response:

- c. Do they provide information from NRC Grape about pest management? Describe.

Response:

- d. Which information did you get about biological and cultural control measures of grapes? Describe.

Response:

- iv. Do you get information about nutrient management of grapes?

Yes/No.

- a. Do you get information about nutrient management as per growth stages of your crop? Describe.

Response:

- b. Do they provide guidance about integrated nutrient management? Describe.

Response:

- c. How do you utilize it? Describe.

Response:

- d. How do they guide you about nutrient management?

Response:

- v. Do you get daily updates regarding grape farming? **Yes/No.**

- a. If yes, then what kind of information did you get? Describe.

Response:

- b. Do they provide new research findings and developments from NRC Grape? Describe.

Response:

- c. When they provide you the updates?

- i. Before damage
- ii. After damage
- iii. At the time of damage.
- iv. Not at all.

- d. Do they provide any market information? **Yes/No**

- vi. Do they provide information after observation of your plot? Describe. **Yes/No**

Response:

- vii. Please indicate your duration of utilization of Grape Master App in hrs per week.

- a. 30 min.
- b. 30 min to 1 hrs.
- c. 1 to 2 hrs.
- d. 2 to 3 hrs.

- viii. Does Grape Master App provide schedule and package of practices for grapes? If yes then how do you utilize it? Describe. **Yes/No**

Response:

ix. Grape Master App provides information and guidance through which forms?

Sr. No.	Statement	Always	Frequently	Never
1.	Audio messages			
2.	Videos			
3.	PDF's, doc etc.			
4.	Images			
5.	Written messages			

B] Utilization purpose of Grape Master App

Sr. No.	Features in Grape Master App	Very Frequently	Frequently	Less Frequently	Not at all
1)	For disease management				
2)	For pest management				
3)	For nutrient management				
4)	Daily working schedule				
5)	For obtaining daily updates regarding grape cultivation.				
6)	For grafting schedule				
7)	Obtaining observation report of grape plot				
8)	For obtaining weather forecast				
9)	For watching the farm videos				
10)	Obtaining feedback				
11)	Maintaining daily diary				

(PART IV)**A) Constraints faced by respondents :(Problems encountered in using Grape Master App)**

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)
- 10)

B) Suggestions made by respondents

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)
- 10)

8. VITAE

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MASTER OF SCIENCE (AGRICULTURE)
in
AGRICULTURAL EXTENSION AND COMMUNICATION
2021

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Plate No. 1 : User Interface of Grape Master App

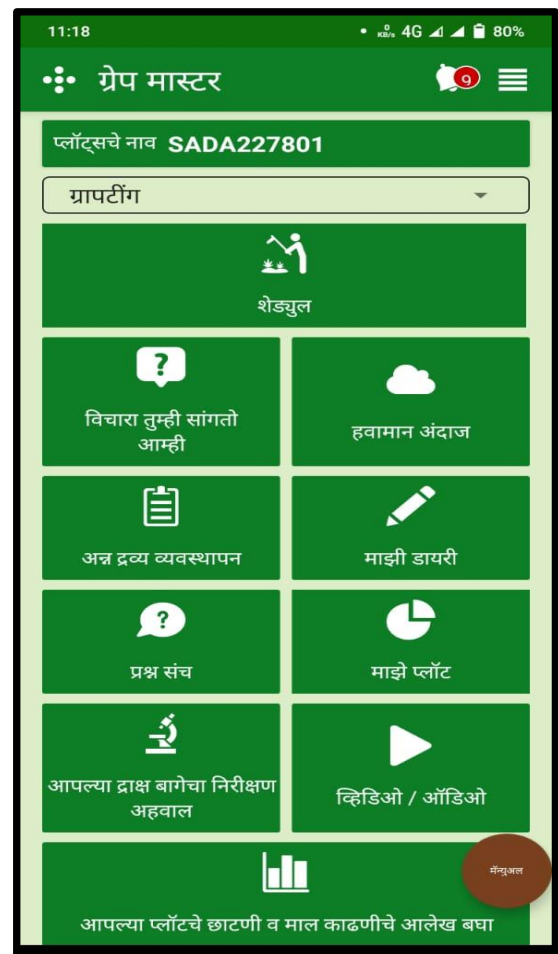


Plate No. 2 : Features in Grape Master App



Plate No. 3: A moment when researcher interviewing respondents at their field



Plate No. 4: A moment when researcher interviewing respondents at their field



Plate No. 5: A moment when researcher interviewing respondents at their field



Plate No. 6: A moment when researcher interviewing respondents at their field



Plate No. 7: A moment when researcher interviewing respondents at their field

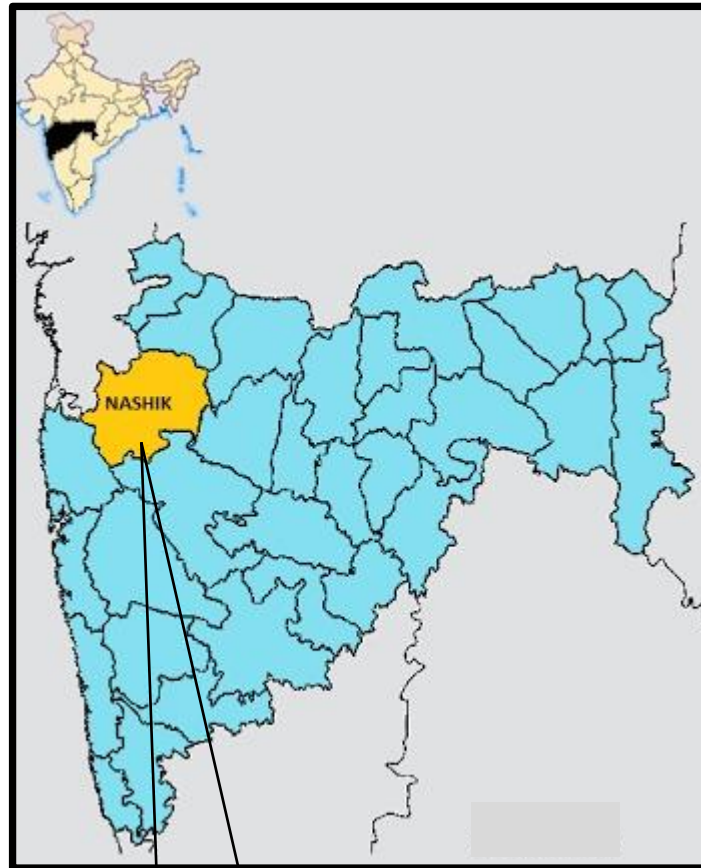


Fig. 1. Map of Nashik District

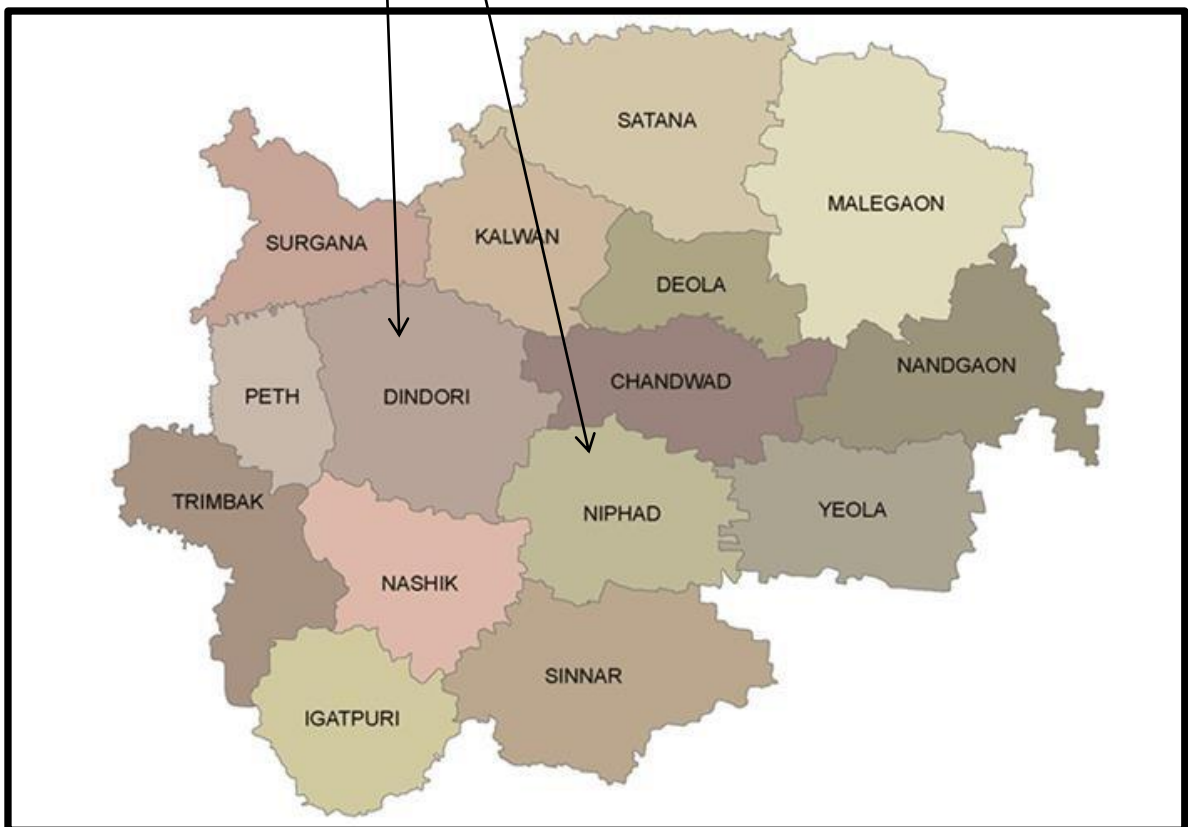


Fig. 2. Locale of study

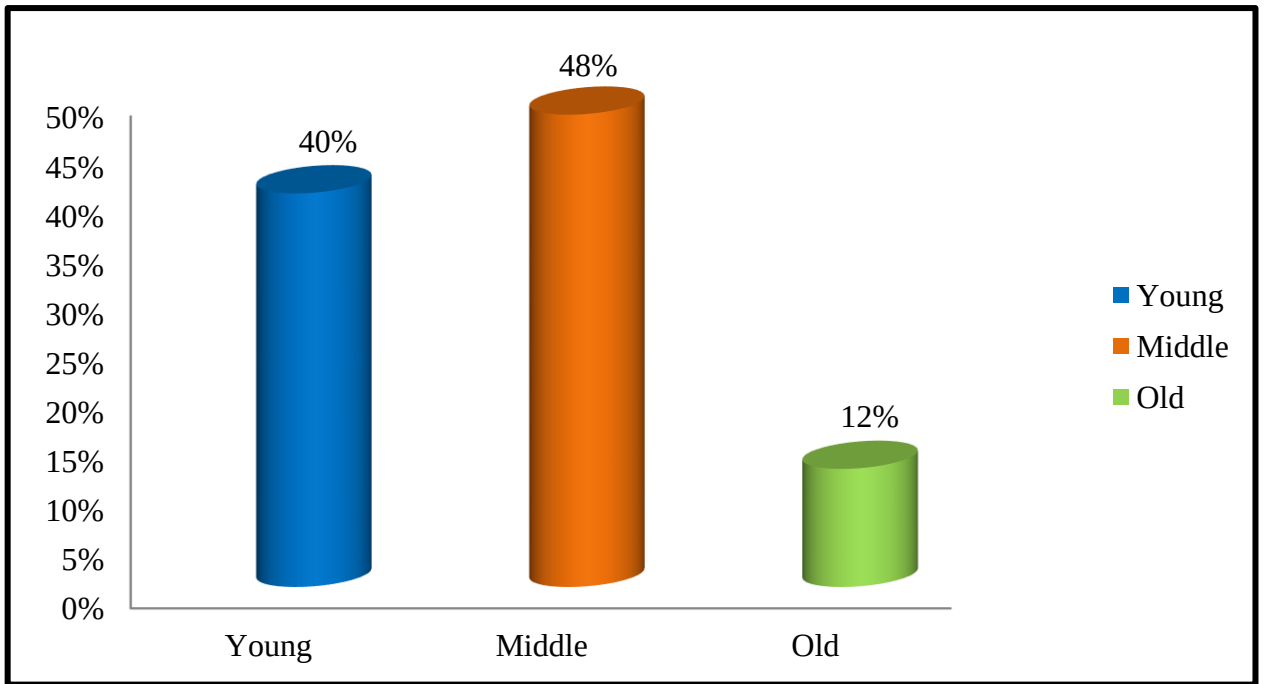


Fig. 3. Distribution of respondents according to their age

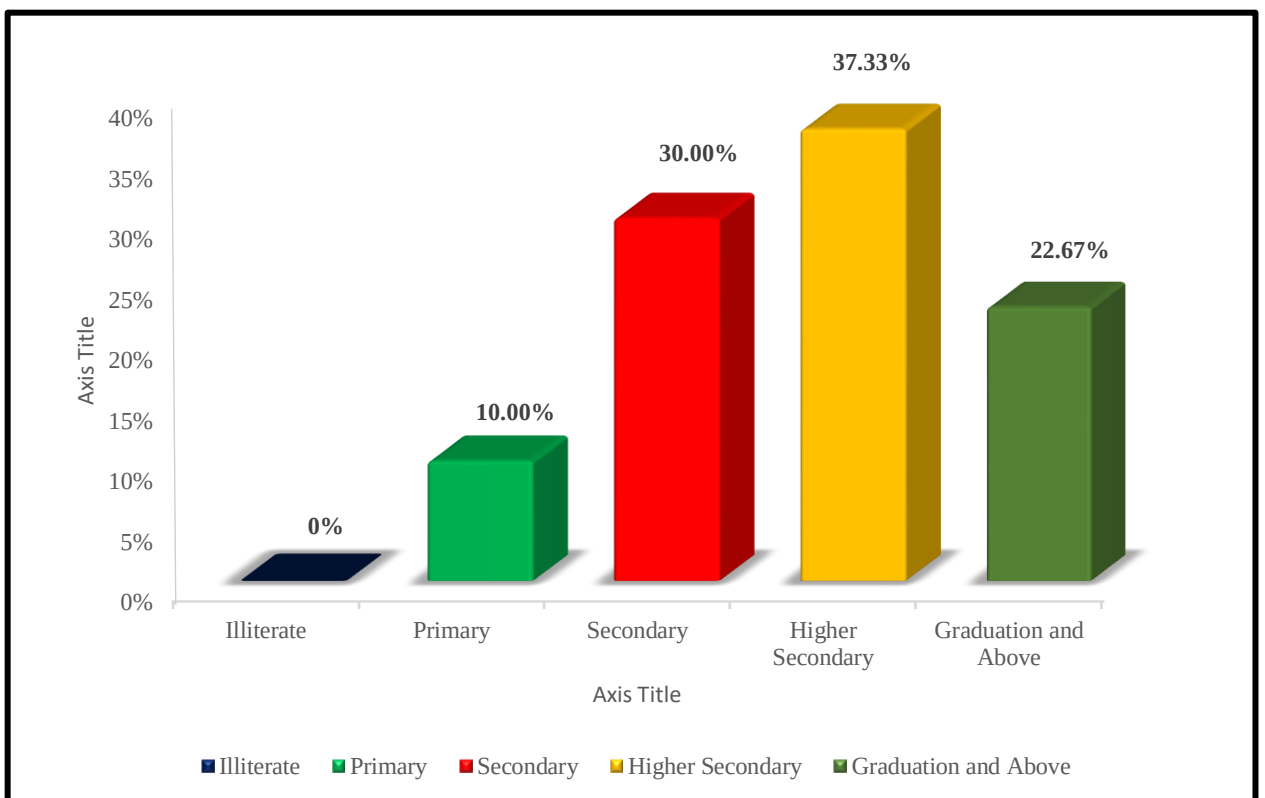


Fig. 4. Distribution of respondents according to their education

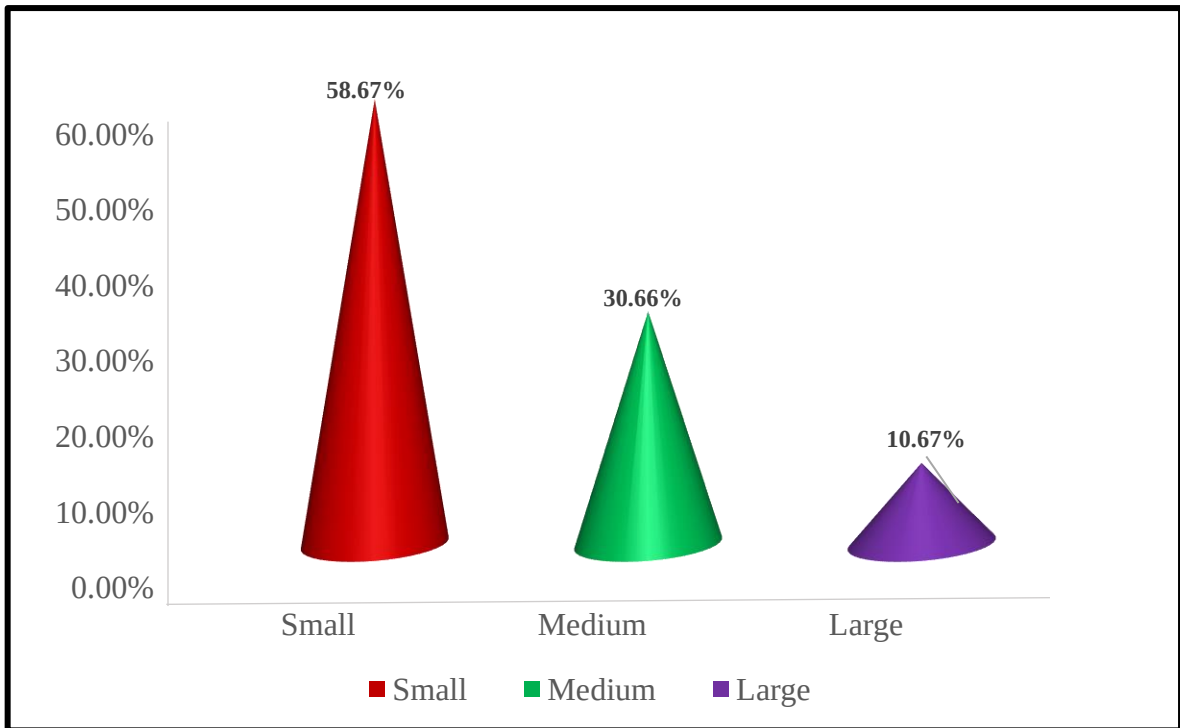


Fig. 5. Distribution of respondents according to their family size

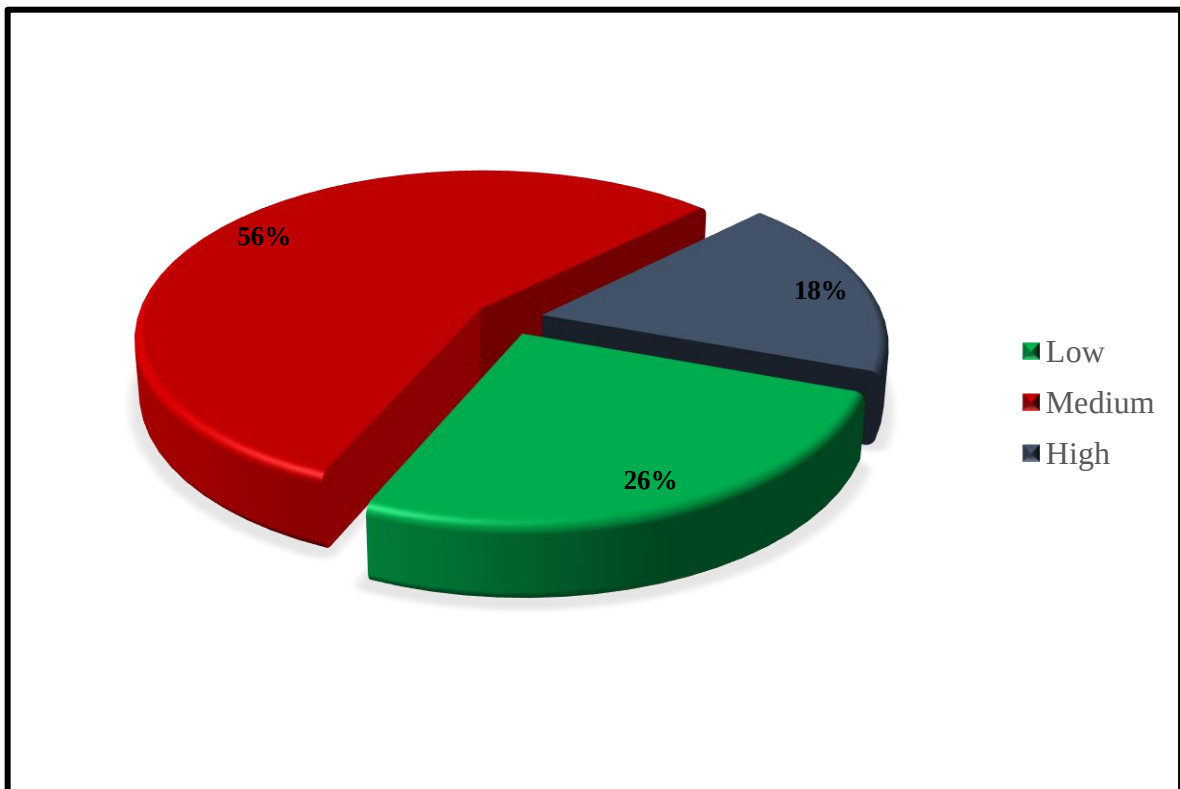


Fig. 6. Distribution of respondents according to their Annual income

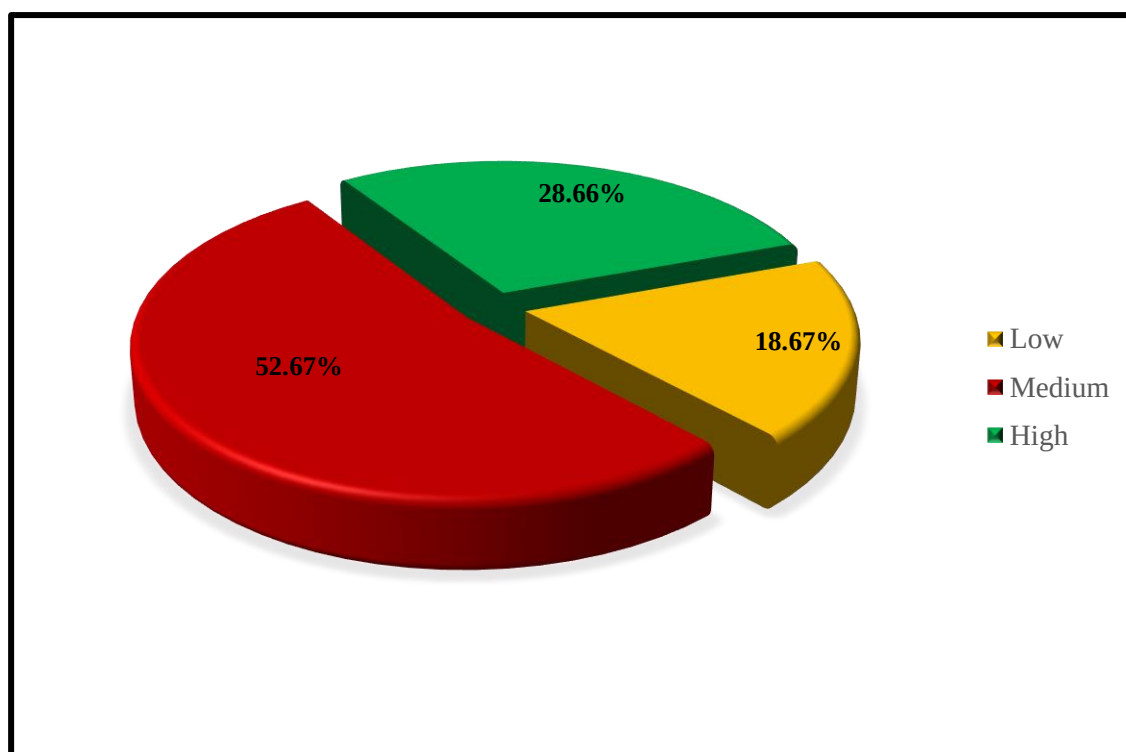


Fig. 7. Distribution of respondents according to knowledge level

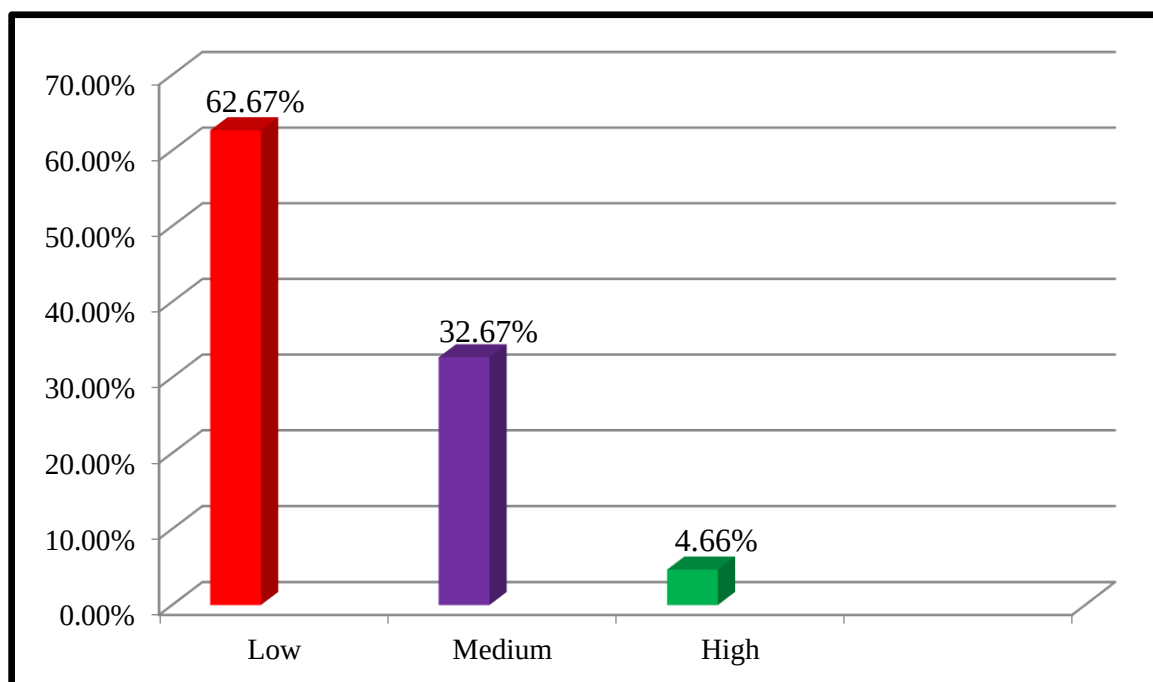


Fig. 8. Distribution of respondents according to their level of social participation

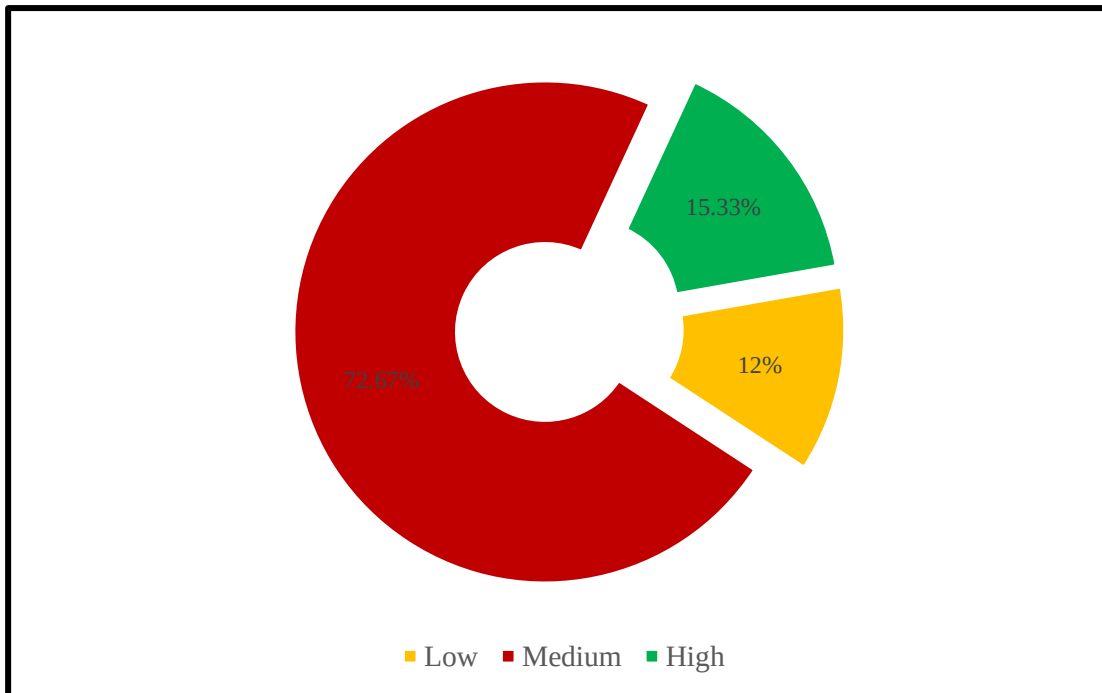


Fig. 9. Distribution of respondents according to level of sources of information

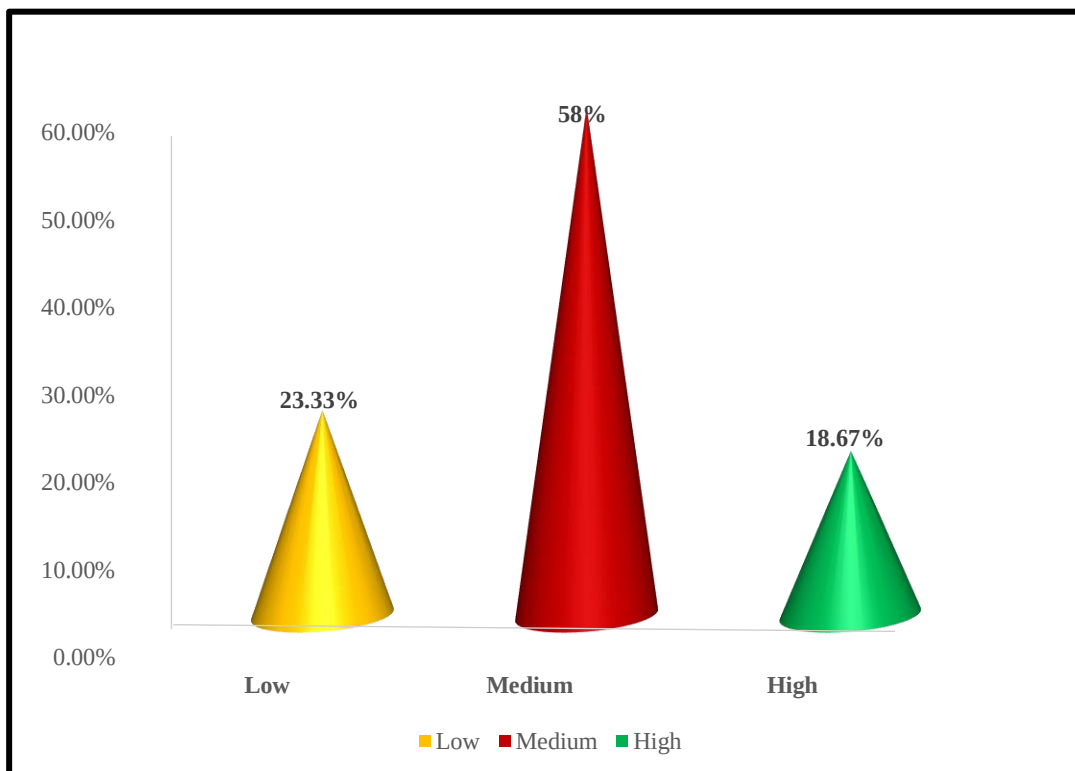


Fig. 10. Distribution of respondents according to level of Innovativeness

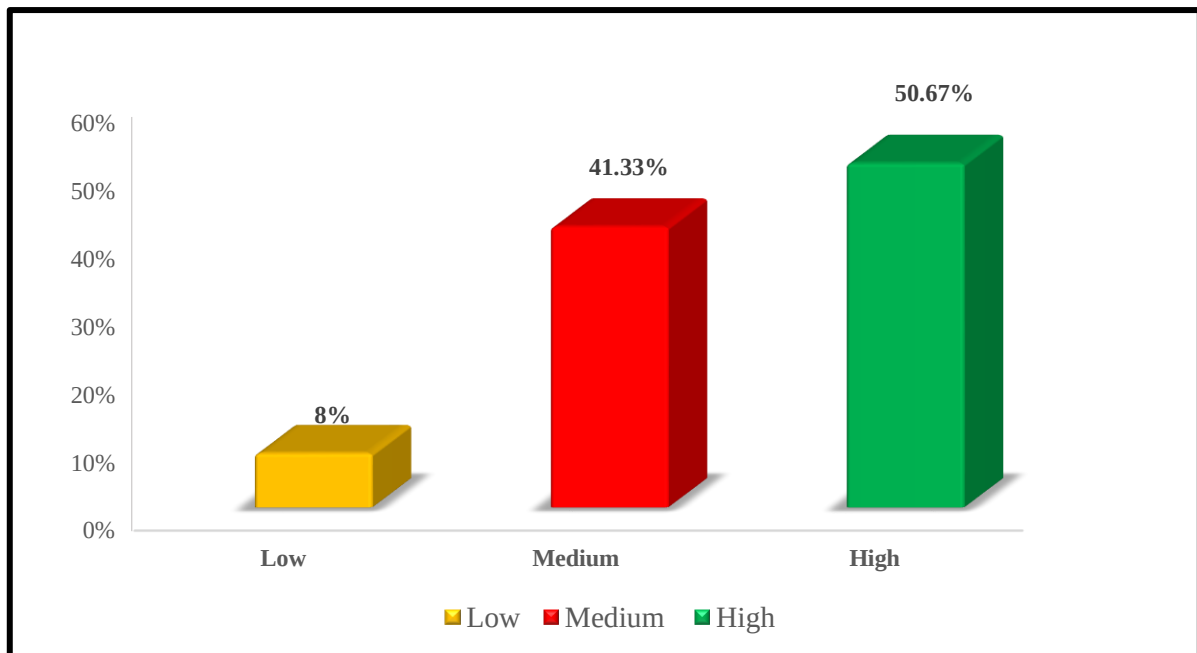


Fig. 11. Distribution of respondents according to level of Techno savviness

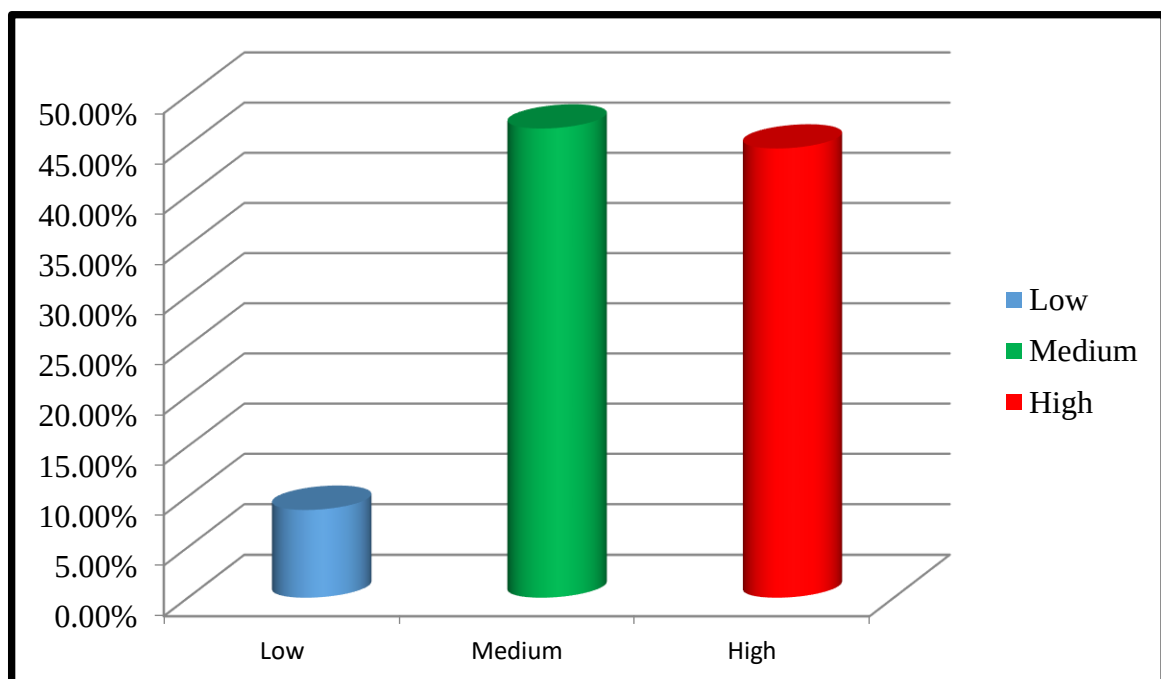


Fig. 12. Distribution of respondents according to their utilization pattern

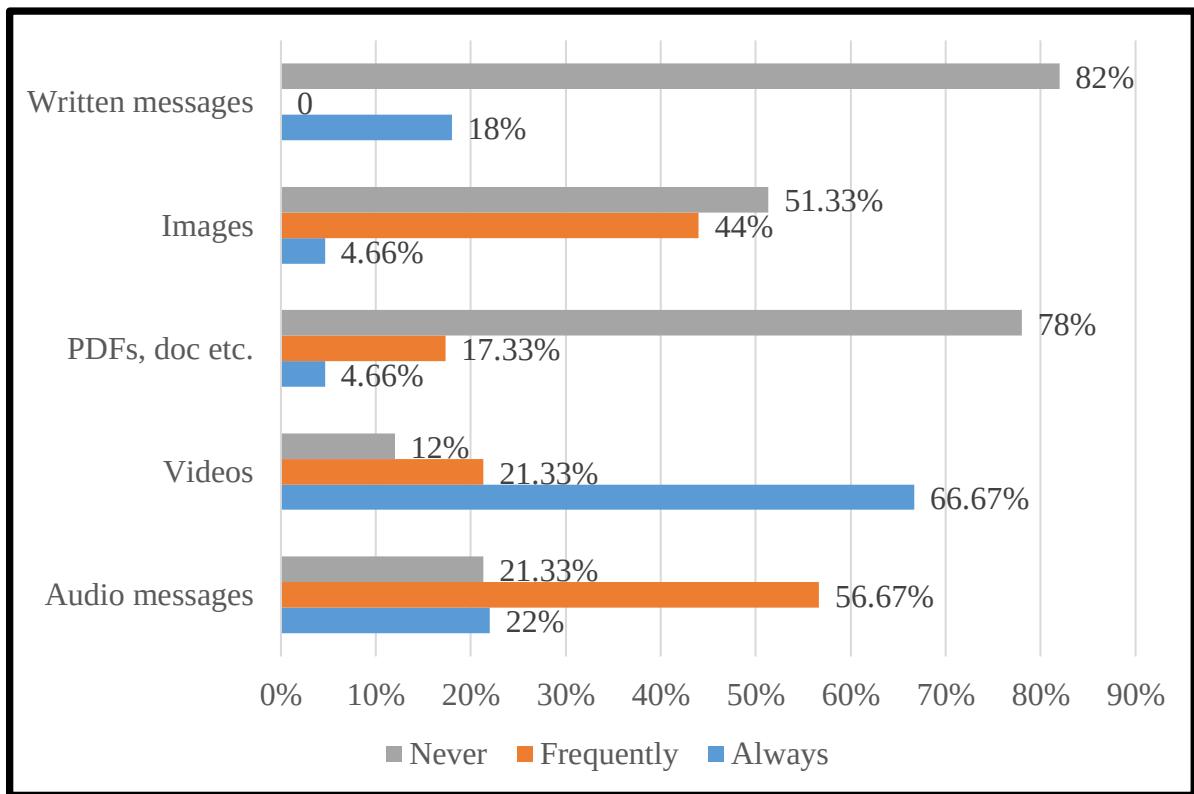


Fig. 13. Distribution of respondents according to forms of information they get from Grape Master App

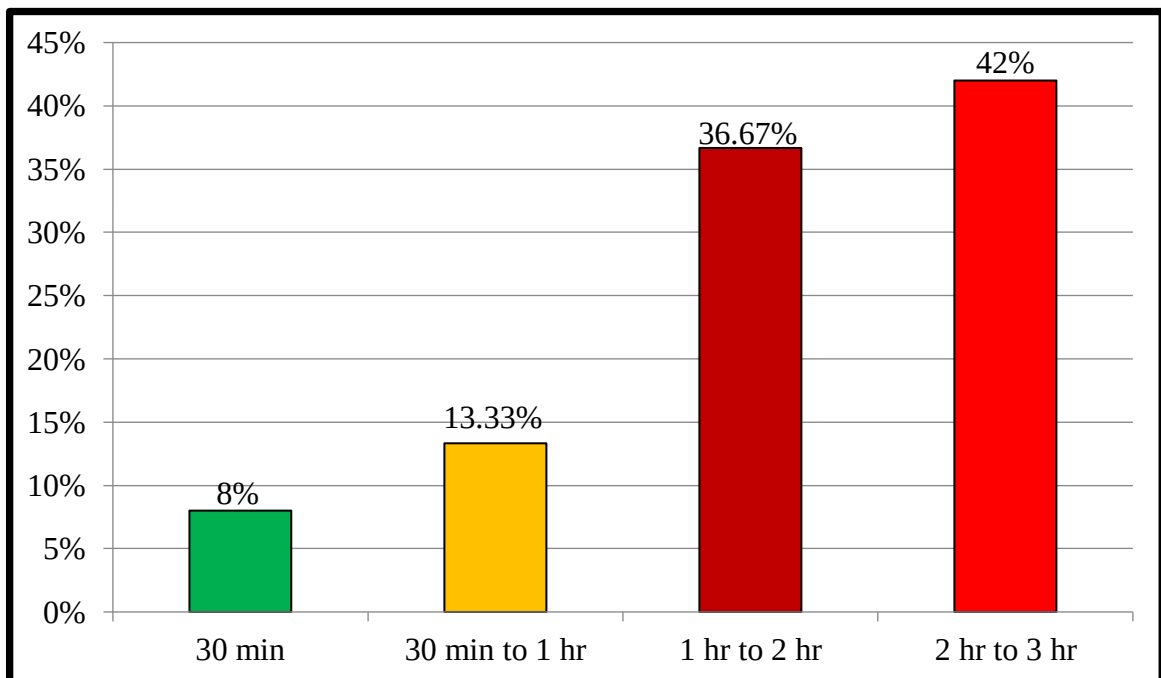


Fig. 14. Distribution of respondents according to their duration of utilization of Grape Master App

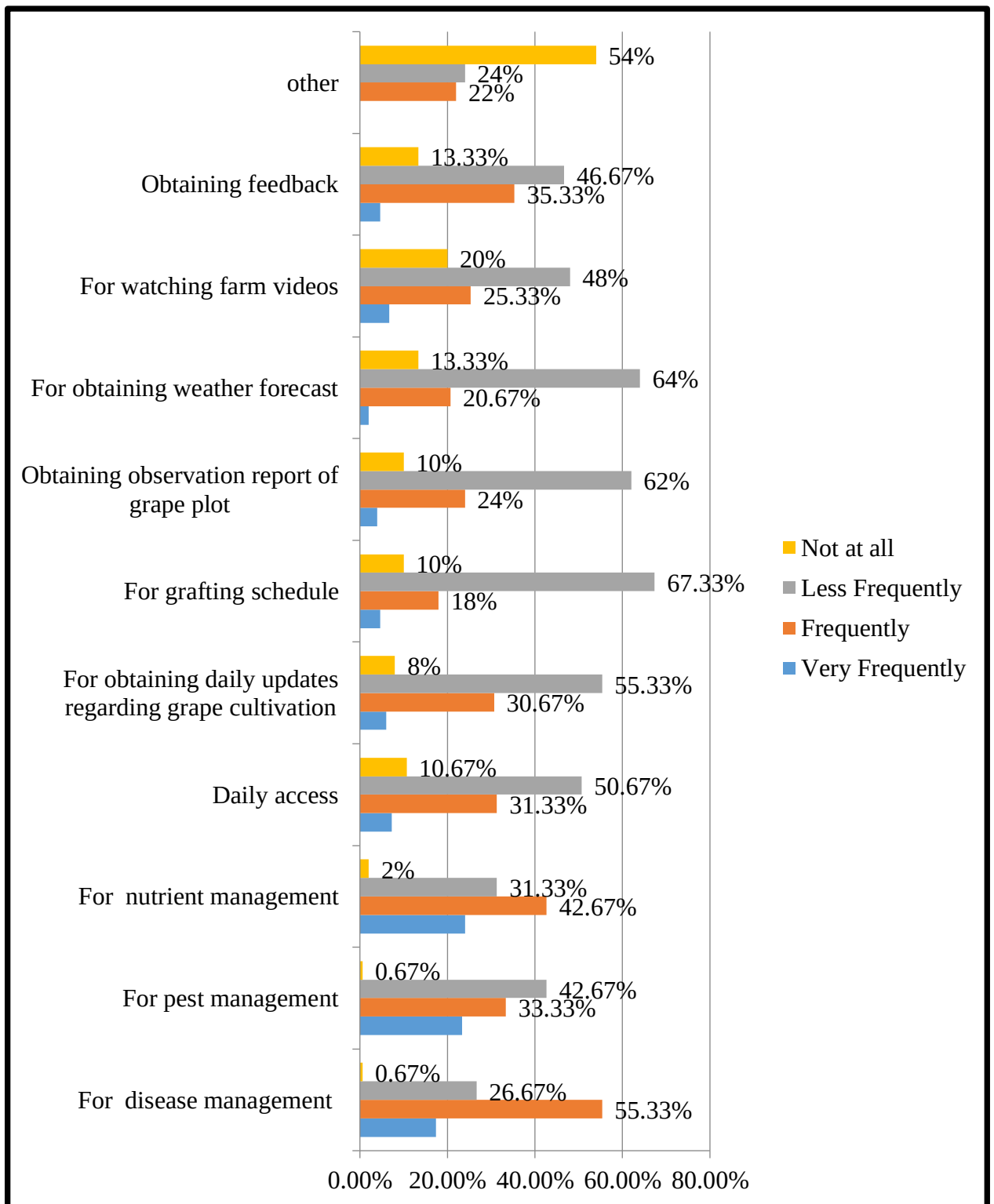


Fig. 15. Distribution of respondents according to their purpose of utilization of Grape Master App

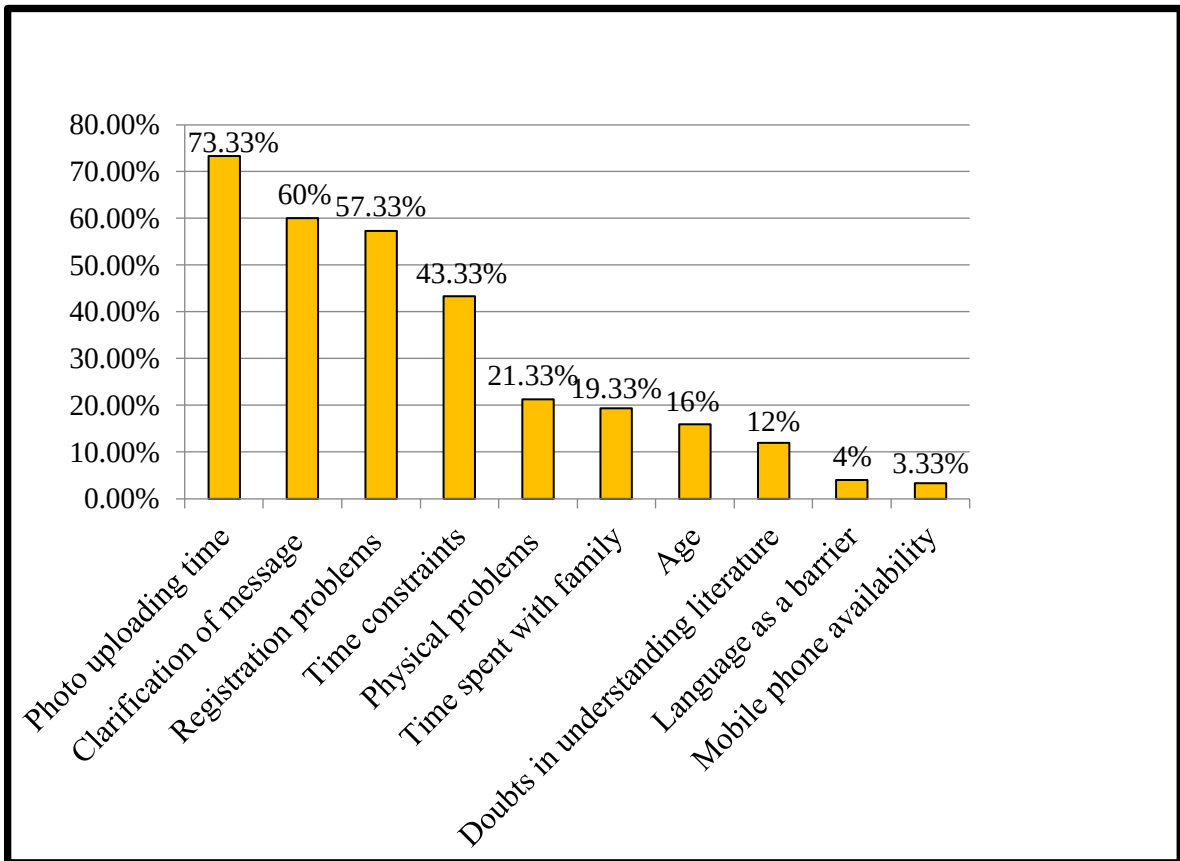


Fig. 16. Distribution of respondents according to constraints faced by them while using Grape Master App

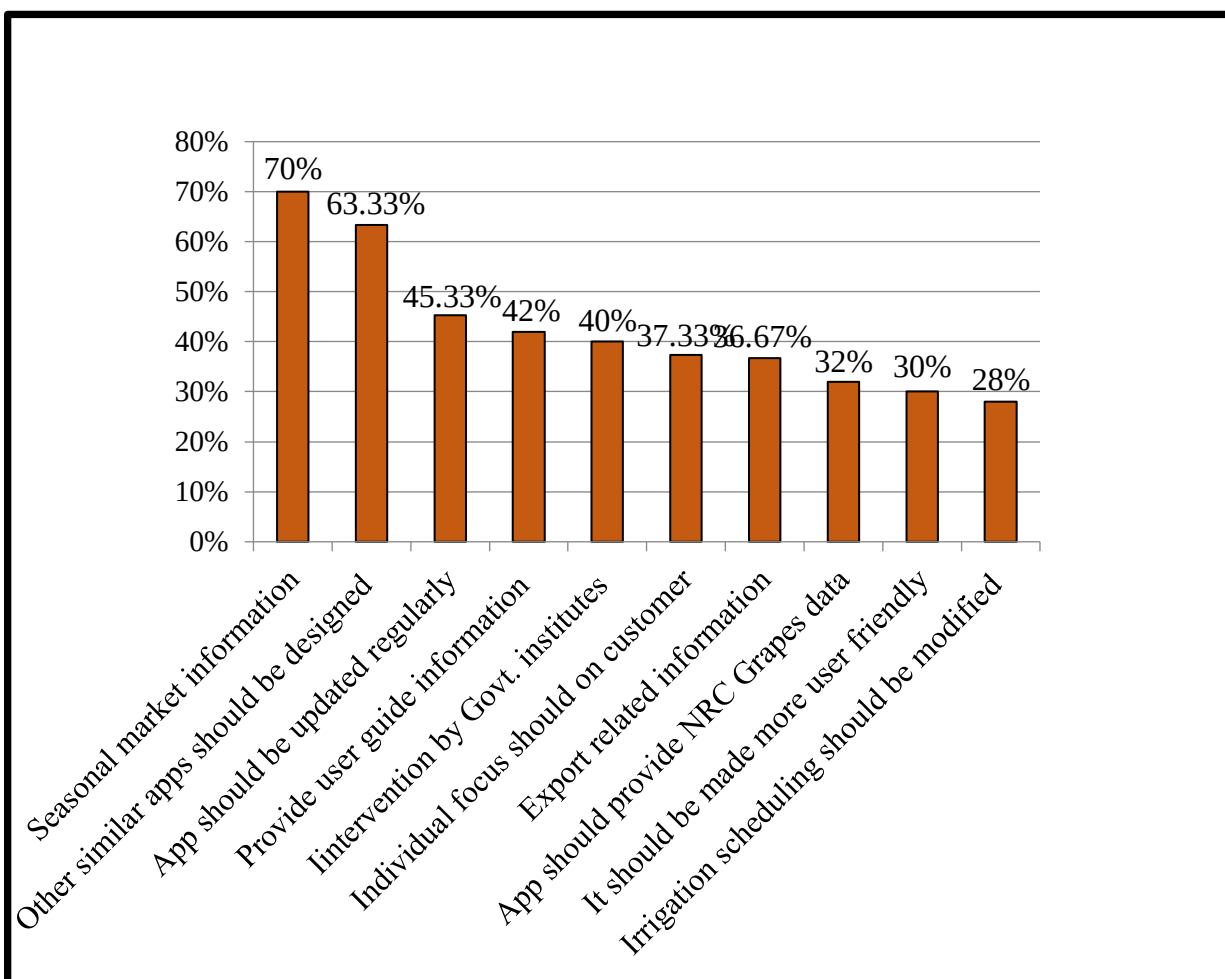


Fig. 17. Distribution of grape growers according to suggestions made by them for further modification in Grape Master App