

A Project Report on

Five Years of the e-NAM Platform

**Examining Factors Influencing Its Adoption and Primary Usage Across
Product Categories and States**

Submitted to

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Chapter 1: Introduction

Agricultural marketing is one of the lifelines for a sizeable population of India and it contributes 25 percent of the GDP. An effective agricultural marketing system can help farmers market their produces at a fair and reasonable price. The agricultural commodity markets often work in the normal forces of demand and supply.

In recent years due to technological breakthroughs, the Indian agriculture sector is experiencing substantial shifts in irrigation strategies and the result is reflected in the surplus production of crops. The Ministry of Agriculture and Farmers Welfare (2021)¹ in its report indicated a record production of foodgrains (305 MMT), fruits and vegetables (330 MMT) during 2020-21, and production of milk (198.4 million tonnes) during 2019-20. The report also indicated an impressive growth in the production of major crops since independence.

Despite record production in crops the visible changes in farmers' earnings are very negligible. The more profitable production of crops emphasizes the importance of agricultural marketing for the inclusive development of the agriculture and welfare of the farmers. It also raises the accountability of all the stakeholders to protect the interest of farmers and provide them with remunerative prices and plans according to the evolving nature of the agricultural market to improve the production of agricultural commodities. Thus the *“government and other organizations are trying to address the key challenges of agriculture in India, including small holdings of farmers, primary and secondary processing, supply chain, the infrastructure supporting the efficient use of resources and marketing, reducing intermediaries in the market”* (Sharma 2021).

Pavithra, *et al* (2018) argued that the Indian agricultural markets are still underdeveloped and flawed and lack both horizontal and vertical integration. The authors also concluded that the supply chains for agricultural commodities in India are mostly controlled by several intermediaries causing a significant price spread from the point of production to end-consumption. Chand (2012) established the presence of at least four intermediaries from the farm produce to end-consumers resulting in a reduction in the producers' net income from the overall profit.

Besides the intermediaries, complexities of the agricultural marketing also increase multi-fold due to the multiple taxations and licensing systems, market fees, and increasing transaction

¹ <https://www.pib.gov.in/PressReleaseDetailm.aspx?PRID=1721692>

costs (Patnaik 2011). Final Report of *the Committee of State Ministers, in charge of Agriculture Marketing to Promote Reforms* (2013) also concluded that the “*fragmented supply chain with inadequate marketing infrastructure, long intermediation and lack of accurate and timely market information/ intelligence system have posed major challenges to the agricultural marketing system in the country, which needs to be strengthened and revitalized*²”.

The government of India (GOI) and other organizations are focusing on the key challenges in the agriculture sector and developing policies to improve the economic conditions of the farmers by supporting them in the efficient use of resources and marketing and reducing intermediaries in the market. Vadivelu and Kiran (2013) advocated market reforms besides proper pricing strategy through a regulated market system that can reinforce the agricultural marketing sector of India. The authors suggested several measures of reforms in agricultural marketing in India, viz offering loans to the farmer at a low rate of interest, subsidizing power supply and loans; getting new state-of-the-art distribution networks; abolishing the remaining loopholes in the present legislations, creating provision of severe action against black marketers and hoarders, starting local outlets at each village where the farmers can sell their produce directly to the consumers/ authorized buyers at fixed prices, and strengthening the public distribution system that can provide realistic prices to the farmers for their produce.

Background of the Electronic National Agriculture Market (e-NAM)

With the vision “*to promote uniformity in agriculture marketing by streamlining of procedures across the integrated markets, removing information asymmetry between buyers and sellers and promoting real-time price discovery based on actual demand and supply*³”, the GoI has introduced National Agriculture Market (eNAM)- a pan-India electronic trading portal in April 2016. It connects the Agricultural Produce Market Committees (APMC) mandis to set up an integrated nationwide market for agricultural commodities. Thus, it unites surplus production regions with deficit regions through an online platform, which may lead to better market competition, and thus better prices for farmers for their produce (Venkatesh et al, 2021).

Online trading on eNAM has been allowed in regional languages through multiple channels, namely Website, trading platform and mobile App. This initiative was widely considered to be a game changer for farmers and the overall agricultural marketing sector of India.

² <http://dmi.gov.in/Documents/stminprreform.pdf>

³ <https://enam.gov.in/web/>

The concept has already been accepted across most of the states and union territories, with Bihar, Ladakh, Sikkim and North-Eastern states (Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland and Tripura) being the major exceptions. The e-NAM is linked with 1000 markets (APMCs) in 18 states and 2 union territory, with over 50 lakh farmer membership in 18 states.

Pavithra, *et al* (2018) suggested that the E-tendering process could be considered the initial phase for accomplishing the objective of market unification. The authors suggested that the e-tendering system could pervade the necessary competition and transparency to reduce the costs of trade in agricultural markets. However, the authors also suggested that for proper implementation of e-NAM, GoI requires to build infrastructure in the form of “*storage, warehousing, banks, grading and assaying facilities, etc.*” inside the market yard, to encourage the traders to participate in e-tendering.

Nuthalapati, Bhatt, and Beero (2020) pointed out the expected benefits of e-NAM: “*accessibility of farmers to a common agriculture market; real-time price discovery; transparency in the agriculture marketing system; reduce the transaction costs of buyers and sellers; real-time information on prices, market arrivals, etc; bidding on quality parameters of commodities; online bidding for more transparency; online payment system to reduce the payment risk and ensure timely payments to farmers, cleaning, sorting, grading and weighing facilities and additional services such as soil testing laboratories at the e-NAM*”.

Chapter 2: Literature Review

Several studies on e-NAM has already been conducted across different states. Based on the findings researchers have also made several suggestions for further improvement of the system. Selected studies from across these states are mentioned here.

Studies Conducted in Karnataka

Reddy (2018) studied the experience of e-markets among farmers, traders, commission agents, and market committee members in Karnataka using daily prices and arrivals data from 2007 to 2016. Based on the analysis author concluded that e-markets intensify competition and eradicate collusion among traders to promote farmers' overall incomes. The author also witnessed modest resistance to e-auction from traders and commission agents as they didn't find any benefit of it against the physical auction. From the study, the author made some recommendations to improve the e-market experience among different stakeholders. The suggestions are as follows: “(i) increasing awareness among farmers in campaign mode, (ii) uninterrupted and low-cost Internet connectivity in markets, (iii) access to computers and mobile devices, (iv) easy-to-use mobile apps for traders and commission agents, (v) setting up help desks through public-private partnership (PPP) mode, (vi) skill up-gradation for market functionaries, (vii) alleviate the fear of taxation among traders and commission agents and (viii) solving conflicts of interest among different stakeholders”.

Aggarwal, Jain, and Narayanan (2017) considered the case of Karnataka's experience with the implementation of e-NAM and pushing other reforms in the agricultural sector, recommended that ‘rules of the game’, ‘incentives for agents to participate actively in the market’ and ‘infrastructure’ could be three pillars for pushing reforms in the agricultural sector of India.

Studies Conducted in Uttar Pradesh

Tewari et al (2017) tried to investigate the farmers' experience towards the modern agricultural marketing system and consumers' perception concerning the modern organized retail system. For this study, the authors used survey data that comprised 140 farmers, 20 traders, and 20 consumers from three districts of Uttar Pradesh viz Varanasi, Azamgarh, and Gazipur. From the analysis authors identified that most farmers were not pleased with the marketing practices in regulated markets whereas the consumers were happy with the modern organized retail system. The study also revealed that the major constraints with the adoption of the e-NAM initiative were the lack of infrastructure, computer incompetency, and unified licensing. To

improve the e-NAM adoption authors recommended that the competent authorities should organize capacity-building programs for the farmers and create suitable infrastructure to attract the attention of stakeholders of the agricultural marketing system.

Katoch and Singh (2021) tried to explore the effect of improving market integration and recent marketing reforms viz. implementation of GST and e-NAM wheat crops. The objective of the study was to assess the price dynamics and market integration of wheat crops in Uttar Pradesh. For the analysis purpose the authors used price data from CAGR for the duration 2006 to 2020. From the analysis, authors concluded that prices of wheat crops from different markets of Uttar Pradesh (viz Agra, Aligarh, Prayagraj, Bulandshahr, and Kanpur) moved simultaneously in the positive direction and were well integrated.

Studies Conducted in Haryana

Sekhar and Bhatt (2018) did systematic research on the functioning of e-NAMs in Haryana keeping five objectives in mind. The objectives are as follows: a) *the extent of the operation, adoption, and functioning of e-NAM*, b) *analyze the improvements due to e-NAMs in price discovery, quantity traded and marketing cost*, c) *Assess the functioning of the assaying laboratories at the e-NAMs and acceptability of quality parameters to various stakeholders* d) *analyze the infrastructure facilities at the e-NAMs for cleaning, sorting, grading and weighing of commodities* and e) *assess the overall impact on the ease of doing business*. Based on the analysis authors concluded that the sale process via e-NAM could be improved by providing the proper infrastructure for sorting and grading, developing a proper refrigeration facility, and reducing delays in online transactions.

Studies Conducted in Madhya Pradesh

Mishra and Rathore (2020) examined the proper accessibility of infrastructural facilities and innovative agricultural marketing practices in the adoption of e-NAM in the Bundelkhand Region of Madhya Pradesh. The study revealed that the common hindrances towards the adoption of e-NAM by the farmers were due to computer illiteracy, lack of interest, lack of computer facility, lack of time, costly technology, and illiteracy.

Studies Conducted in Kerala

Nair (2021) examined the structural and functional dimensions of the agriculture marketing institutions in Kerala emphasizing the existing marketing infrastructure and identifying the improvement areas by taking the opinion of multi-stakeholders. The author identified that

substandard and ineffective marketing infrastructure was the primary cause for post-harvest loss in agriculture in Kerala and consequently influenced the food security of the state. The author advocated well-organized marketing infrastructure facilities at all stages of the supply chain *“for future development of agriculture intending to provide food self-sufficiency and security along with sustainable income generation or farmers”*.

Studies Conducted in Andhra Pradesh

Singh and Alagawadi (2021) did a study to explore the awareness of farmers and traders towards the benefit of adopting e-NAM platforms using sample data from three selected mandis in Andhra Pradesh. The authors identified that educational qualification and age are the two important variables that have a strong association with awareness of e-NAM platforms. The authors concluded that creating awareness and familiarization with the benefit of e-NAM can certainly increase the adoption of e-NAM among farmers and traders.

Studies Conducted in Chhattisgarh

Bachaspati and Pathak (2018) reported a decline in the prices after the introduction of e-NAM in Chhattisgarh.

Studies Conducted in Rajasthan

Jirli and Saini (2021) tried to evaluate the issues related to the difference in price received in the traditional market and e-NAM platform using data from two districts (Dausa and Tonk) of Rajasthan. The authors concluded that the use of the e-NAM platform could avoid price discrimination among the farmers and the e-NAM platform can provide price trends, arrival, trading activities & forecast online, and levies market fees at a single point. This information can help the framers and the traders to take decisions based on the actual demand & supply of the commodity.

Kumar, Pant, and Chandra (2019) in their report made a detailed study on the effect of e-NAM on the price received by the farmers; the perception of operation and execution, and the advantages of e-NAM. Based on the analysis authors suggested sensitization approaches to make different stakeholders aware of e-NAM platforms. They found no price advantage in e-NAM over Agmarknet markets.

Other Studies

Kalamkar, Ahir & Bhaiya (2019) in their report suggested some of the important benefits of e-NAM to farmers and vis-à-vis agriculture market as: “*real-time price discovery; transparency in the agriculture marketing system; reduce the transaction costs of buyers and sellers; real-time information on prices, market arrivals; bidding on quality parameters of commodities; online bidding for more transparency; online payment system to reduce the payment risk and ensure timely payments to farmers, cleaning, sorting, grading and weighing facilities and additional services such as soil testing laboratories at the e-NAM*”. Though the authors have discussed several benefits of the e-NAM portal in their report, they also stated that the awareness level among the farmers for the e-NAM portal is very limited. The authors, in the report, recommended the need for infrastructural facilities such as quality testing, e-auction, weighing, grain storage, soil testing, bid management, etc. for the proper implementation of e-NAM.

Bhargav (2017) studied the challenges associated with agricultural marketing and the initiatives taken by GoI to overcome these problems to increase the earnings of rural farmers. The author identified that GoI had initiated several schemes and programs to improve agricultural marketing in rural India, viz *Pradhan Mantri Krishi Sinchae Yojana (PMKSY); Grameen Bhandaran Yojana (Rural Godown Scheme); Soil Health Card Scheme, Pradhan Mantri Fasal Bima Yojna; India emergence campaign through village emergence; National Agriculture Market (e-NAM); My Village My Pride; A Scheme for Promotion of Innovation, Rural Industry and Entrepreneurship (ASPIRE); NavKalpana Kosh*; etc. However, the author also argued that these schemes would remain ineffective if a proper channel was not devised to move agricultural produce from the farmers to the consumers at a reasonable price and with very less interventions. The author also suggested that for the diffusion of e-Marketing it is important to improve the marketing information system and emphasised needs for adequate human resource development in agricultural marketing.

Gupta and Badal (2018) discussed challenges in the implementation of eNAM in terms of Infrastructure, Institution, and Information and concluded that responsiveness, inclusiveness, and technology-enabled markets can help to increase the adoption of e-NAM. This will have a positive influence on the livelihood and food security of India.

Kathuria, Singh, and Raina (2019) examined whether market reforms could influence the opinion of commission agents and observed that largely the commission agents had a negative

or neutral opinion on the current agricultural marketing reforms. The authors concluded that this negative opinion might be built due to a lack of awareness or partial awareness towards the change or reform.

Reddy and Mehjabeen (2019) observed that the potential of the e-NAMs platform in different marketplaces was not fully utilized due to issues related to the evaluation of the produce and unfamiliarity on the part of farmers and traders with the usage of the platform. In their research authors used the difference-in-difference (DiD) method to assess the impact of e-NAM on prices and market arrivals and tried to identify the problems that arise during the implementation of the e-NAM platforms and suggested solutions for the same. During the analysis, the authors identified a positive relationship between prices obtained by the farmers and an increase in market arrivals in the e-NAM. Finally, the authors recommended that the implementation of the e-NAM platform could only achieve its desired goal if GoI identified and provided the solutions to each stakeholder's problems to increase the adoption of e-NAM across all the stakeholders.

Singh, Pant, and Sathyendra (2020) in their report "*Performance Evaluation of e-National Agriculture Market*" made an extensive study to assess the status of e-NAM implementation on several dimensions viz technology adoption, operation, and infrastructure creation. Some of the specific goals were as follows: a) the effect of e-NAM on prices received by the farmers, b) investigate the stakeholders' opinions on the operations and benefits of e-NAM, c) assess the magnitude of inter-mandi and inter-state trade through e-NAM. Based on their analysis authors recommended urgent requirements to improve the infrastructure facility related to e-NAM; installation of POS machine facility in different mandis; human resource development in the areas of IT; installation of electronic weighing machine/bridge facility, etc.

Chaudhary and Suri (2021a) developed an e-trading adoption framework for agricultural marketing in India using the Neural Network method. Based on the review of the scholarly articles' authors identified eight constructs viz price, transaction cycle, easy to use, infrastructure, customer care, social influence, trust, and cost that plays important role in the adoption framework. Based on the analysis authors also concluded that the digital eNAM e-trading platform could be one of the important initiatives by the GoI aimed at doubling the farmers' income. However, the authors also suggested that using structural equation modeling can provide more insights into causality and interrelationships among the constructs to assess the adoption of the e-trading framework in India.

Levi et al. (2020) tried to assess the influence of the implementation of the Unified Market Platform (UMP) on market prices and farmers' profitability. The authors argued that the success of UMP in the Indian agricultural market depended on the necessary infrastructure that could integrate remote Agri-markets through systemic supply chain logistics and process design. From the analysis authors also concluded that an integrated Agri-platform such as the UMP would be more beneficial for those farmers who produce high-quality products.

Kumar et al (2020) made an extensive study to understand the facilities and awareness of APMC mandi in adopting the e-NAM. The authors reported some ambiguities in the effective implementation of e-NAM e.g. 'skipping of quality testing during peak marketing seasons making the reliability of the grading system highly questionable'.

Chaudhary and Suri (2021b) used an efficient Interpretive Ranking Process (IRP) methodology to rank the factors that impact sustained e-Trading usage in the agriculture marketing of India. Authors ranked 'Trust', 'Cost', 'Perceived Ease of Use', and 'Facilitating Conditions' respectively are the four important factors that influence e-trading in India and concluded that special emphasis should be given to these four factors to strengthen and increase the adoption of eNAM. The authors also suggested that immediate attention be given to aspects such as transparency, quick information dissemination, adequate quality assurance, uniformity in taxes and market fees, improvement in marketing infrastructure, inter-market trade logistics, conflict resolution, mobility, and training to increase the penetration of e-NAM platform among different stakeholders.

Chaudhary and Suri (2022) used a case study of the National Agriculture Market (e-NAM) project to find the enablers of the adoption of e-trading of agricultural produce in India. The authors used the total interpretive structural modeling (TISM) method to develop hierarchical associations among the enablers. From the review of literature authors identified eight variables that influence e-Trading adoption in India viz perceived usefulness; perceived ease of use; social influence; Trust; Cost; facilitating conditions; behavioral intention to adopt; and actual usage. In the analysis the authors identified perceived ease of use', 'facilitating conditions', 'social influence' and lower 'cost' are the most significant enablers along with 'trust' and 'perceived usefulness. Based on the analysis the authors recommended that the GoI should give enough importance to these enablers to improve the supply chain of agricultural produce and thereby enhance the adoption of the e-NAM platform. The authors also argued that the e-NAM has the potential to improve the economic condition of farmers and other stakeholders and

hence it will be beneficial to accept and implement the current reforms for the increased price realization and food security of India.

Challenges in Adoption of the e-NAM

The e-NAM helps farmers to trade directly on their own through the mobile app or through registered commission agents. However, the adoption of the e-NAM among farmers is not quite satisfactory. Some reports have suggested that contrary to the claims by the Government, most of the transactions recorded on e-NAM were conducted through the old system. The actual gain to the farmers through use of this facility is questioned by some researchers.

Others have suggested that the e-NAM has not been able to solve issues related to market fragmentation, multi-level taxation and license issues in APMCs. Vilification of traders and middlemen may have added one more hurdle to the actual wide-scale implementation of the e-NAM. Low digital illiteracy in rural areas and limited internet connections have also increased challenge to its adoption. Besides these, there are practical issues related to assaying and transportation, in spite of government's initiatives to solve these problems (e.g. Kisan Rath). A simple look at the downloads of the e-NAM app across Google Playstore and Apple's Appstore reveals that the numbers are miniscule. A report published in 2019 noted that less than 15% of the farmers were using the e-NAM facility till then (BusinessLine, 2019).

Research Gap

Although these issues have been generally raised in several newspapers and magazine articles as well as some whitepapers (at least one being from the NIAM, Jaipur), there is a lack of proper research study focusing on the challenges faced by farmers in the adoption of the e-NAM. An in-depth study in this regard can greatly help in identifying the major issues so that the government can take appropriate measures for course correction of this excellent initiative.

The project endeavours to find out factors influencing adoption and primary usage across product categories from the farmer's perspective.

Objectives

The major objectives of the project are:

1. Identifying factors influencing adoption of e-NAM platform.
2. Conducting a comparative analysis to explore underlying reasons behind difference in attitude toward adoption of e-NAM.

3. Empirically validating the findings of the study.

Proposed Conceptual Model

As there is a lack of systematic research on the adoption of the e-NAM facility based on established theoretical frameworks, we would like to fill that void in this project. Because the adoption of the e-NAM facility is largely dependent on the acceptance of technology, we

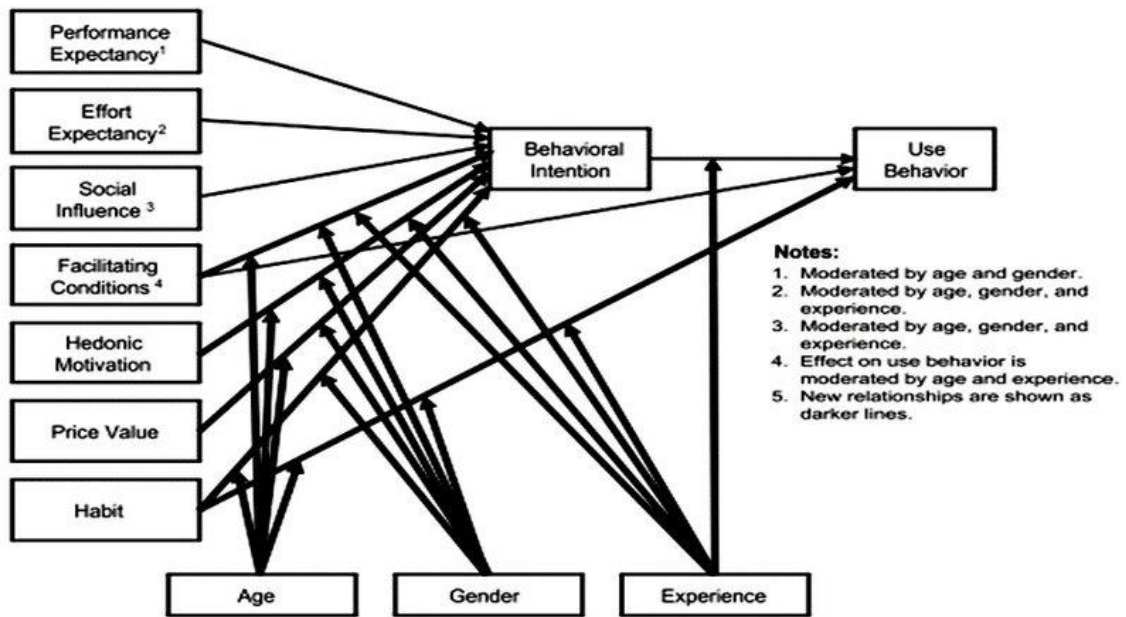


Figure 1: UTAUT-2 Framework

propose to use the Unified Theory of Acceptance, and Use of Technology (UTAUT-2) framework (Figure 1) as the appropriate theoretical base for this project. This framework was proposed by Venkatesh et al (2012) as an improvement upon UTAUT. The constructs related to the UTAUT-2 are summarized in the Table 1 below.

Table 1: Constructs of UTAUT-2

Construct	Definition	Variables
Performance expectancy	The degree to which an individual believes that using the system will help him or her to attain gains in a job	Perceived usefulness
		Extrinsic motivation
		Job-fit
		Relative advantage

		Outcome expectation
Effort expectancy	The degree of ease associated with the use of the system	Perceived ease of use
		Complexity
Social influence	The degree to which an individual feels that it is important for others to believe he or she should use the new system.	Subjective norm
		Social factor
		Image
Facilitating conditions	The degree to which an individual believes that organizational and technical infrastructure exists to support use of the system.	Perceived behavioural control
		Facilitating conditions
		Compatibility
Hedonic motivation	The degree of fun or pleasure derived from using a technology	-
Price value	The cost and pricing structure affecting the use of technology	-
Habit	The extent to which an individual believes the behavior to be automatic	-

The UTAUT-2 framework has been utilized in different studies across various industries. This includes education (Nikolopoulou et. al. (2021), healthcare (Akinuwesi et. al., 2022), automobiles (Nordhoff, 2020), agriculture (Shi et. al., 2022) etc. Thus this framework can provide us with an effective theoretical foundation to explore various factors inhibiting or promoting the adoption of the e-NAM facilities by the farmers.

Taking cue from the UTAUT-2 model, we propose a conceptual model, as shown in Figure 2, for the purpose of this study. This represents the hypotheses we formed based on existing literature and primarily considering UTAUT-2 model. The hypotheses are mentioned below.

H1: Performance expectancy positively influences one's behavioural intention to adopt e-NAM portal / app.

H2: Effort expectancy positively influences one's behavioural intention to adopt e-NAM portal / app.

H3: Social influences positively affects one's behavioural intention to adopt e-NAM portal / app.

H4: Facilitating conditions positively influences one's behavioural intention to adopt e-NAM portal / app.

H5: Hedonic motivation positively influences one's behavioural intention to adopt e-NAM portal / app.

H6: Perception of value with respect to price positively influences one's behavioural intention to adopt e-NAM portal / app.

H7: One's habit positively influences one's behavioural intention to adopt e-NAM portal / app.

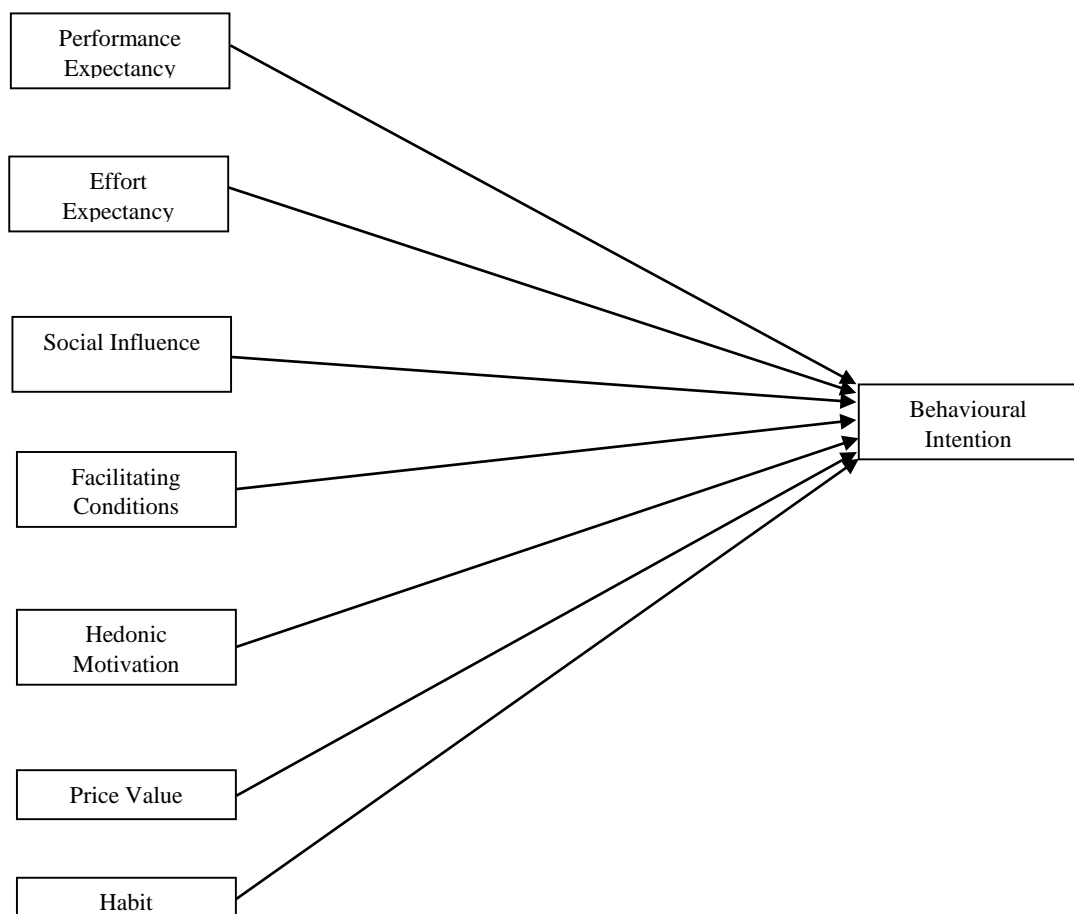


Figure 2: Conceptual framework of the proposed model

Chapter 3: Methodology

The project covers different mandis across the states of Rajasthan, Haryana and Uttarakhand where transaction of variety of agricultural produce takes place. Thus a comparative study could be undertaken within a limited time span and budget allotted for the same. Surveys have been conducted to understand farmers' attitude toward adoption of the e-NAM portal / app.

As per government data available through the e-NAM portal, Rajasthan has the highest number of registered e-NAM mandis and the highest number of traders, we have chosen this state as one for our study. We have chosen Haryana as it has the highest number of commission agents, who may be very influential in the adoption mechanism of the e-NAM. Uttarakhand is at the middle in terms of the number of commission agents, and very near to the bottom in terms of the number of farmers. Hence, it is interesting to study this state.

This study considers primary data along with the secondary data to assess the adoption of e-NAM platform. It employs various statistical techniques applied on the primary data to analyse various aspects of the adoption of e-NAM platform. Thereby it attempts to collect information from farmers related to the hindrances and challenges in implementation of e-NAM with the help of a questionnaire.

A questionnaire was developed aligned with the proposed conceptual model and based on the output of focus group discussion as well as interviews and literature review. To reflect the variety of e-NAM adoption attributes, the questionnaire included multiple items (questions) adopted from previous studies, with minor modifications to fit the context. These are measured with a Likert Scale. For each question, respondents were asked to choose the response that best described their level of agreement.

The survey instrument has been used to collect information pertaining to the knowledge and concern related to the framers towards the adoption e-NAM platform. A representative sample of farmers has bene taken from the various mandis of Rajasthan, Haryana and Uttarakhand. The data was collected between July 2022 and March 2023. The respondents were selected using a multi-stage sampling method. In total, 1364 farmers were approached in 37 mandis located in 10 districts of these three states. 211 usable responses could be received, as most of the farmers showed ignorance of the e-NAM.

Various basic and advanced statistical techniques have been employed to ascertain the reliability and validity of the questionnaire. Standard statistical techniques for data analysis and evaluation (depending on the nature, quality and quantum of data) has been adopted to arrive at rational and scientifically deciphered conclusions.

Measurement Scale

The present study adapted various measurement scales available in the literature to measure the constructs. The UTAUT2 constructs (i.e., Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, Price value, Habit, and Behavioral Intention) were adapted from Venkatesh et al. (2012). All items are measured using 5-point Likert scale from "strongly agree" (5) to "strongly disagree" (1). Table 2 presents the various measurement scales used in the analysis.

Table 2: Assessment characteristics for the adoption of e-NAM

Assessment characteristics	Items	Questions	Reference
Performance expectancy (P)	P1	I find the e-NAM portal/app useful for my agriculture-related activities	Venkatesh, James YL and Xin (2012)
	P2	Using the e-NAM portal / app increases my chances of achieving things that are important to me	
	P3	Using the e-NAM portal / app helps me accomplish things more quickly	
	P4	Using the e-NAM portal / app increases my productivity	
Effort expectancy (E)	E1	Learning how to use the e-NAM portal / app is easy for me	Venkatesh, James YL and Xin (2012)
	E2	My interaction with the e-NAM portal / app is clear and understandable	
	E3	I find the e-NAM portal / app easy to use	
	E4	It is easy for me to become skillful at using the e-NAM portal / app	
Social influence (S)	S1	People who are important to me think that I should use the e-NAM portal / app	Venkatesh, James YL

	S2	People who influence my behavior think that I should use the e-NAM portal / app	and Xin (2012)
	S3	People whose opinions that I value prefer that I use the e-NAM portal / app	
Facilitating conditions (F)	F1	I have the resources to use the e-NAM portal / app	Venkatesh, James YL and Xin (2012)
	F2	I have the knowledge necessary to use the e-NAM portal / app	
	F3	The e-NAM portal / app is compatible with other technologies that I use	
	F4	I can get help from others when I have difficulties using the e-NAM portal / app	
Hedonic motivation (H)	H1	Using the e-NAM portal / app is fun	Venkatesh, James YL and Xin (2012)
	H2	Using the e-NAM portal / app is enjoyable	
	H3	Using the e-NAM portal / app is very entertaining	
Price value (Pr)	Pr1	The e-NAM portal / app is reasonable priced	Venkatesh, James YL and Xin (2012)
	Pr2	The e-NAM portal / app is good value for money	
	Pr3	At the current price the e-NAM portal / app provides a good value	
Habit (Ha)	Ha1	The use of the e-NAM portal / app has become a habit for me	Venkatesh, James YL and Xin (2012)
	Ha2	I am addicted to use the e-NAM portal / app	
	Ha3	I must use the e-NAM portal / app	
	Ha4	Using the e-NAM portal / app has become natural for me	
Use Behavior (B)	B1	I intend to continue using mobile internet in the future	Venkatesh, James YL and Xin (2012)
	B2	I will always try to use the e-NAM portal / app in my daily life	

	B3	I plan to continue to use the e-NAM portal / app frequently	
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Sample Characteristics

Demographic Details

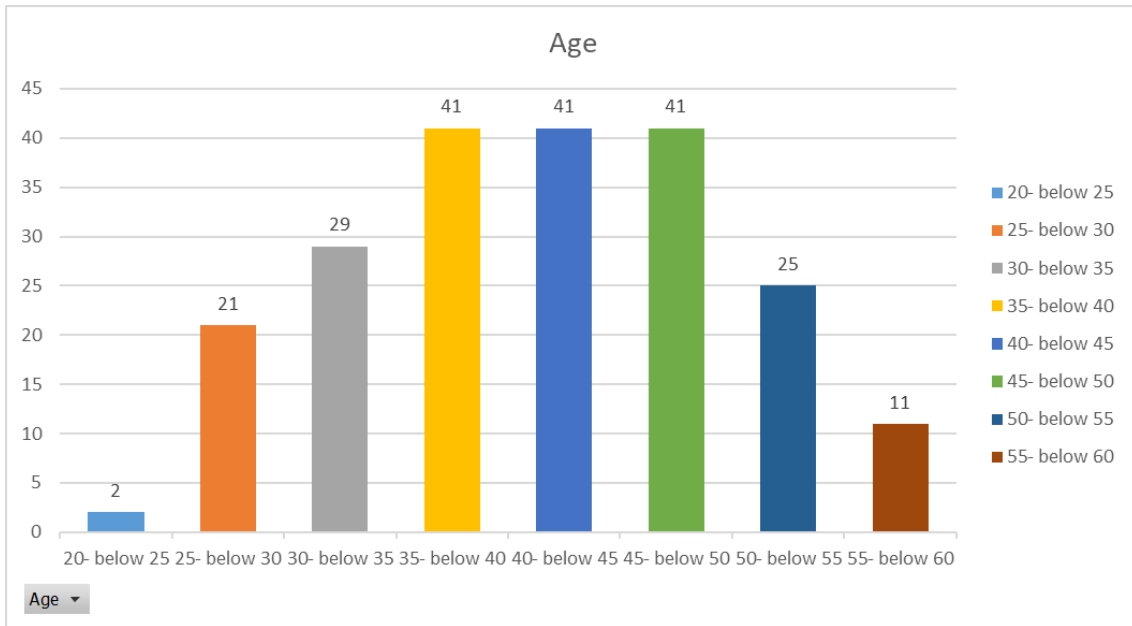


Figure 3: Age distribution of farmers

Data was collected from farmers of different ages, as shown in Figure 3. Most of the responses were derived from those farmers between 35 years to 50 years of age. The number of responses from those below 20 years of age was the least. This is probably reflective of a shift in attitude toward agriculture, as those young people may be busy pursuing other academic or professional interest.

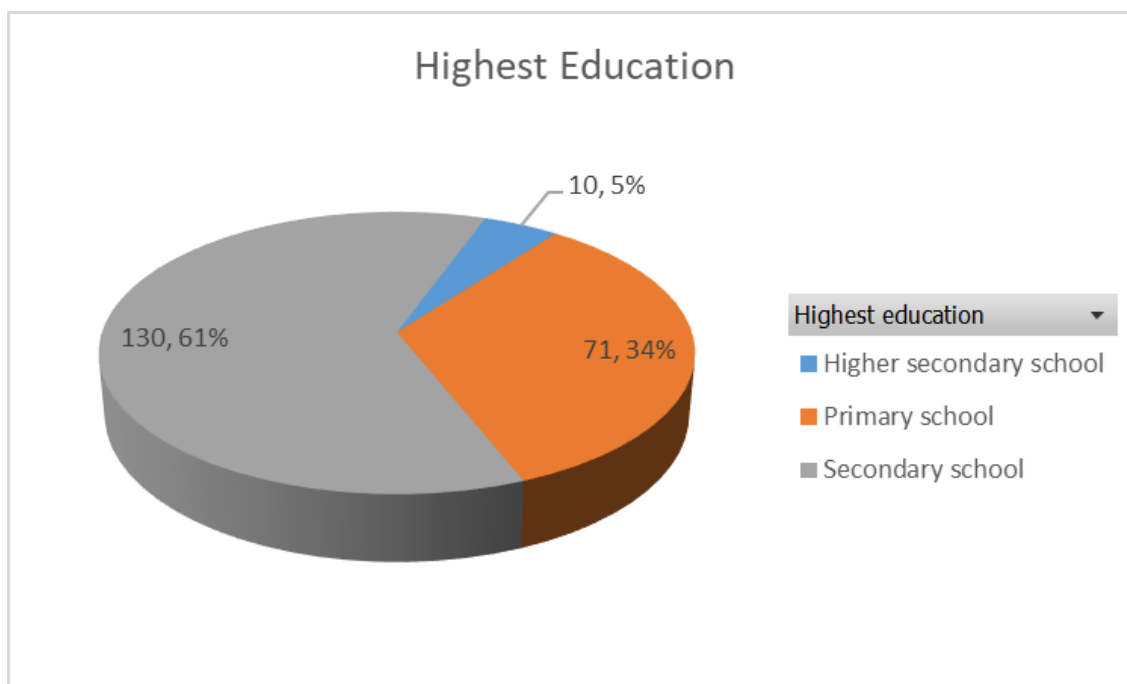


Figure 4: Highest educational qualification of respondents

Majority of the respondents mentioned that they had gone for secondary school education. However, on further inspection it was understood that many of them meant that they had been exposed to certain levels of secondary education, and then did not complete it. Similar revelations came regarding other levels of education too. For the purpose of this study, we consider the farmers' exposure to certain level of education only, without worrying whether they were able to formally complete it or not.

Table 3: Highest educational qualification and responses

State	Highest educational Qualification
Haryana	60
Higher secondary school	2
Primary school	15
Secondary school	43
Rajasthan	121
Higher secondary school	7
Primary school	45
Secondary school	69
Uttarakhand	30
Higher secondary school	1
Primary school	11
Secondary school	18
Grand Total	211

Table 3 gives further insight into the highest educational qualification as mentioned by respondents from different states and number of responses received from them.

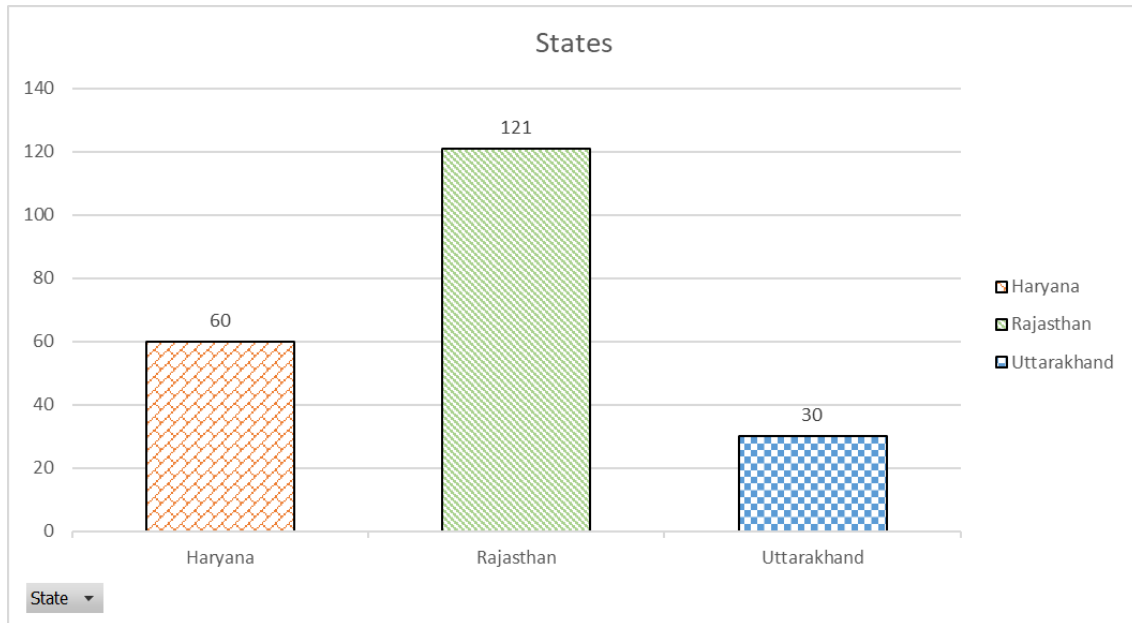


Figure 5: Response from different states

Figure 5 shows the states covered during the project. Around 57% responses were obtained from Rajasthan and lowest number of responses were obtained from Uttarakhand. Table 4 gives further insight into the data collection. 22 mandis in Rajasthan, 11 mandis in Haryana and 4 mandis in Uttarakhand were visited.

Table 4: Districts and mandis covered in the project

State	No. of Districts Sampled	No. of Mandis Represented	No. of Samples
Haryana	4	11	60
Rajasthan	4	22	121
Uttarakhand	2	4	30

These farmers grow different kinds of crops as mentioned below.

- Groundnut
- Oilseeds
- Onion
- Other cereals
- Paddy
- Potato
- Pulses
- Vegetables
- Wheat
- Coriander

- Cotton
- Fruits
- Groundnut
- Oilseeds
- Other cereals
- Paddy
- Potato
- Pulses
- Vegetables

Chapter 4: Analysis

Descriptive Statistics

In Table 5, we present the descriptive statistics for the UTAT2 variables. It shows that 13 out of 28 items had a mean score less than 3.0 (i.e., midpoint on the five-point Likert scale). It indicates that the stakeholders give less importance to these variables in adopting the e-NAM portals/app. From all the items, the variable "The e-NAM portal/app is reasonable priced (Pr1)" had the highest mean score (Mean = 4.1; SD = 0.64) and the variable "Using the e-NAM portal / app is very entertaining (H3)" had the lowest mean score (Mean = 1.7; SD = 0.64). In addition, to verify the data's normality, we also checked each item's skewness and kurtosis value. Chou & Bentler (1995) had suggested a maximum threshold of an absolute value of 3.0 for both skewness and Kurtosis, to confirm the normality. Our analysis found that all the items satisfy the normality criteria, except Ha2, i.e. "I am addicted to use the e-NAM portal / app".

Table 5: Descriptive statistics for the Scale of UTAT2 variables (N = 211)

Variable	Mean	SD	Skewness	Kurtosis
1. I find the e-NAM portal / app useful for my agriculture related activities (P1)	3.26	1.13	-0.9	-0.29
2. Using the e-NAM portal / app increases my chances of achieving things that are important to me (P2)	3.1	1.23	-0.44	-0.89
3. Using the e-NAM portal / app helps me accomplish things more quickly (P3)	3.08	1.29	-0.19	-1.14
4. Using the e-NAM portal / app increases my productivity (P4)	2.99	1.26	-0.11	-1.07
5. Learning how to use the e-NAM portal / app is easy for me (E1)	3.24	1.19	-0.61	-0.48
6. My interaction with the e-NAM portal / app is clear and understandable (E2)	2.51	1.15	0.02	-1.11
7. I find the e-NAM portal / app easy to use (E3)	3.26	1.18	-0.6	-0.57
8. It is easy for me to become skillful at using the e-NAM portal / app (E4)	2.75	1.22	-0.08	-1.09

9. People who are important to me think that I should use the e-NAM portal / app (S1)	2.92	1.08	-0.5	-0.5
10. People who influence my behavior think that I should use the e-NAM portal / app (S2)	3.72	1.16	-1.09	0.55
11. People whose opinions that I value prefer that I use the e-NAM portal / app (S3)	3.18	1.34	-0.42	-1
12. I have the resources to use the e-NAM portal / app (F1)	3.92	0.93	-1.29	2.3
13. I have the knowledge necessary to use the e-NAM portal / app (F2)	3.24	1.21	-0.65	-0.54
14. The e-NAM portal / app is compatible with other technologies that I use (F3)	3.41	0.94	-0.49	0.74
15. I can get help from others when I have difficulties using the e-NAM portal / app (F4)	3.05	1.17	-0.71	-0.62
16. Using the e-NAM portal / app is fun (H1)	2.05	0.93	0.19	-1.29
17. Using the e-NAM portal / app is enjoyable (H2)	2.36	1.03	-0.08	-1.25
18. Using the e-NAM portal / app is very entertaining (H3)	1.7	0.64	0.36	-0.72
19. The e-NAM portal / app is reasonable priced (Pr1)	4.1	0.64	-0.09	-0.6
20. The e-NAM portal / app is good value for money (Pr2)	3.48	1.08	-0.75	0.31
21. At the current price the e-NAM portal / app provides a good value (Pr3)	3.36	1.11	-0.54	-0.01
22. The use of the e-NAM portal / app has become a habit for me (Ha1)	2.44	1.12	0.05	-1.31
23. I am addicted to use the e-NAM portal / app (Ha2)	1.91	0.32	-1.92	4.95
24. I must use the e-NAM portal / app (Ha3)	2.13	1.01	0.24	-1.23
25. Using the e-NAM portal / app has become natural for me (Ha4)	2.41	1.07	0.1	-1.07

26. I intend to continue using mobile internet in the future (B1)	3.26	1.1	-0.73	-0.26
27. I will always try to use the e-NAM portal / app in my daily life (B2)	1.83	0.84	0.56	-0.74
28. I plan to continue to use the e-NAM portal / app frequently (B3)	2.94	1.06	-0.57	-0.7

Usage Frequency

Figure 6 shows the usage frequency of the e-NAM portal as mentioned by the respondents. It is worth noting that even the farmers who use the portal do so quite infrequently. Most of them use the portal sometimes in a month. Only a handful farmers in Rajasthan revealed that they might visit the portal weekly. In depth discussion with these farmers revealed that they often do not visit the portals themselves; sometimes they get to see the portals through the traders or other middlemen involved in the process.

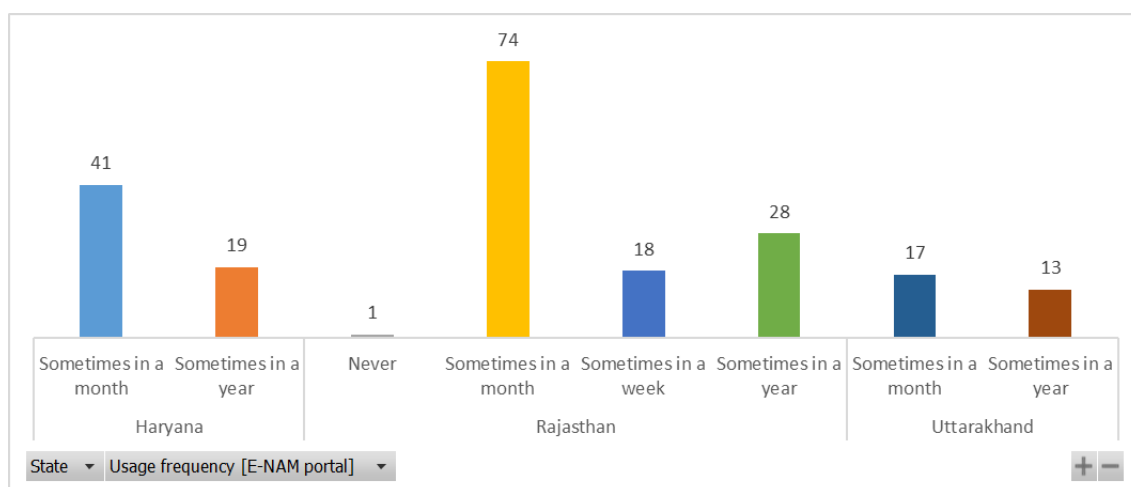


Figure 6: Usage frequency of e-NAM portal

Figure 7 shows the usage of the e-NAM portal by the farmers. We should note that most of the farmers never use the app. Some of those who mentioned that they used the app sometimes in a year revealed that they were referring to the demonstration and training sessions organized by the officials.

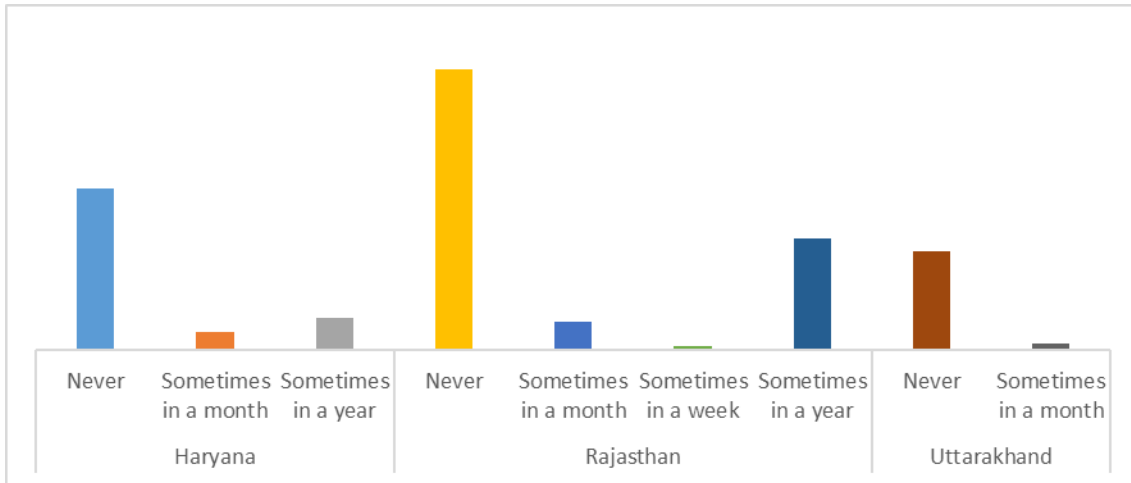


Figure 7: Usage frequency of e-NAM app

In the next parts of this section we give detailed insight for each of the items in the questionnaire and check for any difference across states and academic background.

Performance expectancy [I find the e-NAM portal / app useful for my agriculture related activities]

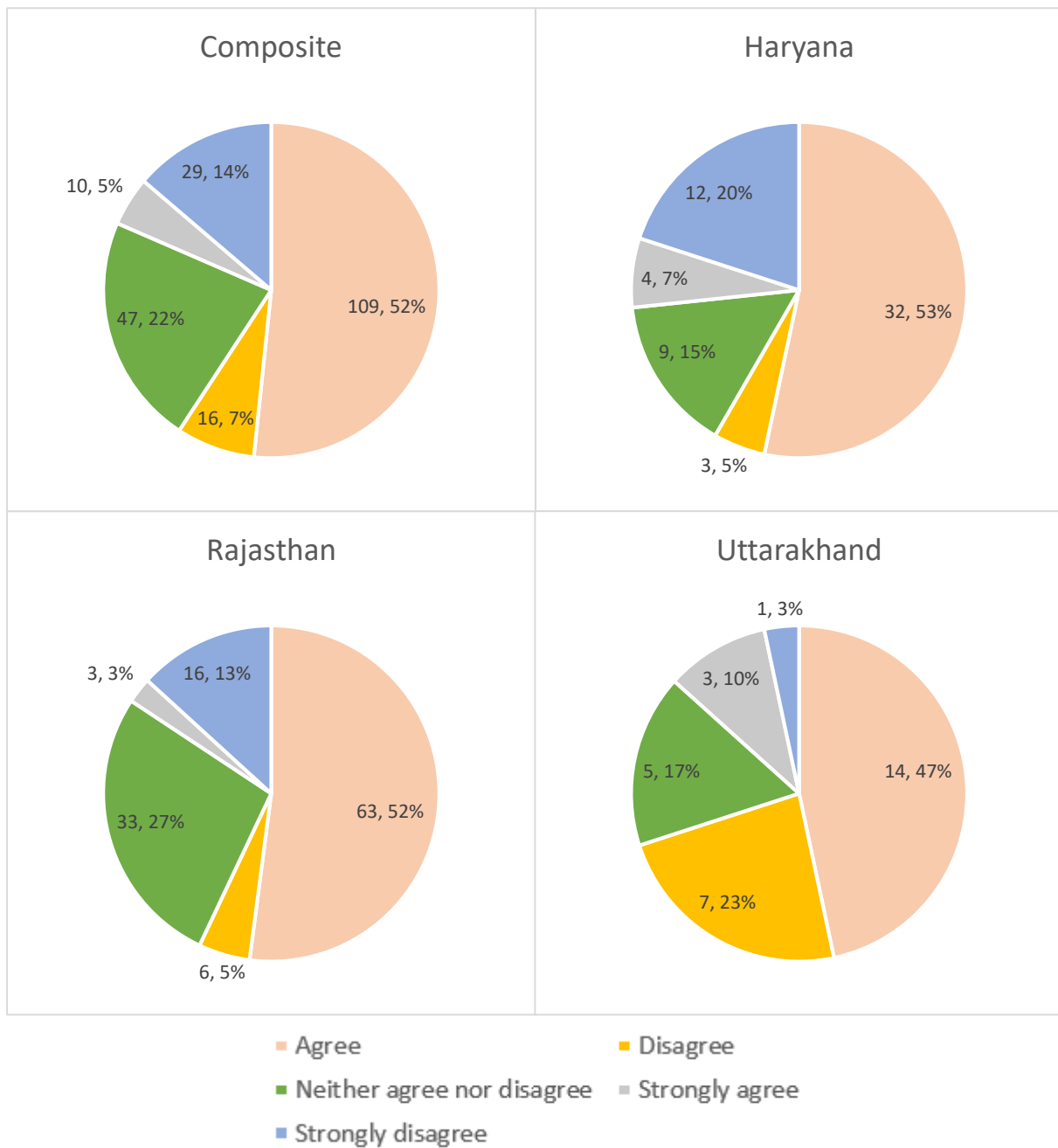


Figure 8: I find the e-NAM portal / app useful for my agriculture related activities

Figure 8 indicates the perception of farmers in the three states- Rajasthan, Haryana and Uttarakhand- about the usefulness of the e-NAM portal or app. Apparently the farmers in Haryana has the most favourable perception of the portal / app, whereas those in Uttarakhand has the most unfavourable perception about the same.

We used ANOVA to check for any statistically significant difference in perception among farmers regarding this aspect across the three states. Table 6 shows the result of ANOVA, which finds no statistically significant difference in perception of farmers regarding usefulness of the e-NAM portal / app.

Table 6: ANOVA (states)- I find the e-NAM portal / app useful for my agriculture related activities

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.456	2	.228	.178	.837
Within Groups	266.208	208	1.280		
Total	266.664	210			

The mean for this item was found to be 3.26 (for all states), where the mean for Uttarakhand is highest at 3.37 and for Haryana it is 3.22. Combined with the Figure 9, it indicates that while some of the farmers have quite good perception about the usefulness of the portal / app, some others have opposite perceptions in the states of Haryana and Uttarakhand.

Next we checked for any difference in perception about this item based on the farmers' level of education. The ANOVA results shown in Table 7 indicate some statistically significant difference (at 0.05 level of significance) this time.

Table 7: ANOVA (Education)- I find the e-NAM portal / app useful for my agriculture related activities

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	29.303	2	14.652	12.839	.000
Within Groups	237.360	208	1.141		
Total	266.664	210			

A post-hoc analysis based on Tukey (Table 8) was undertaken to find out the source of this difference. This reveals that there is a perceptual difference between people having primary level of education and those having secondary or higher secondary level of education.

Table 8: Comparison between groups- I find the e-NAM portal / app useful for my agriculture related activities

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-.716*	.158	.000	-1.09
	Higher secondary	-1.239*	.361	.002	-2.09
Secondary school	Primary school	.716*	.158	.000	.34
	Higher secondary	-.523	.351	.297	-1.35
Higher secondary	Primary school	1.239*	.361	.002	.39
	Secondary school	.523	.351	.297	-.30

Farmers having secondary or higher secondary level of education generally have more positive outlook towards the usefulness of the e-NAM portal / app, with a mean of 3.48 and 4.00 respectively, whereas the mean for those with primary level of education is only 2.76.

Performance expectancy [Using the e-NAM portal / app increases my chances of achieving things that are important to me]

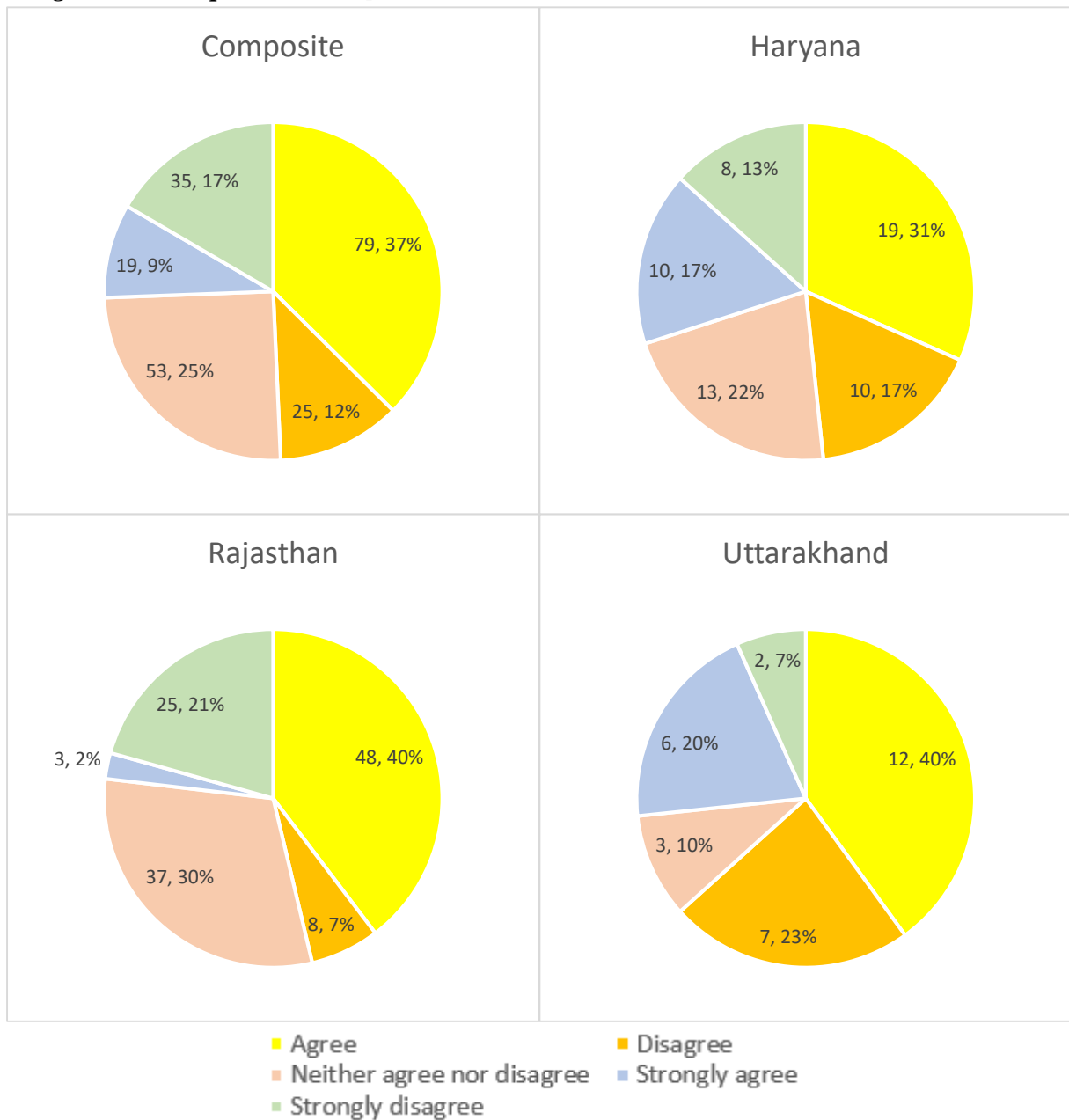


Figure 9: Using the e-NAM portal / app increases my chances of achieving things that are important to me

This question checks whether farmers feel that using the e-NAM portal / app will increase their probability of achieving their agricultural goals. The results are shown in Figure 9. Uttarakhand has the highest mean (3.43), while Rajasthan stands at the lowest with 2.97. Interestingly, Haryana records the highest standard deviation (1.290). This indicates wide variation in perception among farmers in Haryana.

ANOVA results (Table 9), however, indicates no statistically significant difference in perception in this regard among farmers in the three states.

Table 9: ANOVA- Using the e-NAM portal / app increases my chances of achieving things that are important to me

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.288	2	3.144	2.100	.125
Within Groups	311.418	208	1.497		
Total	317.706	210			

We then proceeded to check the variation in perception based on the education level of farmers. ANOVA results (Table 10) indicate that there is a statistically significant difference based on the education levels.

Table 10: ANOVA (Education)- Using the e-NAM portal / app increases my chances of achieving things that are important to me

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	27.027	2	13.514	9.670	.000
Within Groups	290.679	208	1.397		
Total	317.706	210			

Tukey's posthoc analysis (Table 11) reveals that those with primary level of education (mean = 2.63) perceives the e-NAM portal / app unfavourably compared to those having secondary (mean = 3.30) or higher secondary level of education (mean = 3.90). Apparently, the perception becomes more favourable as one has more education. However, beyond the level of primary education, the difference in perception is not statistically significant.

Table 11: Comparison between groups (Education)- Using the e-NAM portal / app increases my chances of achieving things that are important to me

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-.666*	.174	.001	-1.08
	Higher secondary	-1.266*	.399	.005	-2.21
Secondary school	Primary school	.666*	.174	.001	.25
	Higher secondary	-.600	.388	.271	-1.52
Higher secondary	Primary school	1.266*	.399	.005	.32
	Secondary school	.600	.388	.271	-.32

Performance expectancy [Using the e-NAM portal / app helps me accomplish things more quickly]

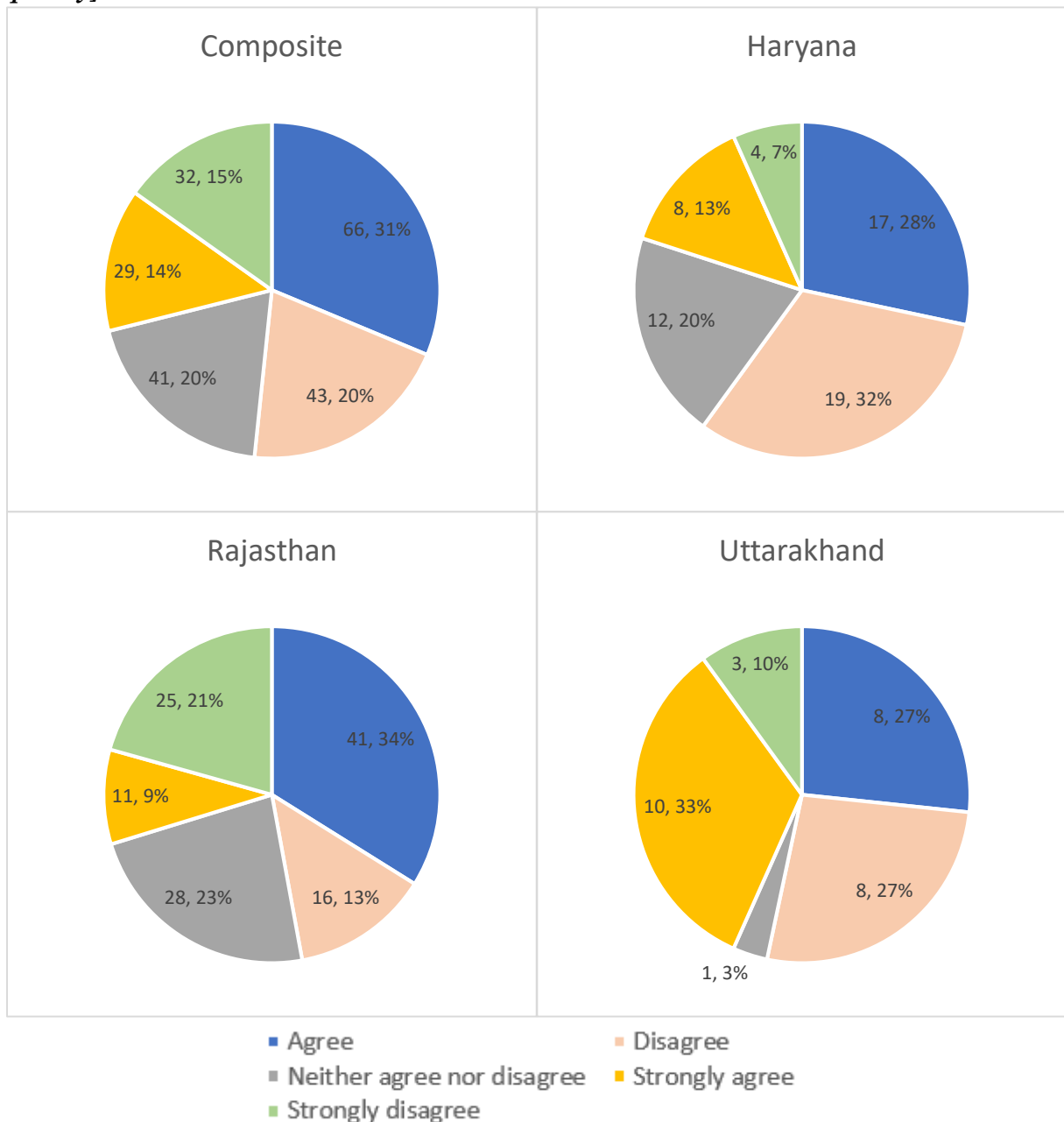


Figure 10: Using the e-NAM portal / app helps me accomplish things more quickly

This question checks whether farmers believe that the e-NAM portal can help them to accomplish their agricultural tasks more quickly. While attempting this question, farmers were reminded about the ways that it might help in selling their crops or different phases of transaction. Figure 11 shows the variety in response received across the three states. Uttarakhand had the highest mean (3.47), and farmers in Rajasthan had the lowest mean (2.98)

among the three states considered. However, the standard deviation for Uttarakhand is also the highest (1.456), while it is the lowest for Haryana (3.10).

ANOVA was employed to find out any statistically significant difference among farmers in these three states. However, as is evident from Table 12, it found no such statistically significant difference.

Table 12: ANOVA- Using the e-NAM portal / app helps me accomplish things more quickly

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.838	2	2.919	1.756	.175
Within Groups	345.792	208	1.662		
Total	351.630	210			

Later we checked for any difference based on the level of farmers' educational background. Once again we find that education can be a differentiator influencing their perceptions, as revealed by ANOVA (Table 13). This is significant at 0.05 level of significance.

Table 13: ANOVA (Education)- Using the e-NAM portal / app helps me accomplish things more quickly

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	27.983	2	13.992	8.992	.000
Within Groups	323.647	208	1.556		
Total	351.630	210			

As we undertook further investigation to explore more about the difference, the posthoc analysis using Tukey's (Table 14) reveals that the farmers having primary level of education differs in their perception from those having secondary or higher secondary level of education. Those having higher secondary education feels that the e-NAM can help them accomplish their tasks quicker (mean = 3.80), while those with primary level of education has the least belief in it (mean = 2.59). Those having secondary level of education lies in the middle with a mean of 3.29.

Table 14: Comparison between groups (Education)- Using the e-NAM portal / app helps me accomplish things more quickly

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-.701*	.184	.001	-1.14
	Higher secondary	-1.208*	.421	.013	-2.20
Secondary school	Primary school	.701*	.184	.001	.27
	Higher secondary	-.508	.409	.431	-1.47
Higher secondary	Primary school	1.208*	.421	.013	.21
	Secondary school	.508	.409	.431	-.46

Performance expectancy [Using the e-NAM portal / app increases my productivity]

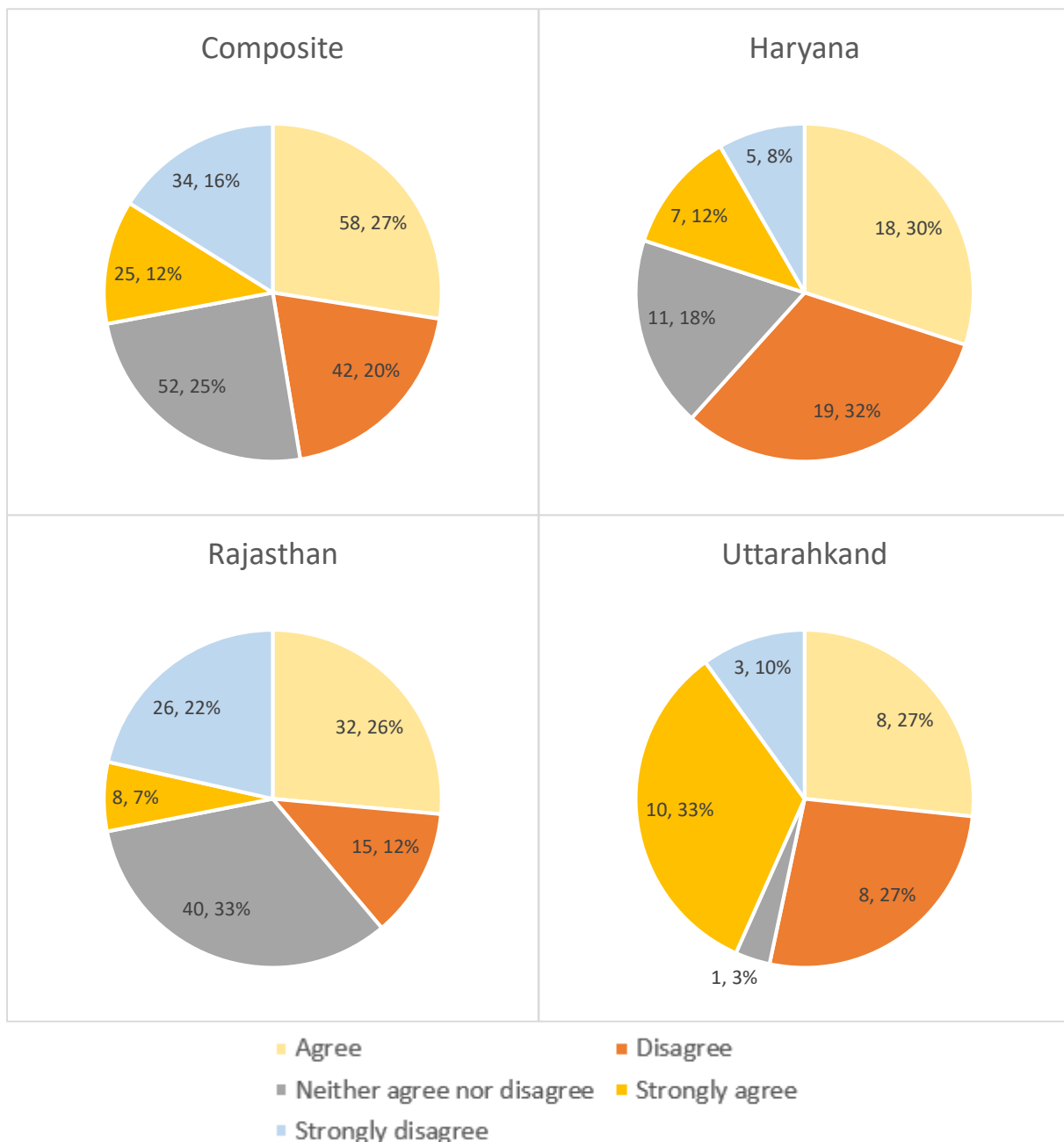


Figure 11: Using the e-NAM portal / app increases my productivity

Figure 11 shows the comparison in belief of farmers from the three states regarding the role of e-NAM portal in increasing their productivity. Uttarakhand farmers score higher than those from the other two, whereas the farmers from Haryana scores the lowest.

To find out whether this difference in belief of the farmers is statistically significant, ANOVA was employed (Table 15). This shows that indeed some statistically significant difference is noticed here at 0.05 level of significance.

Table 15: ANOVA- Using the e-NAM portal / app increases my productivity

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	9.648	2	4.824	3.075	.048
Within Groups	326.333	208	1.569		
Total	335.981	210			

Post-hoc analysis using Tukey’s proves that the difference lies between farmers in Rajasthan and Uttarakhand. The mean for farmers of Rajasthan is only 2.84, whereas that for the farmers of Uttarakhand is 3.47. Hence, farmers from Uttarakhand has more positive belief on the e-NAM regarding its impact on their productivity, which is much more than in the case of Rajasthan.

Table 16: Comparison between groups: Using the e-NAM portal / app increases my productivity

(I) State	(J) State	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Rajasthan	Haryana	-.207	.198	.548	-.67	.26
	Uttarakhand	-.624*	.255	.041	-1.23	-.02
Haryana	Rajasthan	.207	.198	.548	-.26	.67
	Uttarakhand	-.417	.280	.299	-1.08	.24
Uttarakhand	Rajasthan	.624*	.255	.041	.02	1.23
	Haryana	.417	.280	.299	-.24	1.08

In the next stage, we attempted to explore if the belief varies as per education level. ANOVA (Table 17) found that the belief is statistically significantly different across different educational level of farmers. Later a post-hoc analysis was performed using Tukey’s to find out where exactly the difference lied.

Table 17: ANOVA- Using the e-NAM portal / app increases my productivity

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	31.688	2	15.844	10.830	.000
Within Groups	304.293	208	1.463		
Total	335.981	210			

Table 18 clearly shows that the difference is only between farmers having primary education and those at higher education level (secondary or higher secondary). Those having exposure to primary level of education has the lowest belief in the e-NAM regarding its role in increasing their productivity, whereas other have higher belief in the e-NAM in this regard.

Table 18: Comparison between groups (Education)- Using the e-NAM portal / app increases my productivity

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-.758*	.178	.000	-1.18
	Higher secondary	-1.235*	.409	.008	-2.20
Secondary school	Primary school	.758*	.178	.000	.34
	Higher secondary	-.477	.397	.454	-1.41
Higher secondary	Primary school	1.235*	.409	.008	.27
	Secondary school	.477	.397	.454	-.46

Effort expectancy [Learning how to use the e-NAM portal / app is easy for me]

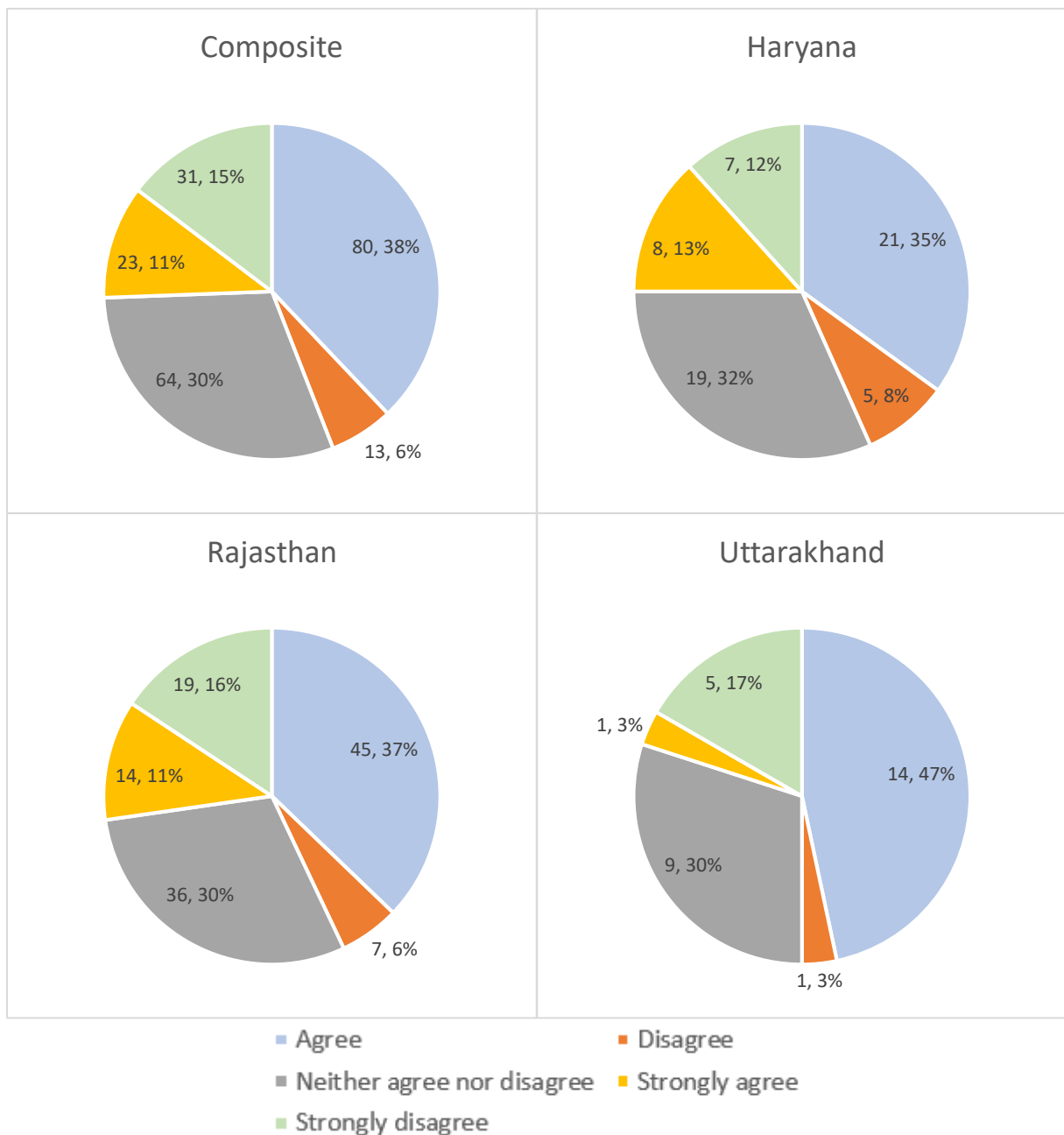


Figure 12: Learning how to use the e-NAM portal / app is easy for me

The figure 12 represents the perception of farmers in the three different states as to how easy they find it to learn different usages of the e-NAM portal / app. The mean for farmers of Haryana (3.30) was found to be more than than the rest, whereas farmers from Uttarakhand scored the lowest (3.17). However, ANOVA could not find this difference to be statistically significant (Table 19).

Table 19: ANOVA- Learning how to use the e-NAM portal / app is easy for me

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.386	2	.193	.135	.873
Within Groups	296.287	208	1.424		
Total	296.673	210			

Later ANOVA (Table 20) was employed once again to find out whether there is any statistically significant difference in this perception depending on the level of farmers' education. A statistically significant difference was observed.

Table 20: ANOVA (Education)- Learning how to use the e-NAM portal / app is easy for me

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	96.109	2	48.054	49.836	.000
Within Groups	200.564	208	.964		
Total	296.673	210			

The Tukey's analysis shows that significant between farmers having exposure to higher secondary level of education with the rest. Those having higher secondary level of education has a mean of 4.60, whereas the farmers having primary level of education scores the lowest (2.34). Farmers having secondary level of education lies at the middle with a mean value of 3.63.

Table 21: Comparison between groups (Education)- Learning how to use the e-NAM portal / app is easy for me

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound
Primary school	Secondary school	-1.293*	.145	.000	-1.63

	Higher secondary	-2.262*	.332	.000	-3.04
Secondary school	Primary school	1.293*	.145	.000	.95
	Higher secondary	-.969*	.322	.008	-1.73
Higher secondary	Primary school	2.262*	.332	.000	1.48
	Secondary school	.969*	.322	.008	.21

Effort expectancy [My interaction with the e-NAM portal / app is clear and understandable]

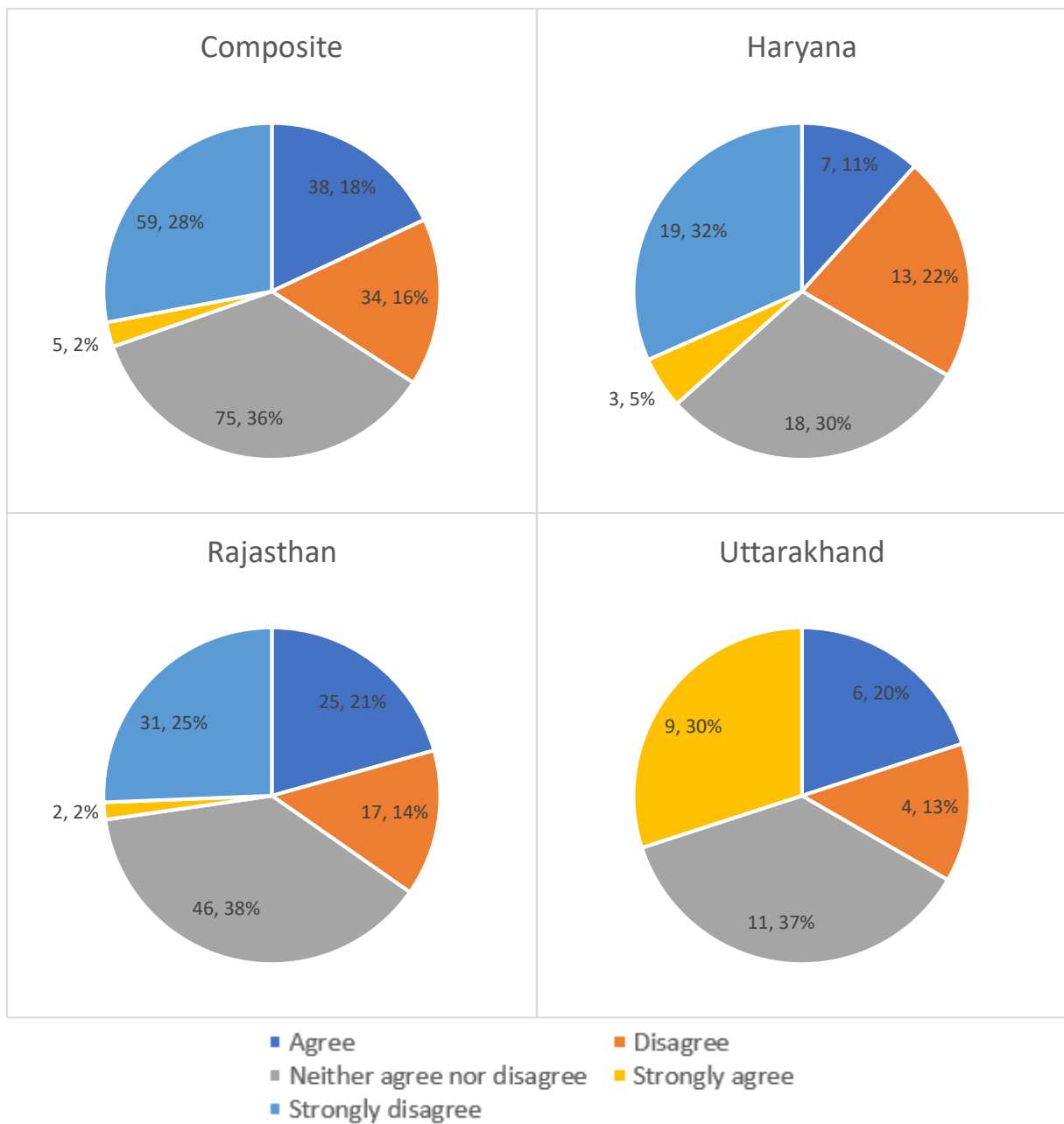


Figure 13: My interaction with the e-NAM portal / app is clear and understandable

This questionnaire item (Figure 13) checks whether farmers in the three states feel that they can clearly interact with the e-NAM app / portal. Farmers in Rajasthan has an over-all highest score at 2.59, whereas farmers in Haryana has the lowest average at 2.37. This shows that farmers are not generally very satisfied with their ability to interact clearly with the e-NAM portal / app.

Table 22: ANOVA- My interaction with the e-NAM portal / app is clear and understandable

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.000	2	1.000	.757	.470
Within Groups	274.739	208	1.321		
Total	276.739	210			

ANOVA was employed to find out if this difference is statistically significant. However, as shown in Table 22 the difference was not found to be statistically significant across the three states.

Table 23: ANOVA (Education)- My interaction with the e-NAM portal / app is clear and understandable

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	29.297	2	14.648	12.313	.000
Within Groups	247.442	208	1.190		
Total	276.739	210			

In the next step, we checked whether there is any statistically significant difference in this regard among the farmers having different levels of educational exposure. ANOVA was again used for this purpose (Table 23) and it found the difference to be statistically significant.

Later Tukey's post-hoc analysis found that farmers have exposure to primary level of education only were the least happy (mean = 2.04), whereas the difference between farmers having exposure to secondary or higher secondary level of education did not differ much in their perception. 130 farmers with secondary level of education had a mean score of 2.68, whereas 10 farmers with higher secondary level of education had a mean score of 3.50.

Table 24: Comparison between groups (Education)- My interaction with the e-NAM portal / app is clear and understandable

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-.642*	.161	.000	-1.02
	Higher secondary	-1.458*	.368	.000	-2.33
Secondary school	Primary school	.642*	.161	.000	.26
	Higher secondary	-.815	.358	.061	-1.66
Higher secondary	Primary school	1.458*	.368	.000	.59
	Secondary school	.815	.358	.061	-.03

Effort expectancy [I find the e-NAM portal / app easy to use]

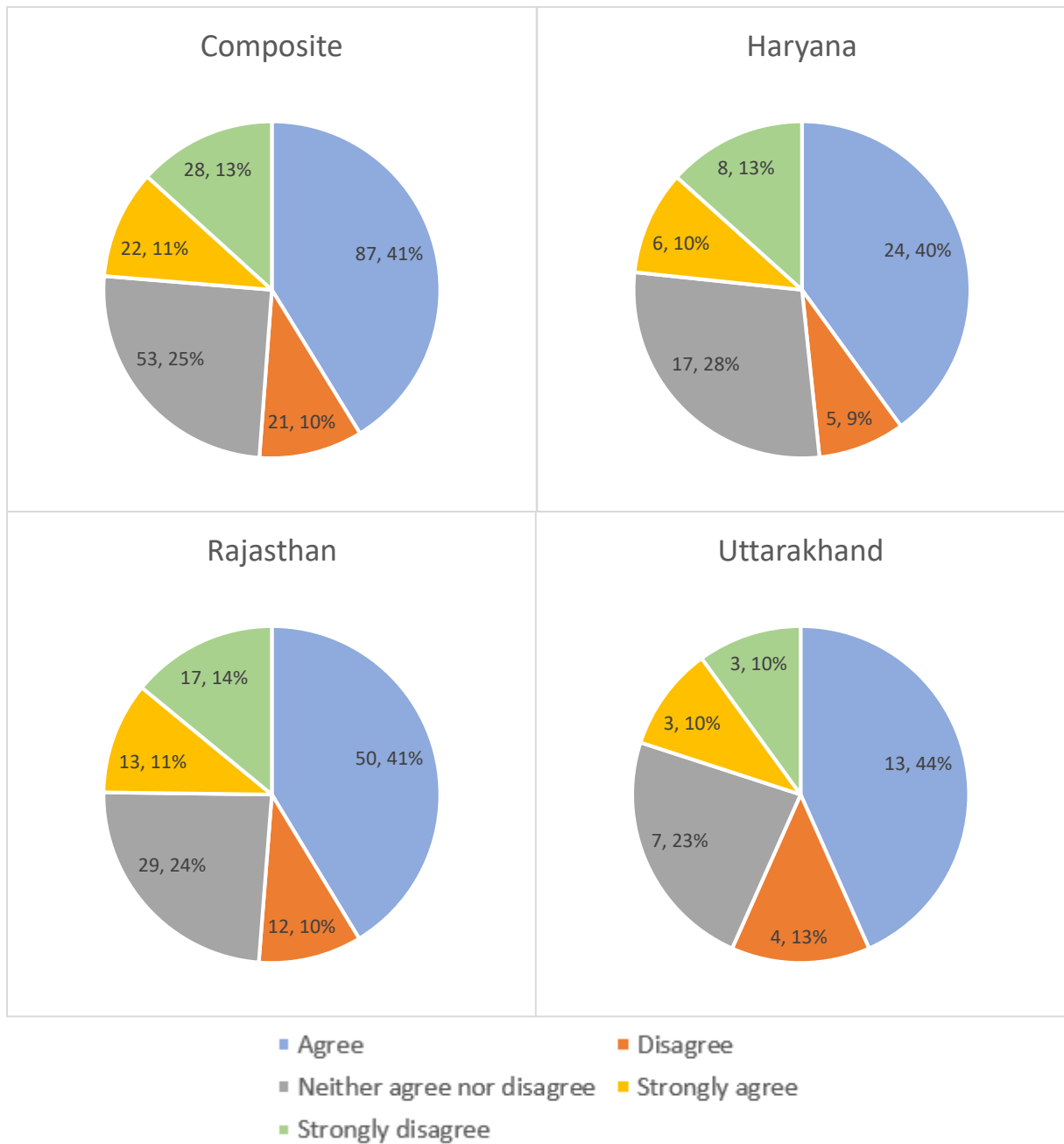


Figure 14: I find the e-NAM portal / app easy to use

We found that farmers across three states have almost same level of perception regarding the ease of use of the e-NAM portal / app (Figure 14). Farmers in Rajasthan and Haryana had a mean score of 3.25, whereas those in Uttarakhand had a mean score of 3.30.

Table 25: ANOVA- I find the e-NAM portal / app easy to use

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.068	2	.034	.024	.976
Within Groups	294.112	208	1.414		
Total	294.180	210			

Tukey's post-hoc analysis (Table 25) could not find any statistically significant difference among farmers of the three states in this regard.

Table 26: ANOVA(Education)- I find the e-NAM portal / app easy to use

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	66.303	2	33.151	30.260	.000
Within Groups	227.877	208	1.096		
Total	294.180	210			

Later we checked the existence of any statistically significant difference among farmers having different levels of educational exposure. ANOVA (Table 26) found that indeed there was some significant difference.

Table 27: Comparison between groups (Education)- I find the e-NAM portal / app easy to use

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound
Primary school	Secondary school	-1.070*	.154	.000	-1.43
	Higher secondary	-1.893*	.354	.000	-2.73
Secondary school	Primary school	1.070*	.154	.000	.71
	Higher secondary	-.823*	.343	.046	-1.63

Higher secondary	Primary school	1.893*	.354	.000	1.06
	Secondary school	.823*	.343	.046	.01

Farmers having higher secondary level of education had a mean score of 4.40, whereas those with secondary level of education had a mean of 3.63. Farmers with primary level of education had the lowest mean at 2.34. Tukey's post-hoc analysis (Table 27) found it to be significant across all three groups. This finding is significant as for the first time in this analysis till here we find that all three groups vary in their opinion.

Effort expectancy [It is easy for me to become skilful at using the e-NAM portal / app]

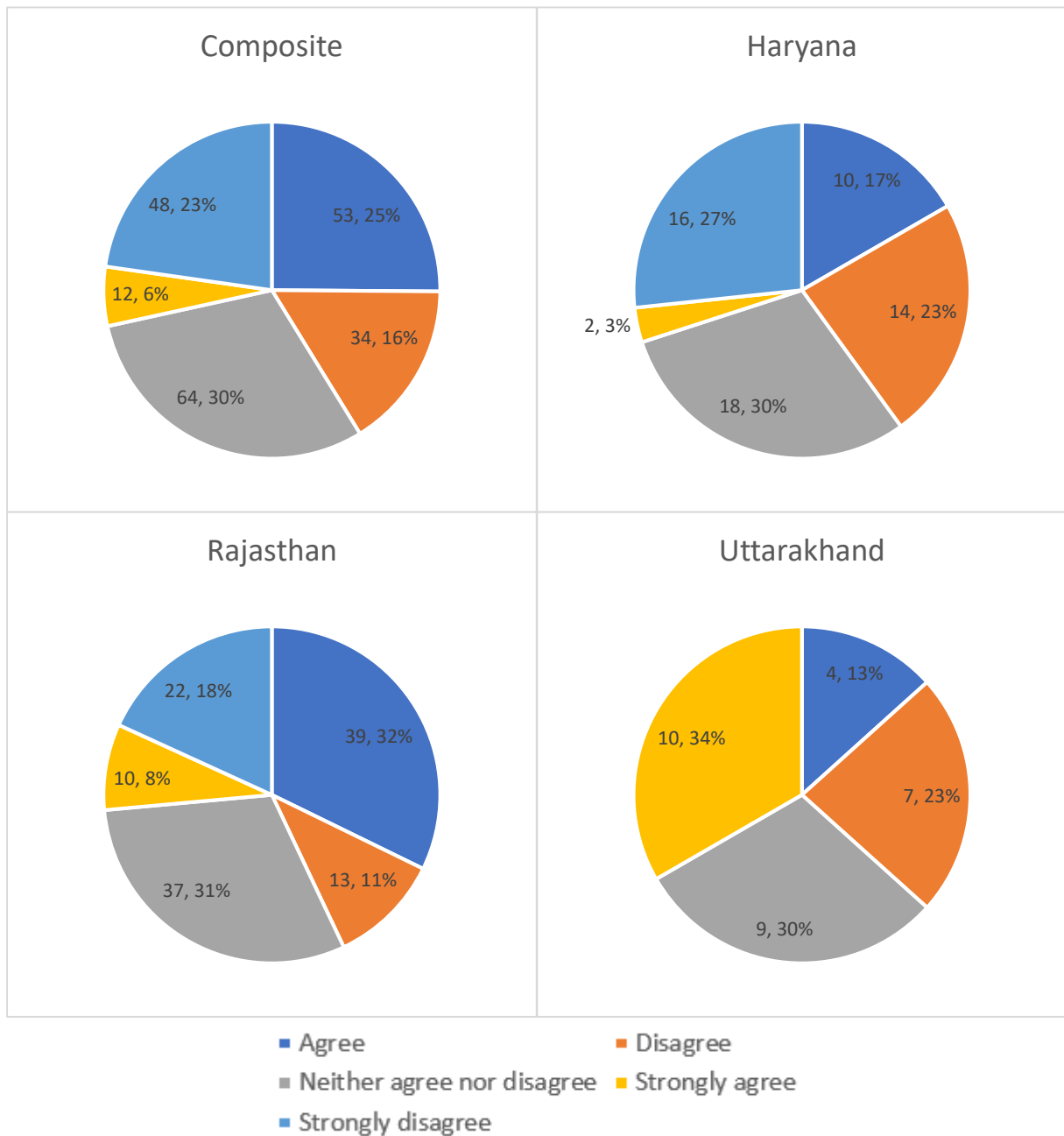


Figure 15: It is easy for me to become skilful at using the e-NAM portal / app

The Figure 15 shows perception of farmers in the states of Haryana, Rajasthan and Uttarakhand regarding how easy they found to be skilful at using the e-NAM portal / app. Farmers at Uttarakhand scored the lowest (mean = 2.23), whereas those in Rajasthan had the highest mean (3.02).

Table 28: It is easy for me to become skilful at using the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	21.420	2	10.710	7.622	.001
Within Groups	292.267	208	1.405		
Total	313.687	210			

ANOVA (Table 28) found the difference to be statistically significant among farmers in Rajasthan and those in Haryana or Uttarakhand.

Table 29: Comparison between groups- It is easy for me to become skilful at using the e-NAM portal / app

(I) State	(J) State	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Rajasthan	Haryana	.550*	.187	.010	.11	.99
	Uttarakhand	.783*	.242	.004	.21	1.35
Haryana	Rajasthan	-.550*	.187	.010	-.99	-.11
	Uttarakhand	.233	.265	.653	-.39	.86
Uttarakhand	Rajasthan	-.783*	.242	.004	-1.35	-.21
	Haryana	-.233	.265	.653	-.86	.39

Next, we proceeded to check for any important difference in perception among farmers based on their exposure to different levels of education. ANOVA (Table 30) found that the difference is indeed statistically significant.

Table 30: ANOVA (Education)- It is easy for me to become skilful at using the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	46.444	2	23.222	18.074	.000
Within Groups	267.243	208	1.285		
Total	313.687	210			

Once again we find that the three groups of farmers having primary, secondary or higher secondary level of education differ significantly in their opinion (Table 31). Farmers having higher secondary level of education had the mean of 4.10, which is the highest among farmers. On the other hand, farmers having primary level of education had the lowest mean at 2.18. Farmers with secondary level of education remain in the middle with a mean score of 2.95.

Table 31: Comparison between groups (Education)- It is easy for me to become skilful at using the e-NAM portal / app

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-.771*	.167	.000	-1.17
	Higher secondary	-1.917*	.383	.000	-2.82
Secondary school	Primary school	.771*	.167	.000	.38
	Higher secondary	-1.146*	.372	.007	-2.02
Higher secondary	Primary school	1.917*	.383	.000	1.01
	Secondary school	1.146*	.372	.007	.27

Social influence [People who are important to me think that I should use the e-NAM portal / app]

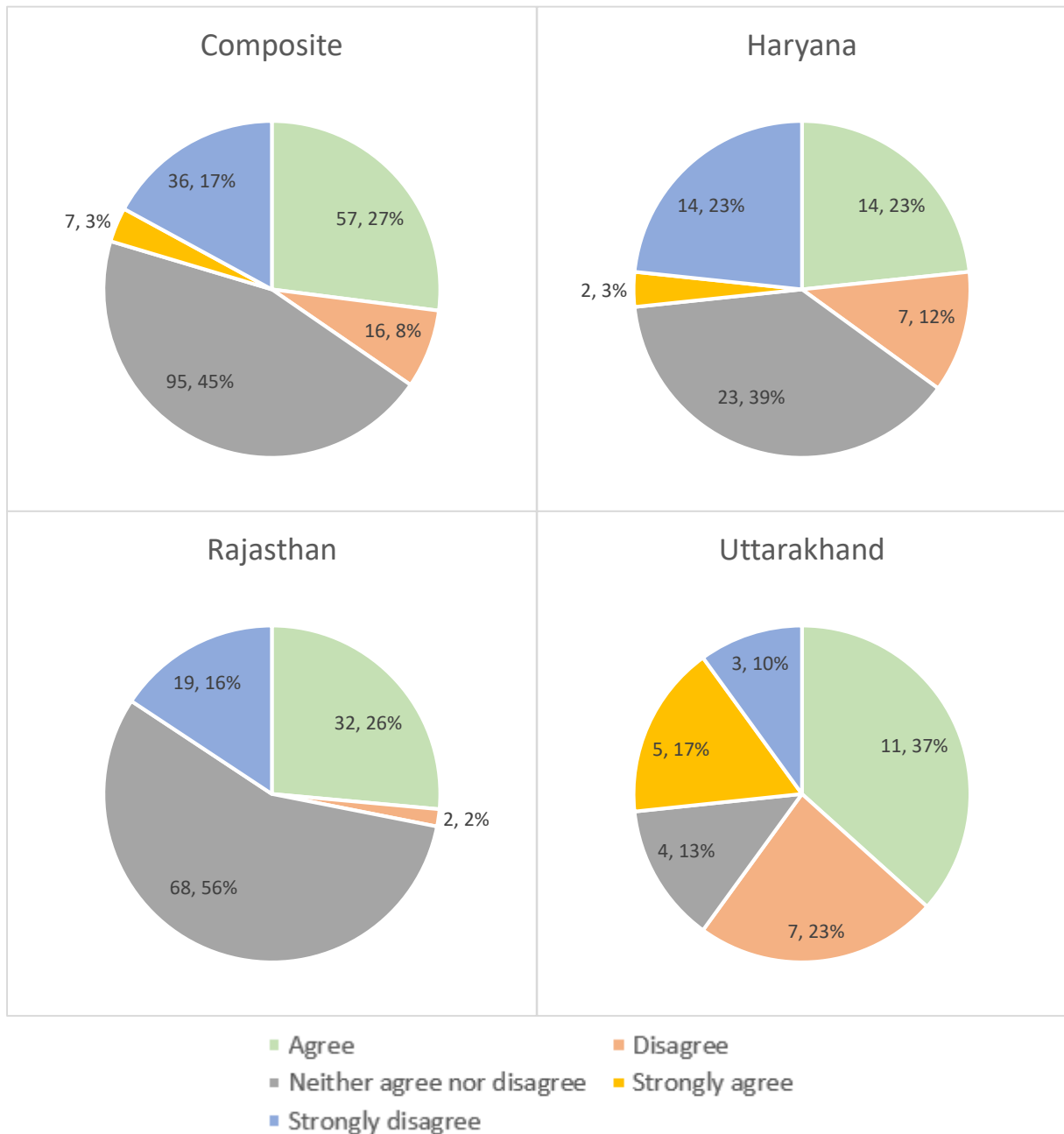


Figure 16: People who are important to me think that I should use the e-NAM portal / app

Important people can influence others in various stages of life, including adoption of new tools or technology. This questionnaire item checked whether farmers thought that people, who they considered important, influenced them in using the e-NAM portal / app. Figure 16 represents the responses received from the farmers in the three states. Farmers in Uttarakhand had the highest mean score of 3.27, those in Rajasthan had a mean score of 2.93, and farmers in Haryana were found to be at the bottom with mean score of 2.72.

Table 32: ANOVA- People who are important to me think that I should use the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.109	2	3.055	2.675	.071
Within Groups	237.521	208	1.142		
Total	243.630	210			

Tukey's post-hoc analysis (Table 32), however, could not find this difference to be statistically significant.

Table 33: ANOVA (Education)- People who are important to me think that I should use the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	14.535	2	7.267	6.598	.002
Within Groups	229.096	208	1.101		
Total	243.630	210			

A similar check was performed based on the education level of farmers and was found to be statistically significant (Table 33) at significance level of 0.05.

Table 34: Comparison between groups (Education)- People who are important to me think that I should use the e-NAM portal / app

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound
Primary school	Secondary school	-.514*	.155	.003	-.88
	Higher secondary	-.837	.354	.050	-1.67
Secondary school	Primary school	.514*	.155	.003	.15

	Higher secondary	-.323	.344	.617	-1.14
Higher secondary	Primary school	.837	.354	.050	.00
	Secondary school	.323	.344	.617	-.49

The mean for farmers with primary level of education was the lowest at 2.56, while the same for farmers with higher secondary level of education was the highest at 3.40. Farmers with secondary level of education remained in the middle with mean score of 3.08. Tukey's post-hoc analysis (Table 34) found that the difference was significant among farmers having primary level of education and those having either secondary or higher secondary level of education. The difference among farmers with secondary and higher secondary level of education was not found to be significant.

Social influence [People who influence my behaviour think that I should use the e-NAM portal / app]

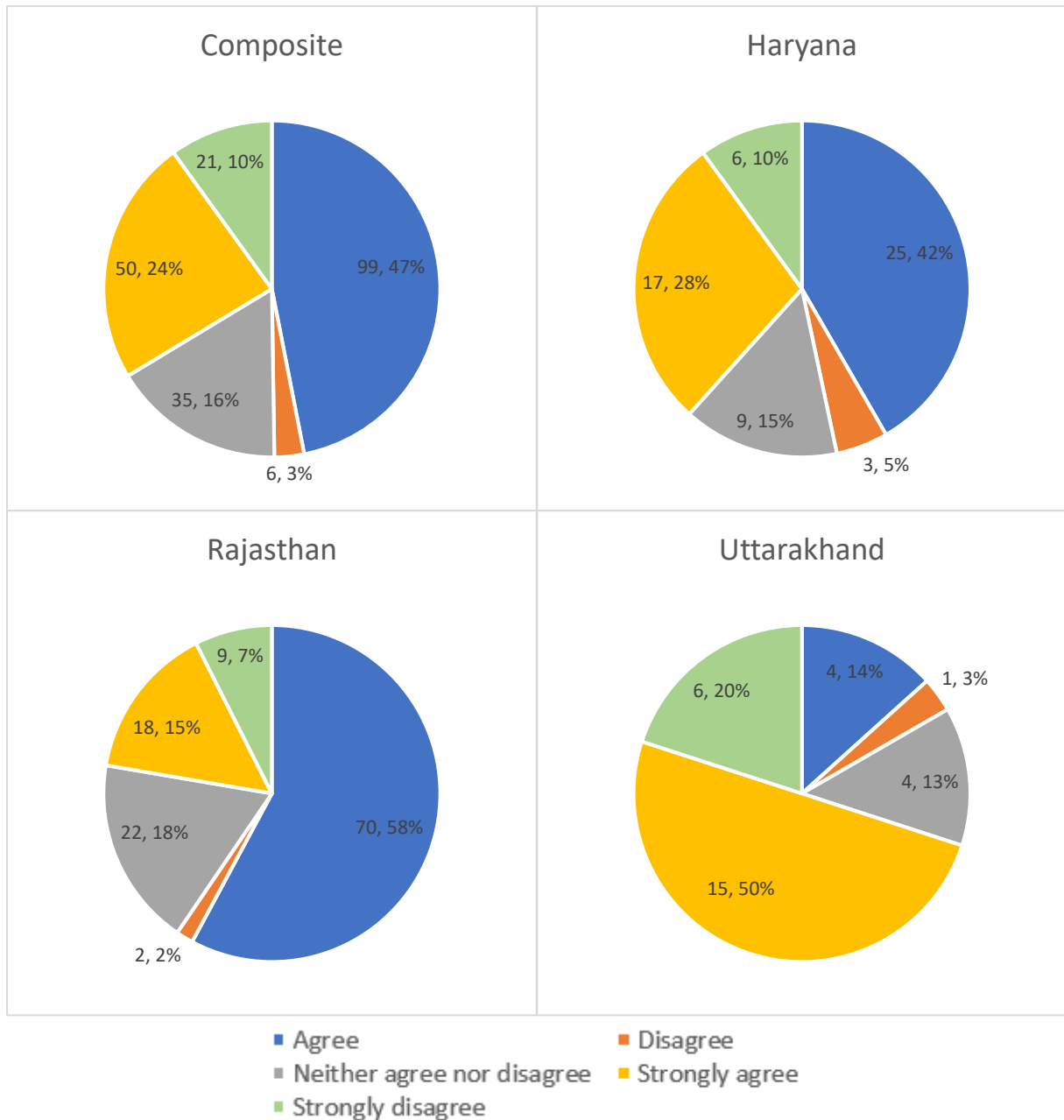


Figure 17: People who influence my behaviour think that I should use the e-NAM portal / app

We also checked whether people who influence the behaviour of farmers persuaded them to use the e-NAM portal / app. This is slightly different from the previous question as farmers may perceive someone to be important to them (e.g. family members, Panchayat Pradhan etc.), whereas some other group of people may influence their behaviour. This group may include government functionaries or other people involved in agricultural marketing, besides others. Figure 17 shows this graphically. Farmers in the three states were found to be almost at the

same level in this regard. Farmers in Haryana scored the highest mean (3.73), whereas those in Uttarakhand scored the lowest mean (3.70).

Post-hoc analysis using Tukey’s could not find any statistically significant difference among farmers from the three states (Table 35).

Table 35: People who influence my behaviour think that I should use the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.029	2	.015	.011	.989
Within Groups	280.909	208	1.351		
Total	280.938	210			

We employed ANOVA to find out any statistically significant difference among farmers in this regard based on their education level. Table 37 shows existence of statistically significant difference among farmers this time.

Table 36: ANOVA (Education)- People who influence my behaviour think that I should use the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	28.717	2	14.358	11.841	.000
Within Groups	252.222	208	1.213		
Total	280.938	210			

Tukey’s post-hoc analysis (Table 38) found that like most of the earlier findings, the farmers with primary level of education only differed significantly compared to those having either secondary or higher secondary level of education. No statistically significant difference was found among those having secondary or higher secondary level of education. Farmers having primary level of education had a mean score of 3.24, while those with higher secondary level of education had the highest mean score of 4.60.

Table 37: Comparison between groups (Education)- People who influence my behaviour think that I should use the e-NAM portal / app

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-.668*	.163	.000	-1.05
	Higher secondary	-1.361*	.372	.001	-2.24
Secondary school	Primary school	.668*	.163	.000	.28
	Higher secondary	-.692	.361	.137	-1.55
Higher secondary	Primary school	1.361*	.372	.001	.48
	Secondary school	.692	.361	.137	-.16

Social influence [People whose opinions I value prefer that I use the e-NAM portal / app]

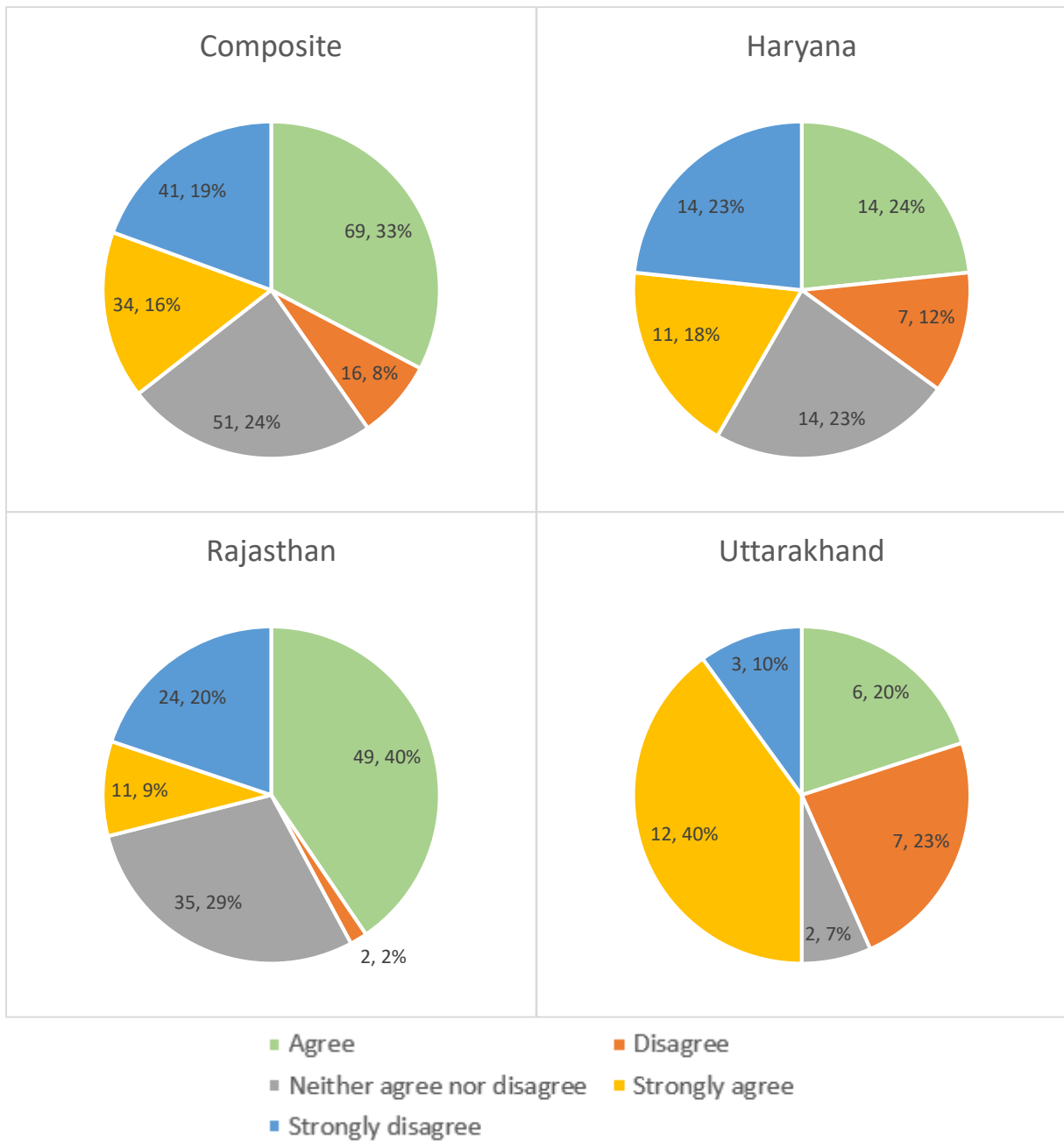


Figure 18: People whose opinions I value prefer that I use the e-NAM portal / app

One may value someone’s opinion in some regard, although those people may not be very important to one or may not have regulatory power to change one’s behaviour. This question checks for those circumstances.

Figure 18 shows the perception of farmers from the three states in this regard. Farmers in Uttarakhand scored the highest mean at 3.57, whereas those from Haryana scored the lowest at 3.02. Farmers in Rajasthan remained in the middle with a mean value of 3.17.

Table 38: ANOVA- People whose opinions I value prefer that I use the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.086	2	3.043	1.703	.185
Within Groups	371.705	208	1.787		
Total	377.791	210			

ANOVA could not find any statistically significant difference among three groups of farmers from the three states in this regard (Table 39).

When we checked for difference among farmers based on their level of education, ANOVA found it to be significant (Table 40).

Table 39: ANOVA (Education)- People whose opinions I value prefer that I use the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	53.606	2	26.803	17.197	.000
Within Groups	324.185	208	1.559		
Total	377.791	210			

Post-hoc analysis using Tukey's (Table 41) found that farmers having primary level of education only differed in their opinion compared to farmers having secondary or higher secondary level of education. These latter two groups did not differ significantly between themselves. Once again, farmers having higher secondary level of education scored the highest mean at 4.40, whereas those with secondary and primary level of education scored mean of 3.45 and 2.54 respectively.

Table 40: Comparison between groups (Education)- People whose opinions I value prefer that I use the e-NAM portal / app

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-.911*	.184	.000	-1.35
	Higher secondary	-1.865*	.422	.000	-2.86
Secondary school	Primary school	.911*	.184	.000	.48
	Higher secondary	-.954	.410	.054	-1.92
Higher secondary	Primary school	1.865*	.422	.000	.87
	Secondary school	.954	.410	.054	-.01

Facilitating conditions [I have the resources to use the e-NAM portal / app]

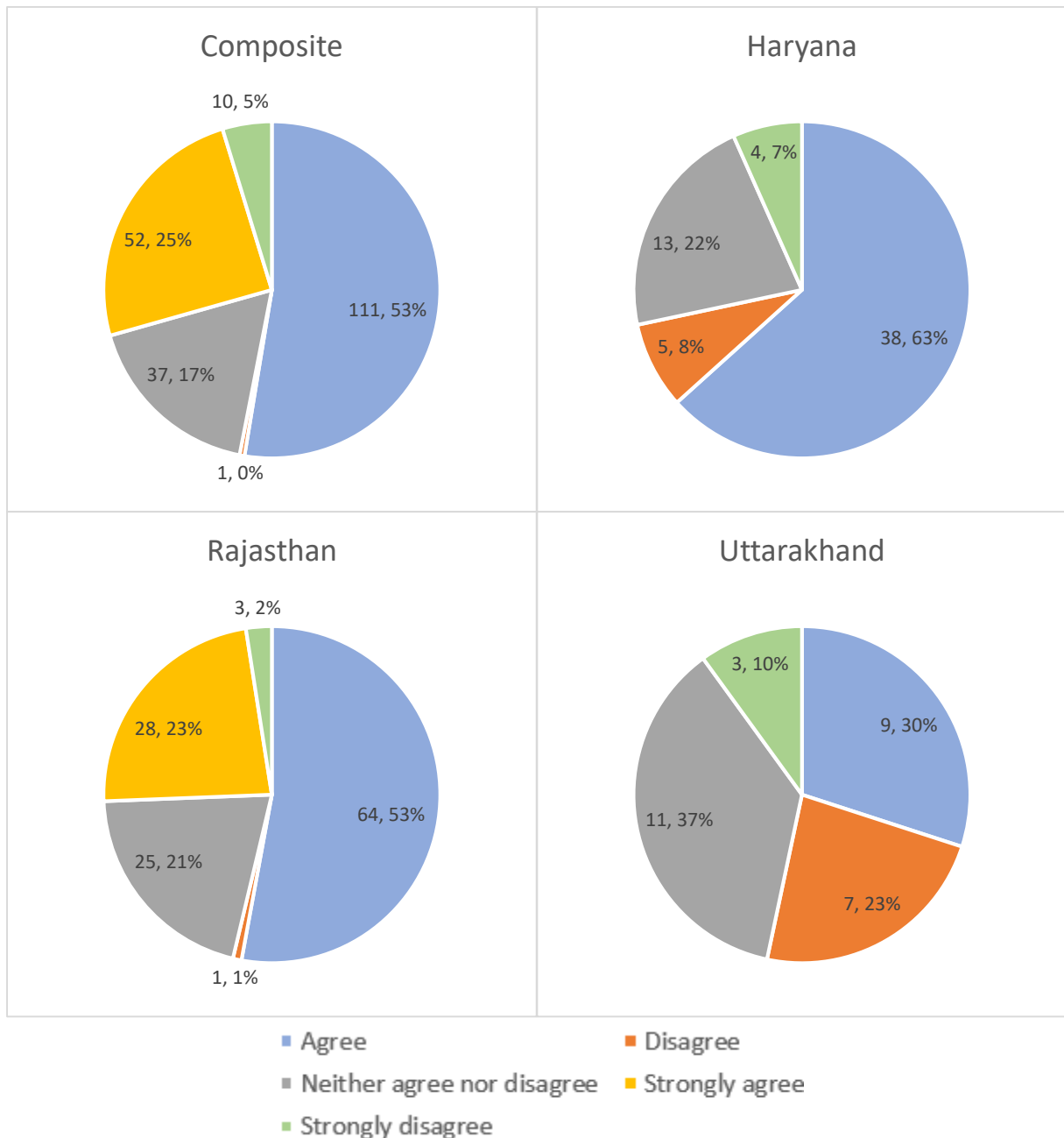


Figure 19: I have the resources to use the e-NAM portal / app

The adoption of any technology will depend on the presence of facilitating conditions, like availability of other prerequisite resources. Figure 19 shows the response of farmers from the three states regarding the availability of necessary resources to use the e-NAM portal / app. This may be the mobile phones, personal computers, laptops or internet connectivity. Farmers from Rajasthan and Haryana had a mean of 3.93, whereas farmers from Uttarakhand had a mean of 3.83.

Table 41: ANOVA- I have the resources to use the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.259	2	.130	.149	.862
Within Groups	181.371	208	.872		
Total	181.630	210			

ANOVA (Table 42) could not find any statistically significant difference in this regard for farmers from the three states.

Table 42: ANOVA (Education)- I have the resources to use the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	33.875	2	16.937	23.843	.000
Within Groups	147.755	208	.710		
Total	181.630	210			

The we checked for difference in opinion in this regard among farmers based on their level of education. When ANOVA test was performed, we found existence of statistically significant difference among farmers in these three states (Table 43).

Table 43: Comparison between groups (Education)- I have the resources to use the e-NAM portal / app

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound
Primary school	Secondary school	-.774*	.124	.000	-1.07
	Higher secondary	-1.320*	.285	.000	-1.99
Secondary school	Primary school	.774*	.124	.000	.48

	Higher secondary	-.546	.277	.121	-1.20
Higher secondary	Primary school	1.320*	.285	.000	.65
	Secondary school	.546	.277	.121	-.11

Tukey's post-hoc analysis (Table 44) confirmed that once again farmers having primary education only differed significantly from those having secondary or higher secondary education. Farmers with primary education scored a mean of 3.38 only, whereas those having secondary education scored 4.15 and the ones having higher secondary education scored 4.70.

Facilitating conditions [I have the knowledge necessary to use the e-NAM portal / app]

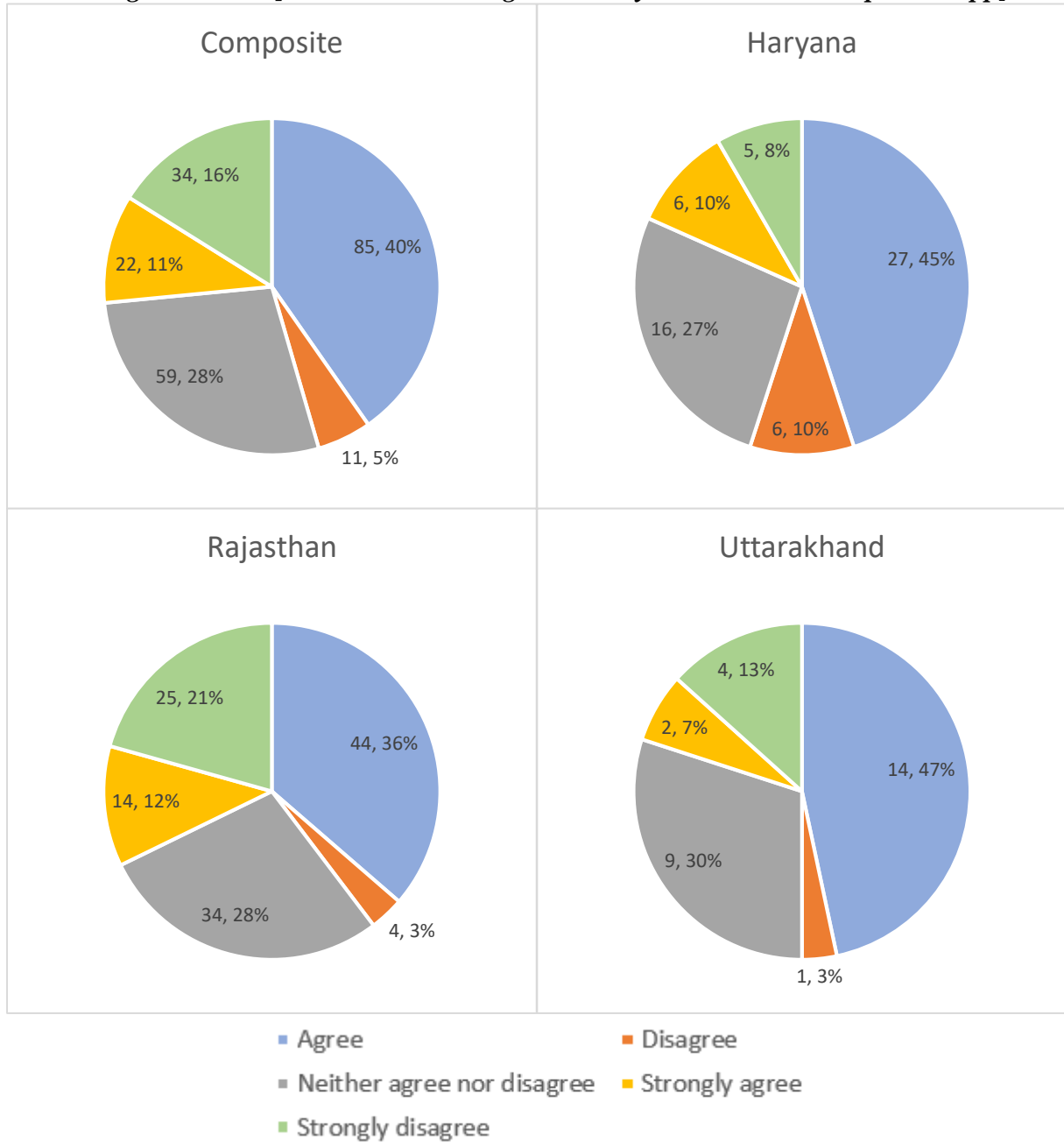


Figure 20: I have the knowledge necessary to use the e-NAM portal / app

One’s knowledge can be an extremely important factor while adopting a new technology. This question revealed whether farmers believed that they had the necessary knowledge to use the e-NAM portal / app. Figure 20 represents the responses received for this question. Farmers from Haryana seemed to have the most confidence in this regard, with a mean score of 3.38, whereas those from Rajasthan scored 3.15. Farmers from Uttarakhand scored 3.30.

Table 44: ANOVA- I have the knowledge necessary to use the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.346	2	1.173	.798	.452
Within Groups	305.806	208	1.470		
Total	308.152	210			

However, ANOVA could not detect this difference to be statistically significant for farmers across these states (Table 45).

Table 45: ANOVA (Education)- I have the knowledge necessary to use the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	89.927	2	44.963	42.857	.000
Within Groups	218.225	208	1.049		
Total	308.152	210			

When we checked the same set of response against the educational level of the farmers, ANOVA detected presence of statistically significant difference (Table 46).

Table 46: Comparison between groups (Education)- I have the knowledge necessary to use the e-NAM portal / app

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound
Primary school	Secondary school	-1.212*	.151	.000	-1.57
	Higher secondary	-2.320*	.346	.000	-3.14
Secondary school	Primary school	1.212*	.151	.000	.86

	Higher secondary	-1.108*	.336	.003	-1.90
Higher secondary	Primary school	2.320*	.346	.000	1.50
	Secondary school	1.108*	.336	.003	.31

Tukey's post-hoc analysis (Table 47) revealed that the difference is significant for all the three groups. Farmers with primary education only scored a mean of 2.38, those with secondary education scored 3.59 and the rest with higher secondary education scored 4.70. Apparently those with higher secondary level of education are more confident about their knowledge for using the e-NAM portal / app.

Facilitating conditions [The e-NAM portal / app is compatible with other technologies that I use]

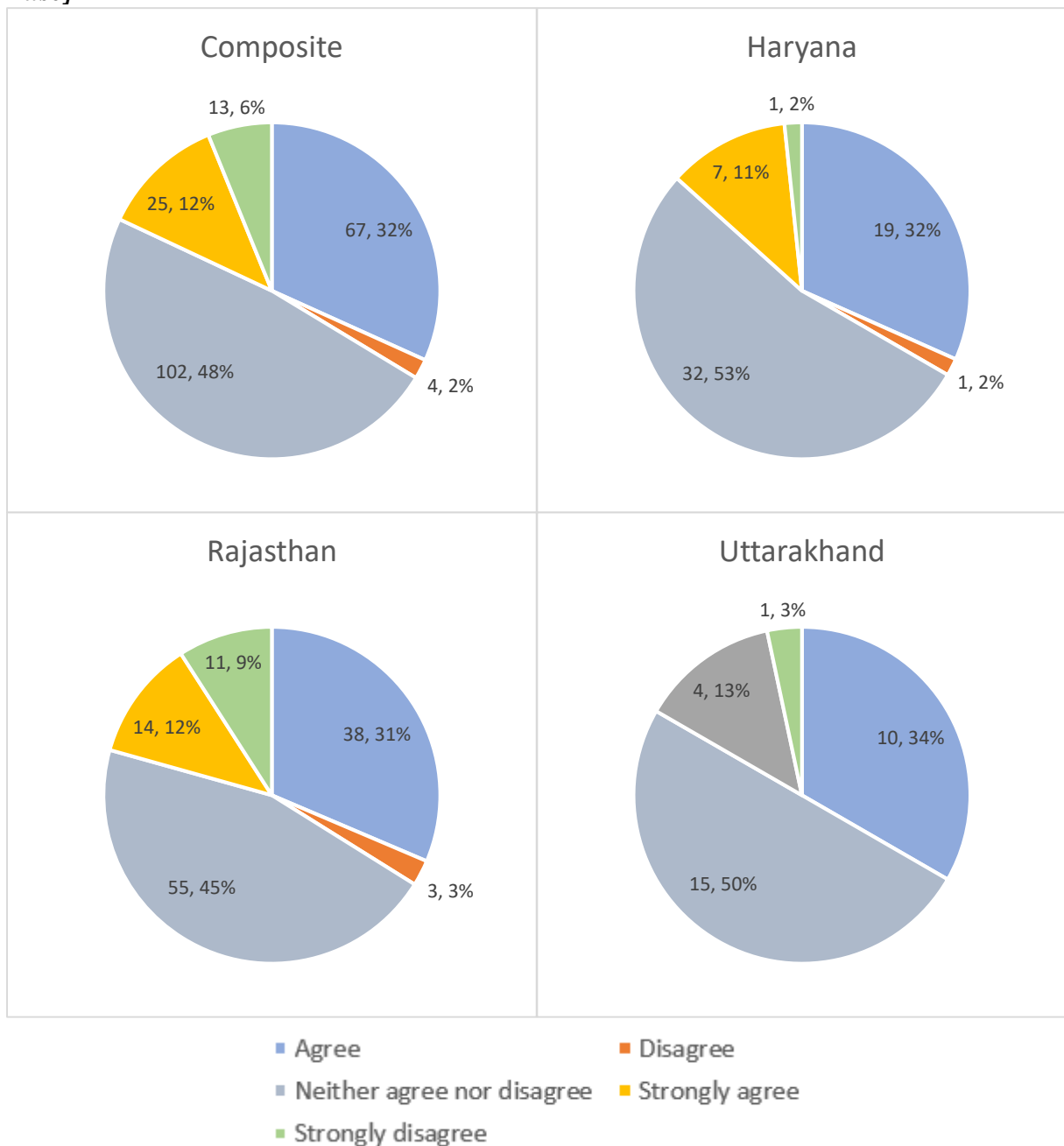


Figure 21: The e-NAM portal / app is compatible with other technologies that I use

This question attempted to find whether farmers believed that the e-NAM portal / app is compatible with other technologies being used by them. The above Figure 21 represents the response of the farmers received in this regard. Farmers from Uttarakhand scored the highest with a mean score of 3.53, while those from Rajasthan scored the lowest with a mean of 3.34. Farmers from Haryana stood in between with a mean score of 3.50.

Table 47: ANOVA- The e-NAM portal / app is compatible with other technologies that I use

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.554	2	.777	.871	.420
Within Groups	185.574	208	.892		
Total	187.128	210			

We employed ANOVA to detect if the difference of perception among farmers from the three states is statistically significant. However, the difference was not found to be statistically significant at significance level 0.05.

Table 48: ANOVA (Education)- The e-NAM portal / app is compatible with other technologies that I use

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	43.001	2	21.500	31.028	.000
Within Groups	144.127	208	.693		
Total	187.128	210			

With the help of ANOVA when we checked the same question against the education level of farmers, statistically significant difference was noticed (Table 50).

Table 49: Comparison between groups (Education)- The e-NAM portal / app is compatible with other technologies that I use

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-.845*	.123	.000	-1.13
	Higher secondary	-1.583*	.281	.000	-2.25

Secondary school	Primary school	.845*	.123	.000	.55
	Higher secondary	-.738*	.273	.020	-1.38
Higher secondary	Primary school	1.583*	.281	.000	.92
	Secondary school	.738*	.273	.020	.09

The Tukey's post-hoc analysis confirmed that all three groups varied significantly. Farmers with higher secondary level of education had a mean score of 4.40, those with secondary level of education had their mean score at 3.66, while the rest with primary level of education scored a mean of 2.82 only. This may indicate that farmers with comparatively higher education generally use more advanced technology and hence are more comfortable while adopting a new technology.

Facilitating conditions [I can get help from others when I have difficulties using the e-NAM portal / app]

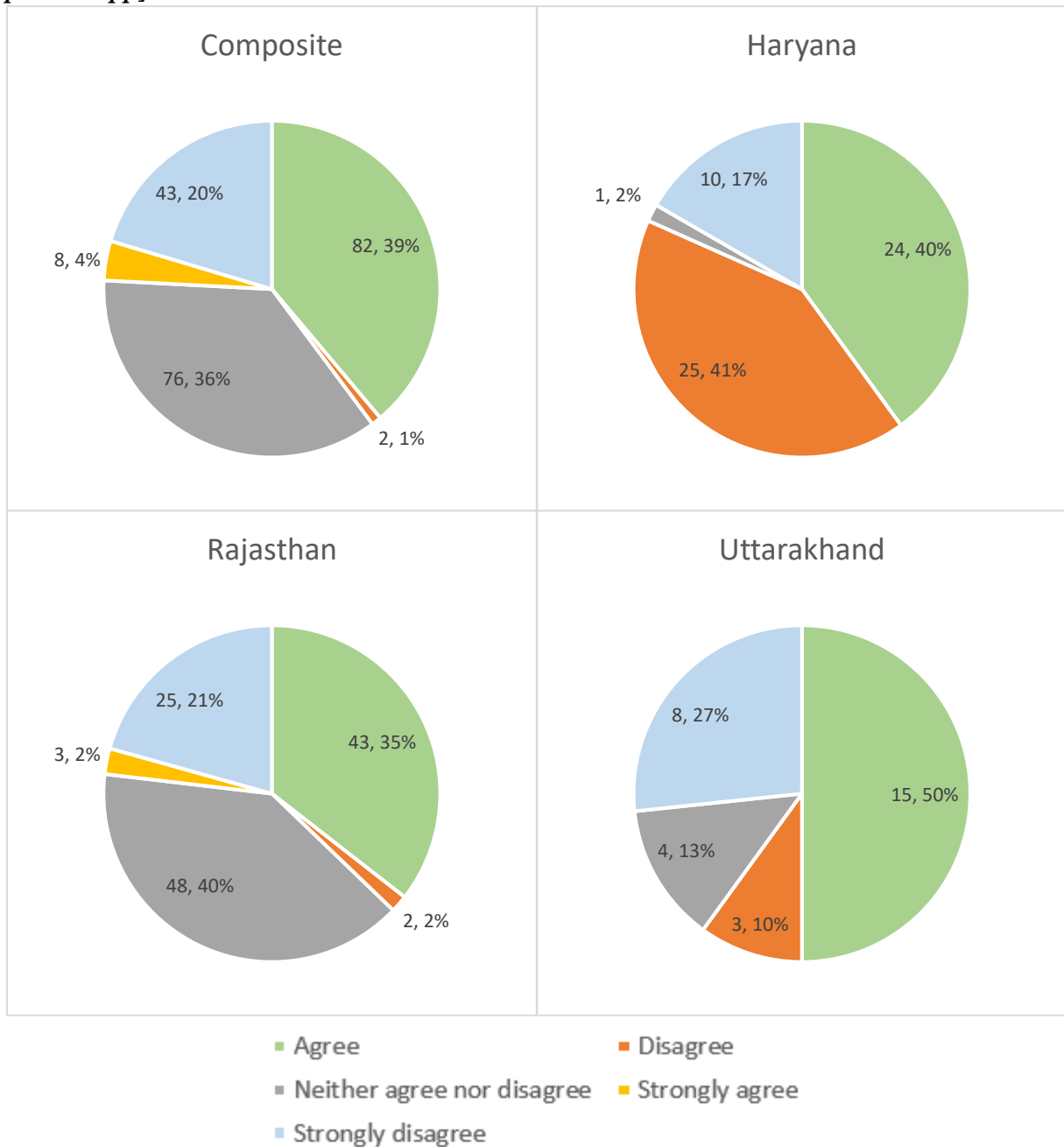


Figure 22: I can get help from others when I have difficulties using the e-NAM portal / app

Farmers from Uttarakhand revealed that they were more confident of getting help from others in case of any difficulty in using the e-NAM portal / app (mean = 3.23), while those from Rajasthan scored the lowest with a mean score of 2.98. The mean score for farmers of Haryana stood at 3.10. Figure 22 shows the response received for this question.

Table 50: ANOVA- I can get help from others when I have difficulties using the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.834	2	.917	.668	.514
Within Groups	285.692	208	1.374		
Total	287.526	210			

Nevertheless, ANOVA could not find this difference to be statistically significant.

Table 51: ANOVA (Education)- I can get help from others when I have difficulties using the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	55.606	2	27.803	24.935	.000
Within Groups	231.920	208	1.115		
Total	287.526	210			

The difference in opinion was found to be significant among the three groups of farmers based on their level of education, as found by ANOVA (Table 52).

Table 52: Comparison between groups (Education)- I can get help from others when I have difficulties using the e-NAM portal / app

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound
Primary school	Secondary school	-1.002*	.156	.000	-1.37
	Higher secondary	-1.648*	.357	.000	-2.49
Secondary school	Primary school	1.002*	.156	.000	.63

	Higher secondary	-.646	.347	.152	-1.46
Higher secondary	Primary school	1.648*	.357	.000	.81
	Secondary school	.646	.347	.152	-.17

Tukey's post-hoc analysis (Table 53) revealed that the difference in opinion is statistically significant only among farmers with primary level of education and those with either secondary or higher secondary level of education. The latter two groups scored 3.35 and 4.00 respectively, whereas farmers with primary level of education scored 2.35 only.

Hedonic motivation [Using the e-NAM portal / app is fun]

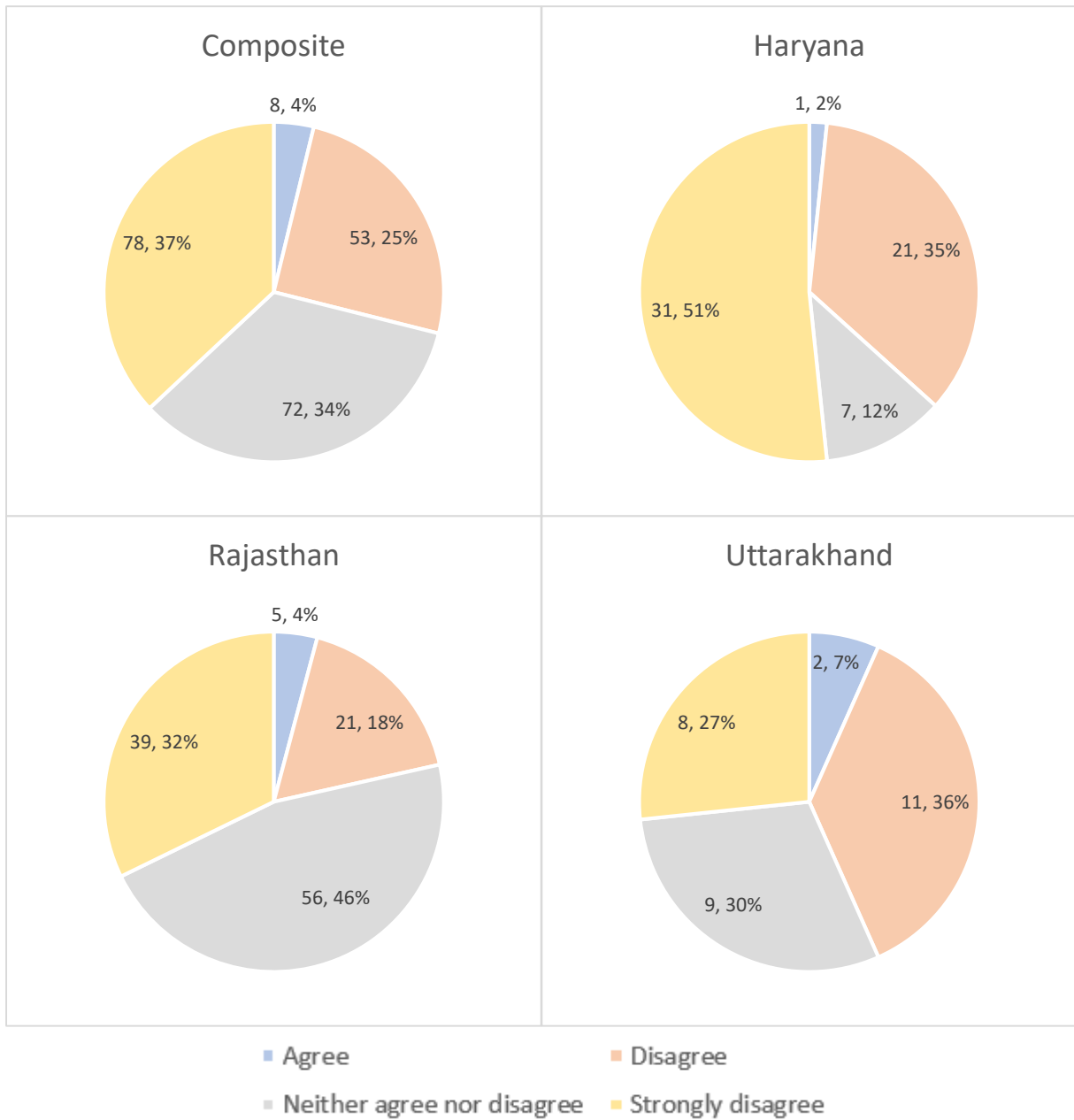


Figure 23: Using the e-NAM portal / app is fun

People are more prone to adopt a new technology if they find it fun to use. This question checked the perception of farmers from the three states in this regard. The response is graphically represented in Figure 23. Farmers from Rajasthan and Uttarakhand scored very closely with means of 2.22 and 2.17 respectively, while the farmers from Haryana scored the lowest at 1.63. It is to be noted that the mean value for all the three states here is below the 2.50 mark, which indicates that the e-NAM portal / app generally lack any kind of fun quotient.

Table 53: Using the e-NAM portal / app is fun

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	14.451	2	7.225	8.995	.000
Within Groups	167.075	208	.803		
Total	181.526	210			

ANOVA found this difference to be statistically significant at 0.05 level of significance (Table 54), although in general all the groups found the e-NAM portal / app to lack fun elements.

Table 54: Comparison between groups- Using the e-NAM portal / app is fun

(I) State	(J) State	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Rajasthan	Haryana	.590*	.142	.000	.26	.92
	Uttarakhand	.056	.183	.949	-.38	.49
Haryana	Rajasthan	-.590*	.142	.000	-.92	-.26
	Uttarakhand	-.533*	.200	.023	-1.01	-.06
Uttarakhand	Rajasthan	-.056	.183	.949	-.49	.38
	Haryana	.533*	.200	.023	.06	1.01

Tukey's post-hoc analysis (Table 55) found that farmers from Haryana differed significantly from those from Rajasthan or Uttarakhand.

Then we checked for existence of any statistically significant difference in perception for this particular question among farmers based on their level of education. ANOVA (Table 56) could not find any such difference in this regard (Table 56). This confirms that all groups of farmers generally found that the e-NAM portal / app fails to provide them with fun.

Table 55: ANOVA (Education)- Using the e-NAM portal / app is fun

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.824	2	1.912	2.238	.109
Within Groups	177.702	208	.854		
Total	181.526	210			

Hedonic motivation [Using the e-NAM portal / app is enjoyable]

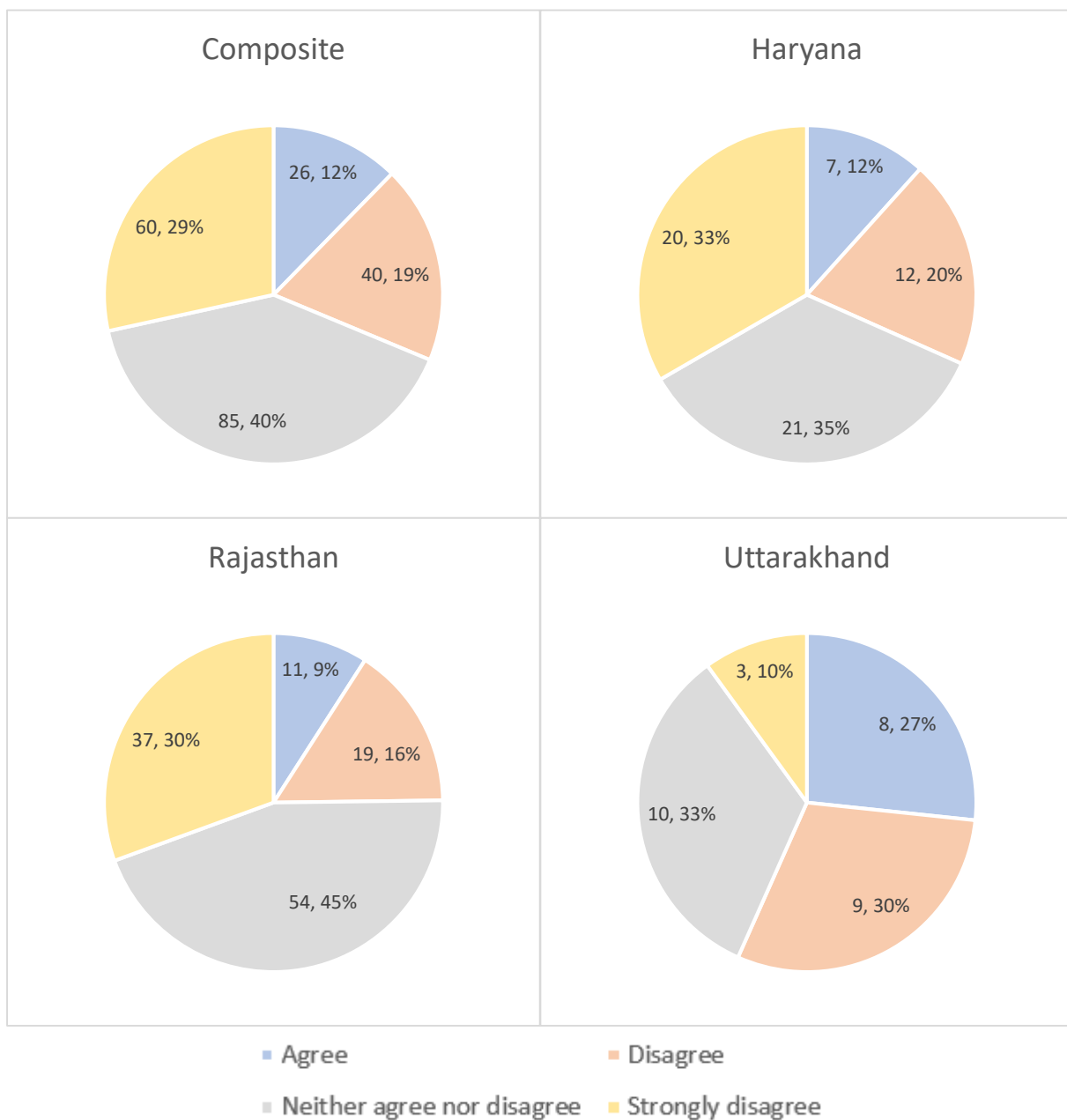


Figure 24: Using the e-NAM portal / app is enjoyable

Figure 24 represents the response from farmers about whether they felt that using the e-NAM portal / app was enjoyable. Farmers from Uttarakhand only crossed the half-way mark of 2.50 with a mean score of 2.77. Farmers from Haryana scored the lowest (mean = 2.25), while those from Rajasthan scored 2.32.

ANOVA (Table 56) did not find this difference to be statistically significant.

Table 56: ANOVA- Using the e-NAM portal / app is enjoyable

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.854	2	2.927	2.831	.061
Within Groups	215.046	208	1.034		
Total	220.900	210			

However, based on the education level of the farmers, the difference was found to be significant after employing ANOVA (Table 57).

Table 57: ANOVA (Education)- Using the e-NAM portal / app is enjoyable

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11.734	2	5.867	5.834	.003
Within Groups	209.167	208	1.006		
Total	220.900	210			

Farmers having primary level of education had the lowest mean of 2.06, which is significantly different from those having secondary (mean = 2.49) or higher secondary (mean = 2.90) level of education (Table 58).

Table 58: Comparison between groups- Using the e-NAM portal / app is enjoyable

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-.436*	.148	.010	-.79
	Higher secondary	-.844*	.339	.036	-1.64
Secondary school	Primary school	.436*	.148	.010	.09
	Higher secondary	-.408	.329	.432	-1.18

Higher secondary	Primary school	.844*	.339	.036	.04
	Secondary school	.408	.329	.432	-.37

Hedonic motivation [Using the e-NAM portal / app is very entertaining]

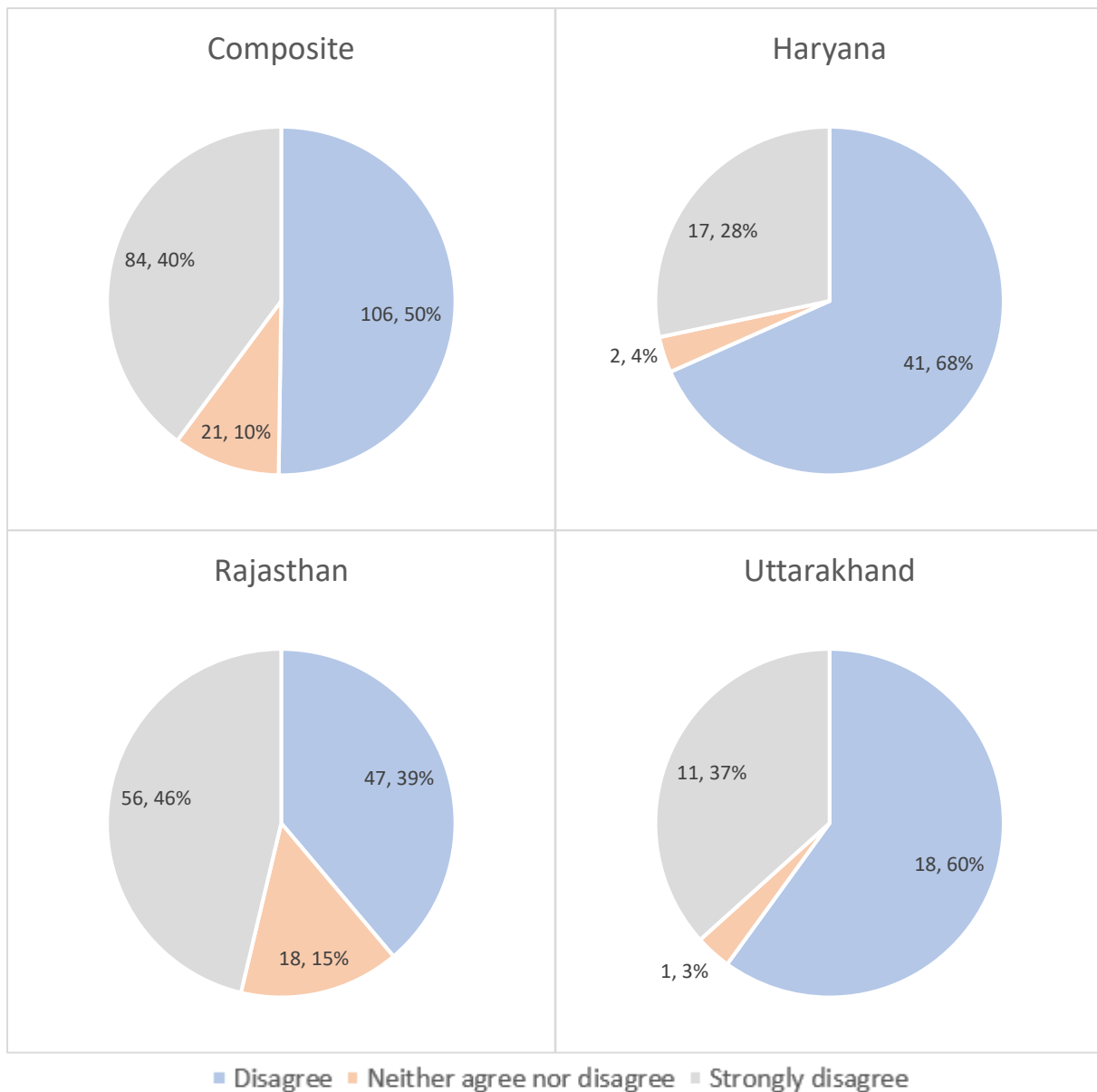


Figure 25: Using the e-NAM portal / app is very entertaining

We also asked farmers if they found the use of e-NAM portal / app to be entertaining. Figure 25 represents their response. Farmers from Haryana scored the highest with a mean of merely 1.75, whereas farmers from Uttarakhand scored the lowest mean of 1.67 and farmers from Rajasthan had a mean score of 1.69. This is the lowest value for any question asked to the farmers in this survey.

Table 59: ANOVA- Using the e-NAM portal / app is very entertaining

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.207	2	.103	.250	.779
Within Groups	85.983	208	.413		
Total	86.190	210			

Our ANOVA analysis could not find this difference to be statistically significant across the three different states (Table 59).

Table 60: ANOVA (Education)- Using the e-NAM portal / app is very entertaining

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.549	2	1.274	3.169	.051
Within Groups	83.641	208	.402		
Total	86.190	210			

The difference among farmers based on their level of education was also not found to be statistically significant. However, the farmers with higher secondary level of education scored the highest at 1.90, while those with secondary level of education scored the lowest at 1.62 and farmers with primary education scored 1.83.

Price value [The e-NAM portal / app is reasonably priced]

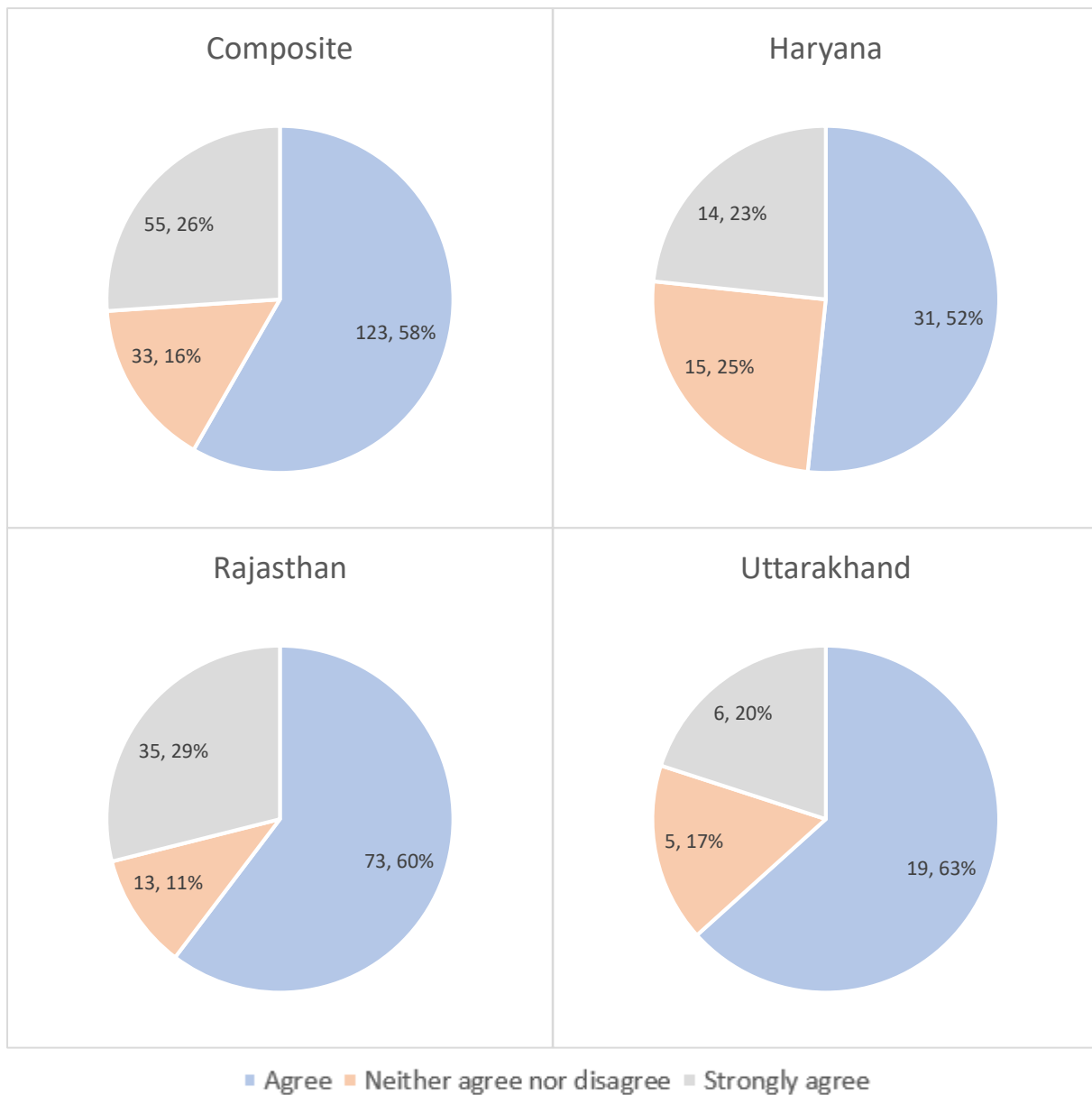


Figure 26: The e-NAM portal / app is reasonably priced

Price may be an important factor while deciding to adopt a new technology or tool. So, we endeavoured to find out farmers’ opinion about the e-NAM portal / app in this regard. Figure 26 represents farmers’ opinion from the three states. The score was found to be quite high, as farmers do not have to pay to use the app / portal. The farmers from Rajasthan scored the highest at 4.18, while those from Haryana scored the lowest mean of 3.98. Farmers from Uttarakhand had a mean of 4.03.

Table 61: ANOVA- The e-NAM portal / app is reasonably priced

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.756	2	.878	2.176	.116
Within Groups	83.950	208	.404		
Total	85.706	210			

We employed ANOVA to find out if this difference was statistically significant. However, it could not find any such significance (Table 61).

Table 62: ANOVA (Education)- The e-NAM portal / app is reasonably priced

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12.642	2	6.321	17.995	.000
Within Groups	73.064	208	.351		
Total	85.706	210			

When the same question was checked for any statistically significant difference among farmers with different levels of education, it was indeed found to be so (Table 62).

Table 63: Comparison between groups (Education)- The e-NAM portal / app is reasonably priced

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound
Primary school	Secondary school	-.361*	.087	.000	-.57
	Higher secondary	-1.069*	.200	.000	-1.54
Secondary school	Primary school	.361*	.087	.000	.15
	Higher secondary	-.708*	.194	.001	-1.17

Higher secondary	Primary school	1.069*	.200	.000	.60
	Secondary school	.708*	.194	.001	.25

Tukey's post-hoc analysis (Table 63) found that all three groups of farmers differed significantly in their opinion in this regard. Farmers with primary level of education scored a mean of 3.83, while farmers with secondary level of education scored 4.19 and those with higher secondary level of education scored a mean of 4.90.

Price value [The e-NAM portal / app is good value for money]

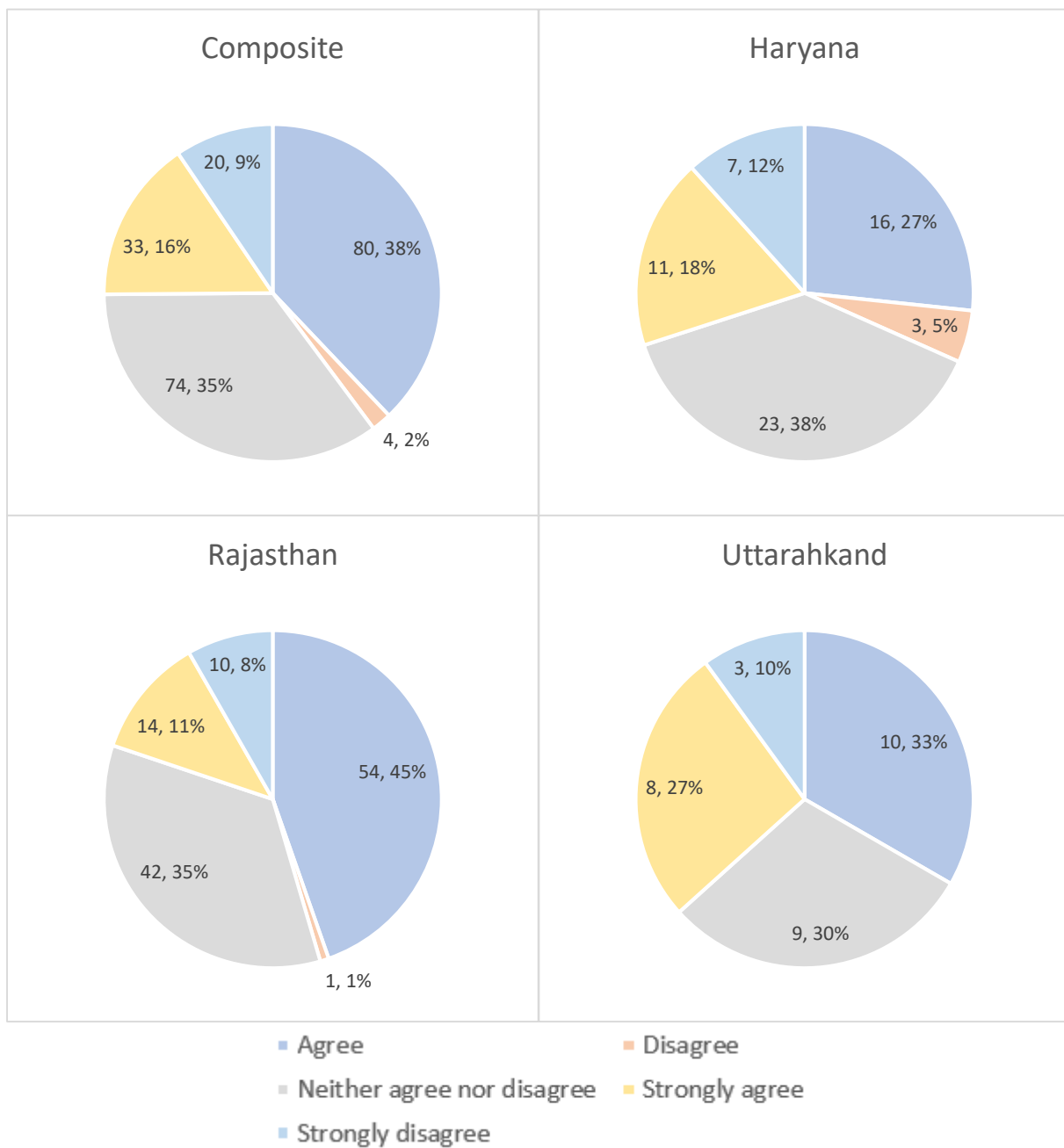


Figure 27: The e-NAM portal / app is good value for money

Farmers from Haryana, Rajasthan and Uttarakhand were asked whether they found the e-NAM portal to be good value for money. Their response is represented in Figure 27. Farmers from Uttarakhand scored the highest with a mean score of 3.67, whereas those from Haryana scored the lowest at 3.35. Farmers from Rajasthan scored 3.50.

Table 64: ANOVA- The e-NAM portal / app is good value for money

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.127	2	1.064	.905	.406
Within Groups	244.565	208	1.176		
Total	246.692	210			

The ANOVA test (Table 64), however, could not find this difference to be statistically significant.

Table 65: ANOVA (Education)- The e-NAM portal / app is good value for money

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	32.656	2	16.328	15.868	.000
Within Groups	214.036	208	1.029		
Total	246.692	210			

The difference in opinion among farmers in this regard varied significantly based on their level of education, as found by ANOVA (Table 65).

Table 66: Comparison between groups (Education)- The e-NAM portal / app is good value for money

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound
Primary school	Secondary school	-.720*	.150	.000	-1.07
	Higher secondary	-1.428*	.343	.000	-2.24
Secondary school	Primary school	.720*	.150	.000	.37
	Higher secondary	-.708	.333	.087	-1.49

Higher secondary	Primary school	1.428*	.343	.000	.62
	Secondary school	.708	.333	.087	-.08

Farmers with primary level of education differed significantly from the others having secondary or higher secondary level of education (Table 66). They scored a mean of 2.97, whereas farmers with secondary education had a mean score of 3.69 and the ones with higher secondary level of education had the highest mean of 4.40.

Price value [At the current price the e-NAM portal / app provides a good value]

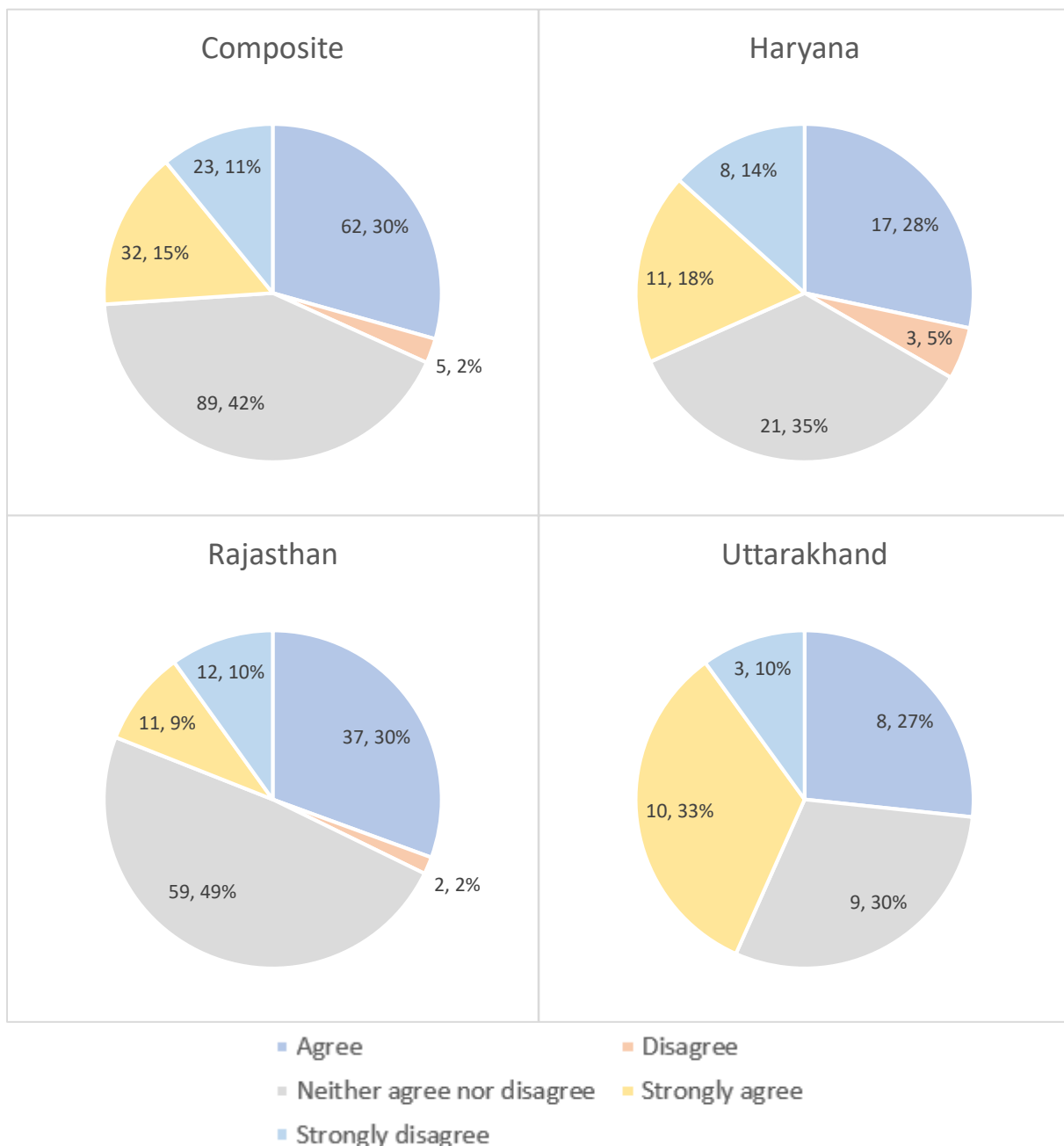


Figure 28: At the current price the e-NAM portal / app provides a good value

Farmers from Hayrana, Rajasthan and Uttarakhand stated whether they felt the e-NAM portal / app provided good value at the current price, which is basically nil, except for the usage cost of internet and mobile device or laptop or computer. Figure 28 represents their response. Farmers from Uttarakhand scored the highest at 3.73, while those from Rajasthan scored the lowest at 3.27 mean value. Farmers from Haryana scored close to those from Rajasthan, with a mean score of 3.33.

Table 67: At the current price the e-NAM portal / app provides a good value

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.141	2	2.571	2.095	.126
Within Groups	255.200	208	1.227		
Total	260.341	210			

However, ANOVA test (Table 67) failed to detect any statistically significant difference based on the response received.

Table 68: ANOVA (Education)- At the current price the e-NAM portal / app provides a good value

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	44.549	2	22.274	21.470	.000
Within Groups	215.792	208	1.037		
Total	260.341	210			

When the same question was analysed using ANOVA (Table 68) based on the education level of farmers, the difference was found to be statistically significant.

Table 69: Comparison between groups (Education)- At the current price the e-NAM portal / app provides a good value

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound
Primary school	Secondary school	-.898*	.150	.000	-1.25
	Higher secondary	-1.468*	.344	.000	-2.28
Secondary school	Primary school	.898*	.150	.000	.54

	Higher secondary	-.569	.334	.206	-1.36
Higher secondary	Primary school	1.468*	.344	.000	.66
	Secondary school	.569	.334	.206	-.22

Tukey's post-hoc analysis (Table 69) found that farmers with primary level of education only differed significantly (mean = 2.73) from those having secondary level of education (mean = 3.63) or higher secondary level of education (mean = 4.20). However, the difference between these latter two groups was not statistically significant.

Habit [The use of the e-NAM portal / app has become a habit for me]

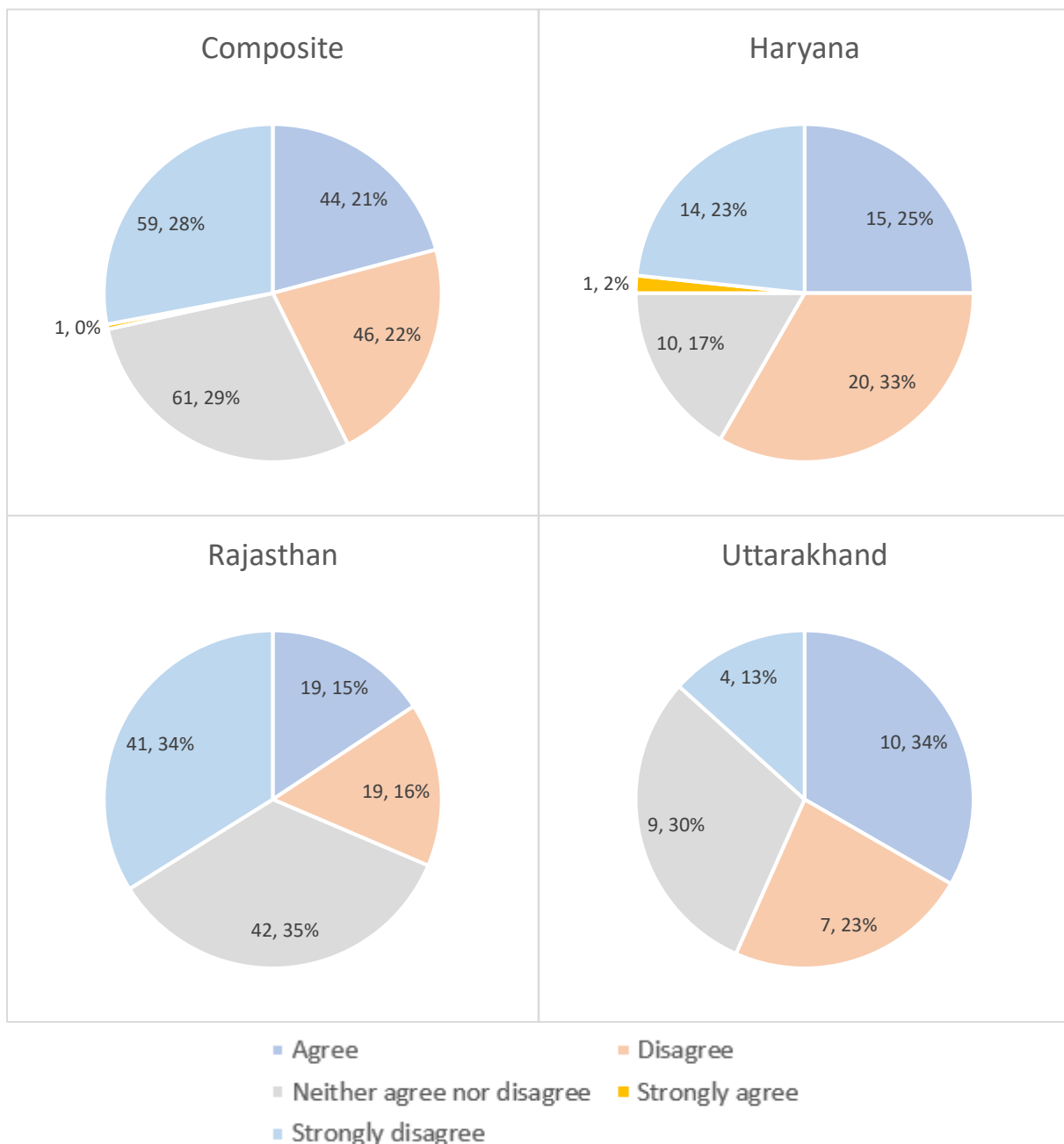


Figure 29: The use of the e-NAM portal / app has become a habit for me

One's habit can enhance usage of a new technology. Thus farmers were asked whether they felt that they had formed a habit of using the e-NAM portal / app. Only farmers from Uttarakhand scored more than the half-way mark of 2.50, with a mean score of 2.83. Farmers from Haryana scored in between the two groups with a mean score of 2.48. Farmers from Rajasthan scored the lowest with a mean of 2.32 only.

Table 70: ANOVA- The use of the e-NAM portal / app has become a habit for me

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.430	2	3.215	2.596	.077
Within Groups	257.580	208	1.238		
Total	264.009	210			

However, Tukey's post-hoc test failed to find this difference statistically significant (Table 70).

Table 71: ANOVA (Education)- The use of the e-NAM portal / app has become a habit for me

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	19.531	2	9.765	8.308	.000
Within Groups	244.479	208	1.175		
Total	264.009	210			

The difference in opinion became significant when it was checked against the educational level of farmers (Table 71).

Table 72: Comparison between groups (Education)- The use of the e-NAM portal / app has become a habit for me

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-.507*	.160	.005	-.88
	Higher secondary	-1.230*	.366	.003	-2.09
Secondary school	Primary school	.507*	.160	.005	.13
	Higher secondary	-.723	.356	.107	-1.56
Higher secondary	Primary school	1.230*	.366	.003	.37

	Secondary school	.723	.356	.107	-.12
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Tukey's post-hoc analysis found that farmers with primary level of education differed significantly from the rest two groups with a mean score of 2.07. Farmers with secondary level of education scored a mean of 2.58 and those with higher secondary education had a mean score of 3.30. It is to be noted that the composite score of all the three groups combined is less than the half-way mark of 2.50, with a mean of 2.44 only.

Habit [I am addicted to use the e-NAM portal / app]

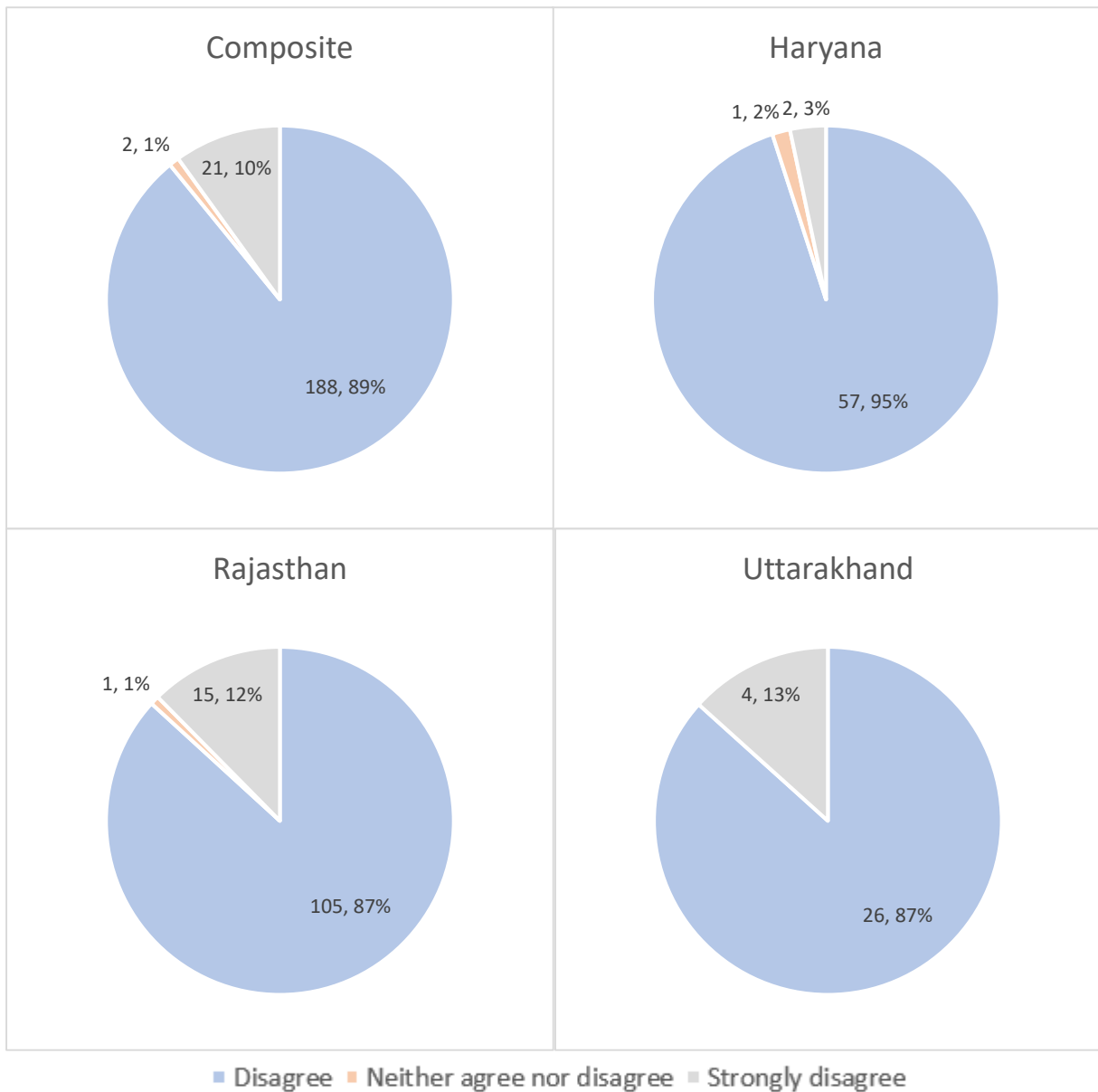


Figure 30: I am addicted to use the e-NAM portal / app

Addiction can make one’s use of technology extremely important. So, farmers were asked this question to find out whether they felt they were addicted to the e-NAM portal / app. This basically intends to find out whether farmers felt that they could not live without the e-NAM portal / app. Their response is shown in Figure 30. The response shows a very low level of mean, with all groups of farmers from the three different states indicating an agreement level of much below the half-way mark of 2.50. Farmers from Haryana scored the highest with 1.98, whereas those from Rajasthan scored 1.88 and the others from Uttarakhand scored a mean of 1.87.

Table 73: ANOVA- I am addicted to use the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.459	2	.229	2.291	.104
Within Groups	20.830	208	.100		
Total	21.289	210			

ANOVA test (Table 73) failed to detect this difference to be statistically significant.

Table 74: ANOVA (Education)- I am addicted to use the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.122	2	.061	.600	.550
Within Groups	21.167	208	.102		
Total	21.289	210			

When the same response was checked against the education level of farmers, once again ANOVA could not find the difference to be statistically significant (Table 74).

Habit [I must use the e-NAM portal / app]

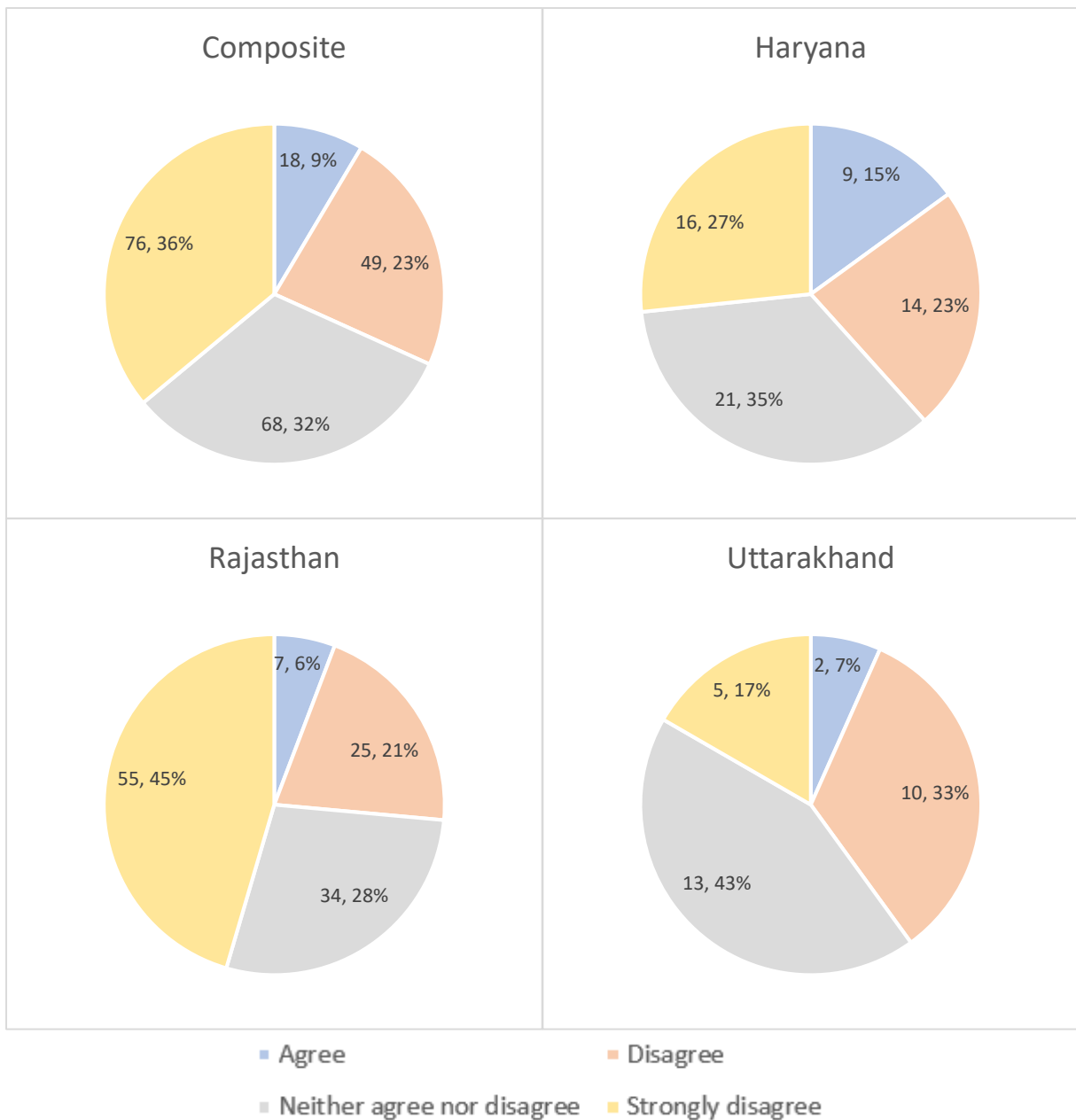


Figure 31: I must use the e-NAM portal / app

We also attempted to find out whether the farmers believed that they must use the e-NAM portal / app. Their answer might have been influenced by the way the agricultural market works or because of certain government regulations. Figure 31 shows their response. Farmers from Uttarakhand scored the highest with a mean score of only 2.40, whereas farmers from Rajasthan scored the lowest with a mean of 1.94. Those from Haryana scored 2.38. In general, the farmers seem to agree that the e-NAM portal in its present form is not an absolute necessity, as indicated by the composite mean score of all farmers (2.13)

Table 75: ANOVA- I must use the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10.306	2	5.153	5.307	.006
Within Groups	201.978	208	.971		
Total	212.284	210			

ANOVA test revealed that some statistically significant difference exists among the groups (Table 75).

Table 76: Comparison between groups- I must use the e-NAM portal / app

(I) State	(J) State	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Rajasthan	Haryana	-.441*	.156	.014	-.81	-.07
	Uttarakhand	-.458	.201	.061	-.93	.02
Haryana	Rajasthan	.441*	.156	.014	.07	.81
	Uttarakhand	-.017	.220	.997	-.54	.50
Uttarakhand	Rajasthan	.458	.201	.061	-.02	.93
	Haryana	.017	.220	.997	-.50	.54

Tukey's post-hoc analysis reveals that farmers from Rajasthan significantly differ in their opinion in this regard from farmers of Haryana (Table 76).

Table 77: ANOVA (Education)- I must use the e-NAM portal / app

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.570	2	4.285	4.375	.014
Within Groups	203.715	208	.979		

Total	212.284	210			
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We also checked whether the response of three groups was significant based on their level of education. ANOVA test indicated the presence of some significant difference among the groups (Table 77).

Table 78: Comparison between groups- I must use the e-NAM portal / app

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-.395*	.146	.020	-.74
	Higher secondary	-.641	.334	.136	-1.43
Secondary school	Primary school	.395*	.146	.020	.05
	Higher secondary	-.246	.325	.729	-1.01
Higher secondary	Primary school	.641	.334	.136	-.15
	Secondary school	.246	.325	.729	-.52

Tukey's post-hoc analysis (Table 78) established that the significant difference lies between farmers having primary level of education (mean = 1.86) with those having secondary education (mean = 2.25) or higher secondary level of education (mean = 2.50).

Habit [Using the e-NAM portal / app has become natural for me]

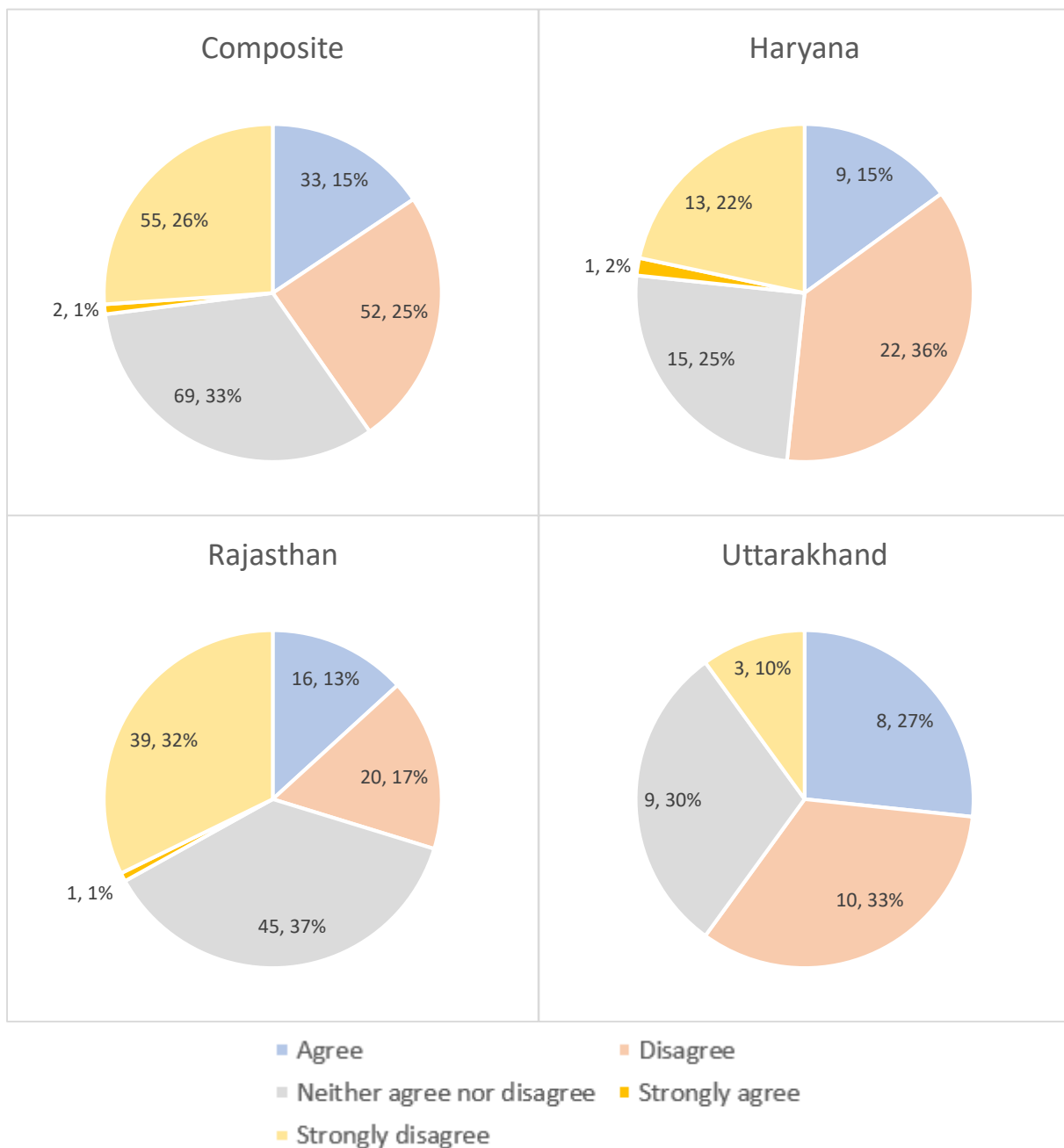


Figure 32: Using the e-NAM portal / app has become natural for me

Farmers were asked to reveal whether they felt that using the e-NAM portal / app comes naturally to them. Their response is represented in Figure 32. In general, the farmers seem to disagree with this. Those from Uttarakhand scored the highest mean of 2.73, while the farmers from Rajasthan scored the lowest mean of 2.34. Farmers from Haryana scored 2.38.

Table 79: ANOVA- Using the e-NAM portal / app has become natural for me

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.790	2	1.895	1.676	.190
Within Groups	235.157	208	1.131		
Total	238.948	210			

ANOVA test (Table 79) failed to find that this difference in opinion is statistically significant.

Table 80: ANOVA (Education)- Using the e-NAM portal / app has become natural for me

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11.347	2	5.674	5.185	.006
Within Groups	227.601	208	1.094		
Total	238.948	210			

However, based on the education level of farmers, the difference in opinion was found to be statistically significant by the three groups of farmers (Table 80).

Table 81: Comparison between groups (Education)- Using the e-NAM portal / app has become natural for me

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-.477*	.154	.006	-.84
	Higher secondary	-.615	.353	.192	-1.45
Secondary school	Primary school	.477*	.154	.006	.11
	Higher secondary	-.138	.343	.914	-.95
Higher secondary	Primary school	.615	.353	.192	-.22

	Secondary school	.138	.343	.914	-.67
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Tukey's post-hoc analysis (Table 81) revealed that farmers having primary level of education (mean = 2.08) differed significantly in their opinion from the farmers having secondary education (mean = 2.56).

Behavioural intention [I intend to continue using the e-NAM portal / app in the future]

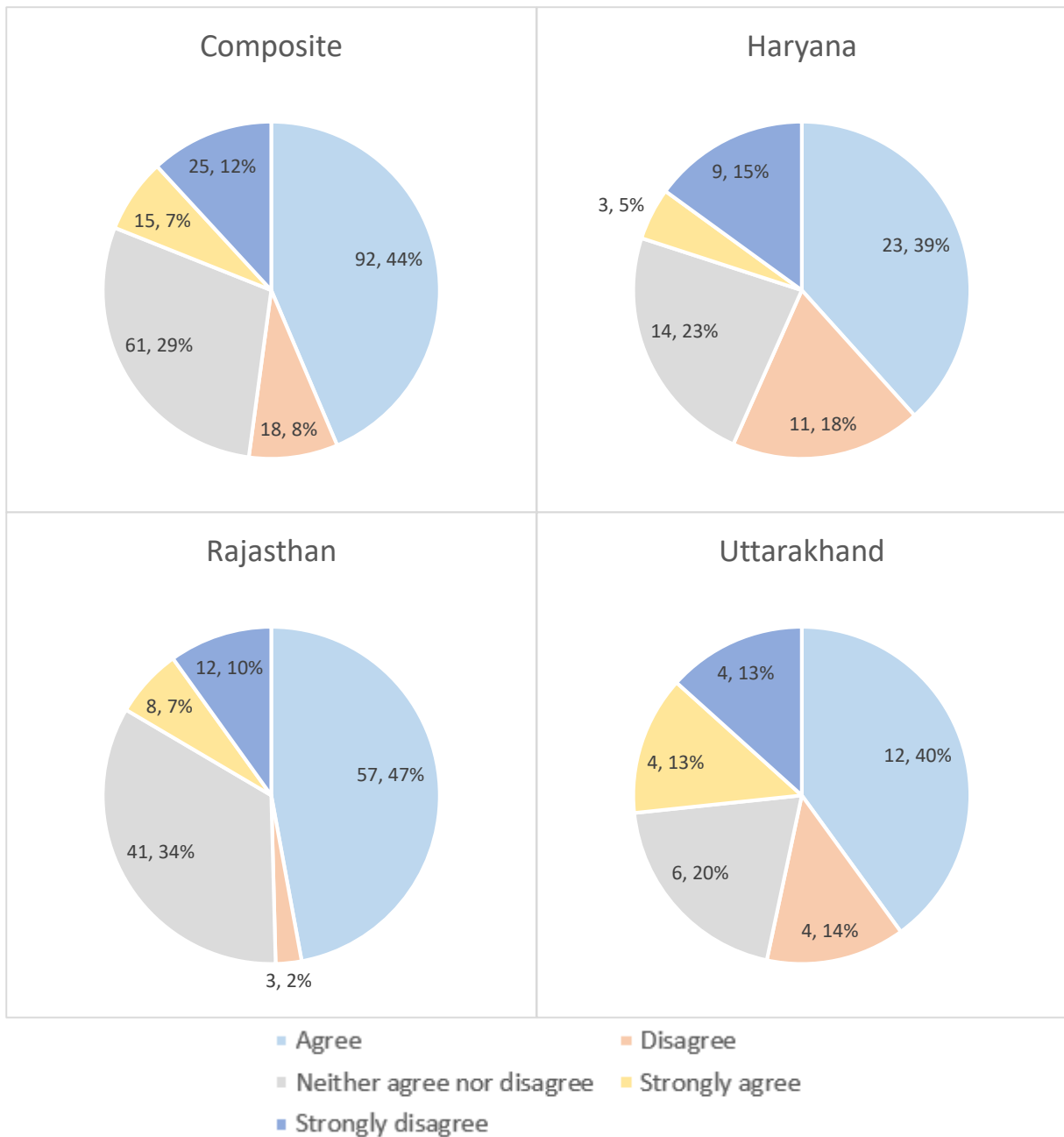


Figure 33: I intend to continue using the e-NAM portal / app in the future

Farmers revealed whether they intended to continue using the e-NAM portal / app in the future. Their response is represented in Figure 33. Farmers of Rajasthan scored the highest mean of 3.38, while those from Haryana scored the lowest with a mean value of 3.00. Farmers from Uttarakhand scored 3.27 and were somewhat close to those from Rajasthan.

Table 82: ANOVA- I intend to continue using the e-NAM portal / app in the future

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.801	2	2.901	2.410	.092
Within Groups	250.379	208	1.204		
Total	256.180	210			

The difference was not found to be statistically significant by ANOVA test (Table 82).

Table 83: ANOVA (Education)- I intend to continue using the e-NAM portal / app in the future

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	46.240	2	23.120	22.906	.000
Within Groups	209.940	208	1.009		
Total	256.180	210			

However, when the same set of response was analysed based on the education level of farmers, ANOVA test found existence of some statistically significant difference (Table 83).

Table 84: Comparison between groups (Education)- I intend to continue using the e-NAM portal / app in the future

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-.919*	.148	.000	-1.27
	Higher secondary	-1.480*	.339	.000	-2.28
Secondary school	Primary school	.919*	.148	.000	.57
	Higher secondary	-.562	.330	.206	-1.34

Higher secondary	Primary school	1.480*	.339	.000	.68
	Secondary school	.562	.330	.206	-.22

Later, Tukey's post-hoc analysis (Table 84) found that farmers having primary level of education only differed significantly (mean = 2.62) with those having secondary level of education (mean = 3.54) or higher secondary level of education (mean = 4.10). However, the difference between these two latter groups was not statistically significant.

Behavioural intention [I will always try to use the e-NAM portal / app in my daily life]

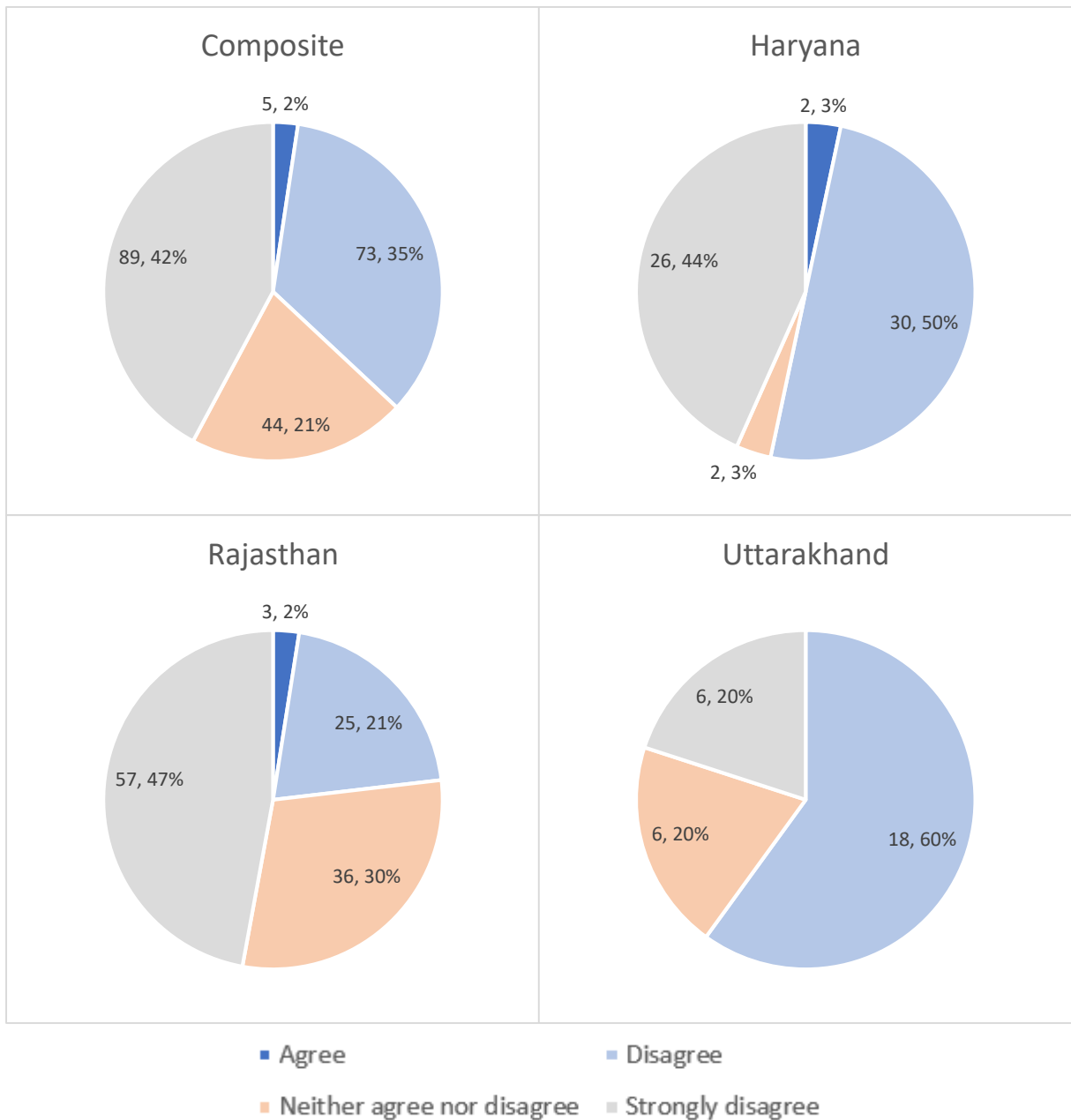


Figure 34: I will always try to use the e-NAM portal / app in my daily life

Farmers from all three states in general indicated that they did not consider the e-NAM portal / app for their daily use. Their response is represented in Figure 35. Farmers from Uttarakhand scored the highest mean with a mere score of 2.00, while those from Haryana scored 1.67 and Rajasthan scored 1.88. This indicates that farmers generally do not think of the e-NAM app / portal even though the intention behind this initiative was to help farmers in their extremely important activities related to agricultural marketing.

Table 85: I will always try to use the e-NAM portal / app in my daily life

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.720	2	1.360	1.958	.144
Within Groups	144.474	208	.695		
Total	147.194	210			

The difference in opinion among farmers from the three states was not found to be statistically significant through the ANOVA test (Table 85).

Table 86: ANOVA (Education)- I will always try to use the e-NAM portal / app in my daily life

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.220	2	1.610	2.326	.100
Within Groups	143.974	208	.692		
Total	147.194	210			

On the basis of farmers' education level also, no statistically significant difference was noticed among the three groups of farmers. (Table 86). Nevertheless, farmers having higher secondary level of education scored the highest mean of 2.30, while farmers having primary level of education scored the lowest mean of 1.72. Those having secondary level of education scored a mean of 1.86.

Behavioural intention [I plan to continue to use the e-NAM portal / app frequently]

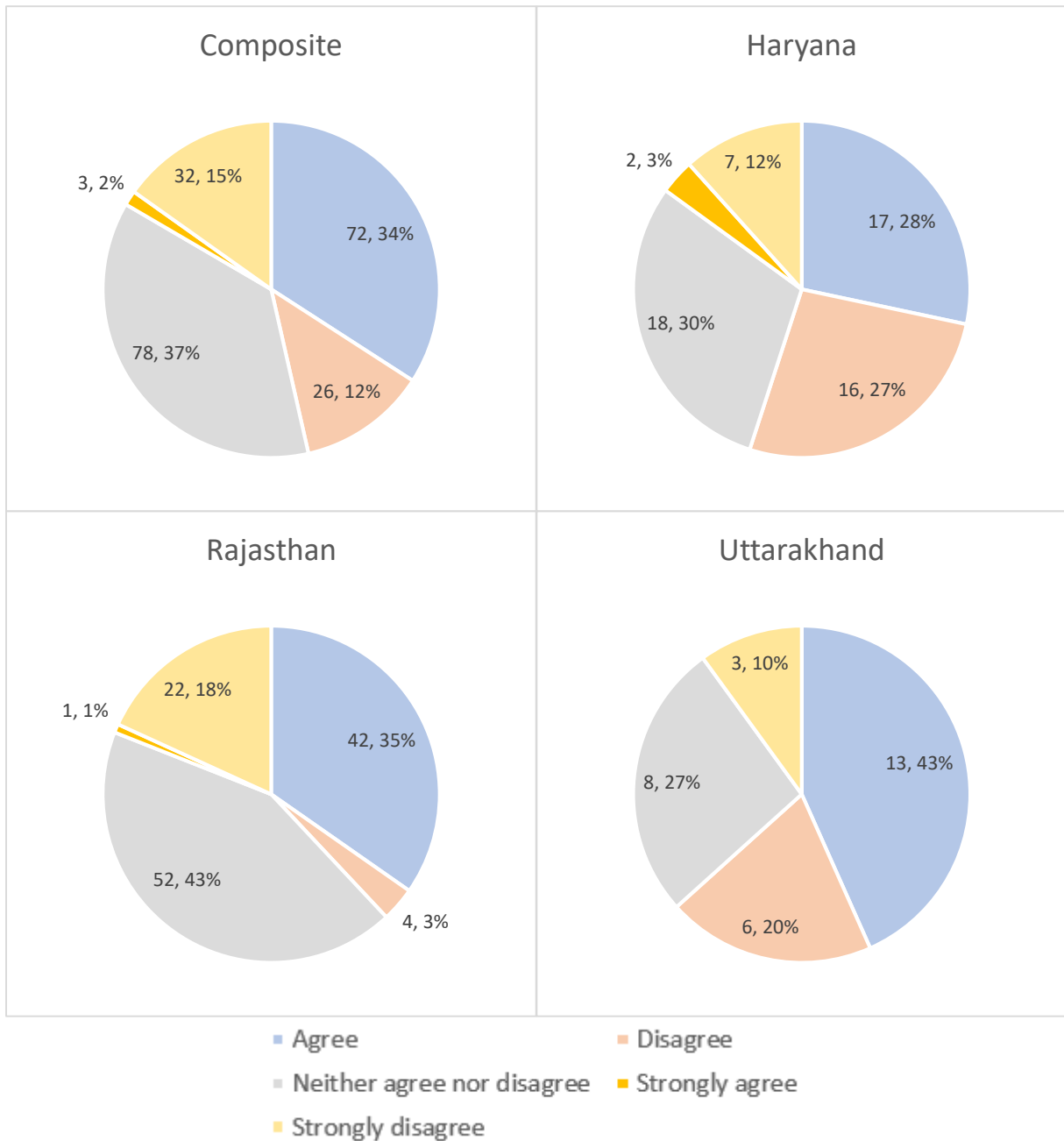


Figure 35: I plan to continue to use the e-NAM portal / app frequently

Farmers from all three states revealed that they planned to continue to use the e-NAM portal / app frequently. Those from Uttarakhand scored the highest mean value of 3.03, while the farmers from Haryana scored the lowest mean value of 2.85. Farmers from Rajasthan scored 2.85. This response might have been influenced by the various initiatives by the government or their functioning agencies.

Table 87: I plan to continue to use the e-NAM portal / app frequently

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.833	2	.417	.366	.694
Within Groups	236.484	208	1.137		
Total	237.318	210			

However, ANOVA test (Table 87) failed to find any statistically significant difference among farmers from the three different states.

Table 88: ANOVA (Education)- I plan to continue to use the e-NAM portal / app frequently

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	28.548	2	14.274	14.221	.000
Within Groups	208.770	208	1.004		
Total	237.318	210			

Based on the education level of farmers, ANOVA could find some statistically significant difference (Table 88).

Table 89: Comparison between groups (Education)- I plan to continue to use the e-NAM portal / app frequently

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-.674*	.148	.000	-1.02
	Higher secondary	-1.335*	.338	.000	-2.13

Secondary school	Primary school	.674*	.148	.000	.32
	Higher secondary	-.662	.329	.112	-1.44
Higher secondary	Primary school	1.335*	.338	.000	.54
	Secondary school	.662	.329	.112	-.11

Farmers having primary level of education only differed significantly (mean = 2.46) from those having secondary education (mean = 3.14) or higher secondary education (mean = 3.80), as found by Tukey's post-hoc analysis (Table 89).

Experience [I have experience of browsing the internet]

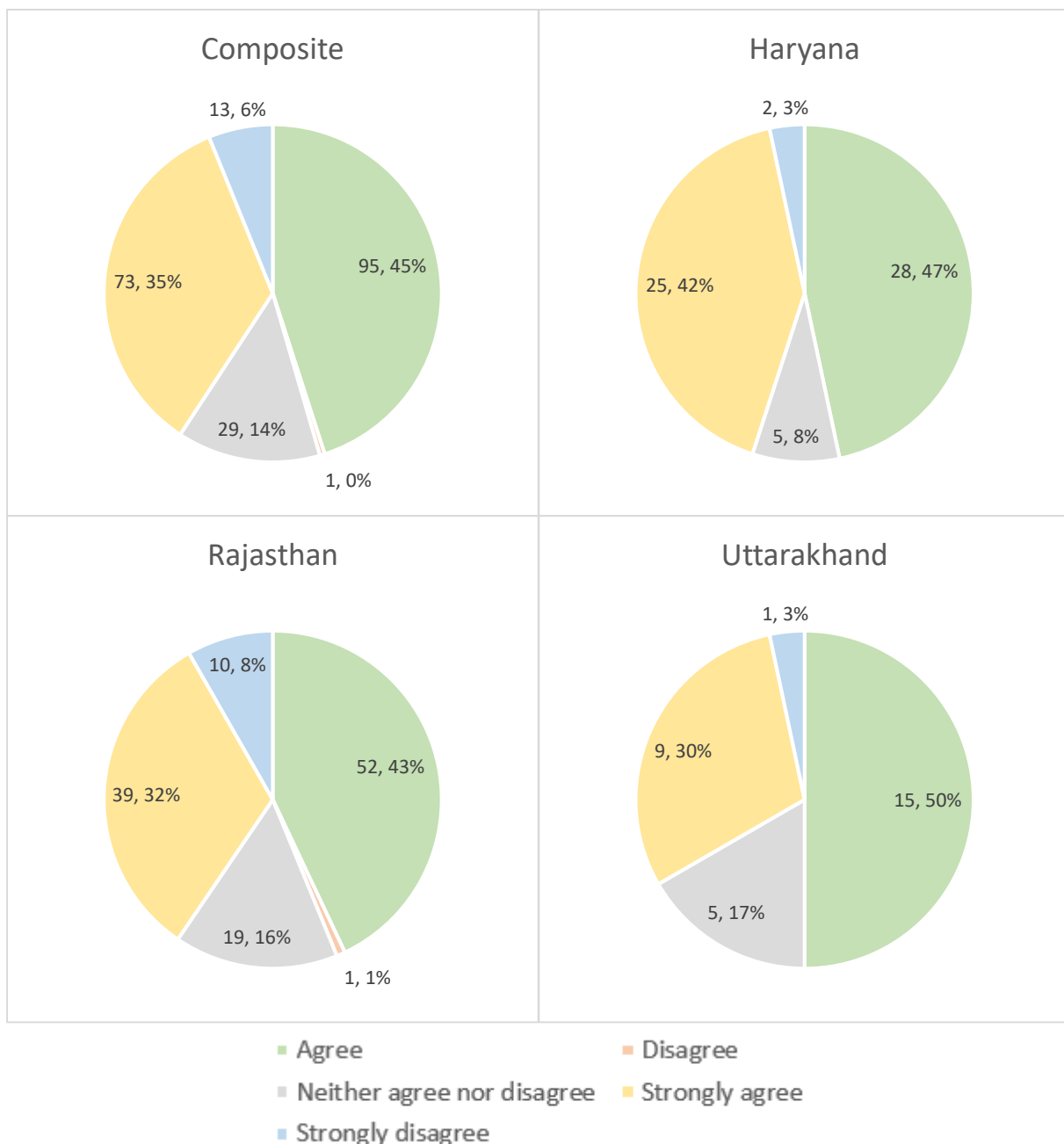


Figure 36: Experience [I have experience of browsing the internet]

Using the e-NAM portal would be easier for one having experience of browsing the internet. Farmers from the states of Haryana, Rajasthan and Uttarakhand revealed their experience of browsing the internet in response to this question (Figure 36). Farmers from Haryana scored the highest with mean of 4.23, whereas those from Rajasthan scored the lowest with a mean of 3.90. Farmers from Uttarakhand scored 4.03.

Table 90: ANOVA- I have experience of browsing the internet

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.447	2	2.224	2.117	.123
Within Groups	218.510	208	1.051		
Total	222.957	210			

However, ANOVA test failed to find this difference to be statistically significant (Table 90).

Table 91: ANOVA (Education)- I have experience of browsing the internet

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	68.020	2	34.010	45.658	.000
Within Groups	154.937	208	.745		
Total	222.957	210			

Based on the education level of farmers, statistically significant difference was found through ANOVA test, when the response was analysed for all the farmers (Table 91).

Tukey's post-hoc analysis (Table 92) found that the farmers with primary level of education had the least experience of browsing the internet (mean = 3.24), while those having secondary education had a mean of 4.36 and the others having higher secondary level of education had a mean of 5.00.

Table 92: Comparison between groups (Education)- I have experience of browsing the internet

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-1.122*	.127	.000	-1.42
	Higher secondary	-1.761*	.292	.000	-2.45

Secondary school	Primary school	1.122*	.127	.000	.82
	Higher secondary	-.638	.283	.065	-1.31
Higher secondary	Primary school	1.761*	.292	.000	1.07
	Secondary school	.638	.283	.065	-.03

This is a significant finding as it indicates farmers with higher level of education are more comfortable browsing the internet and hence they are better suited to adopt the e-NAM portal / app for their agricultural marketing purposes.

Experience [I have experience of downloading app from Google PlayStore / AppStore]

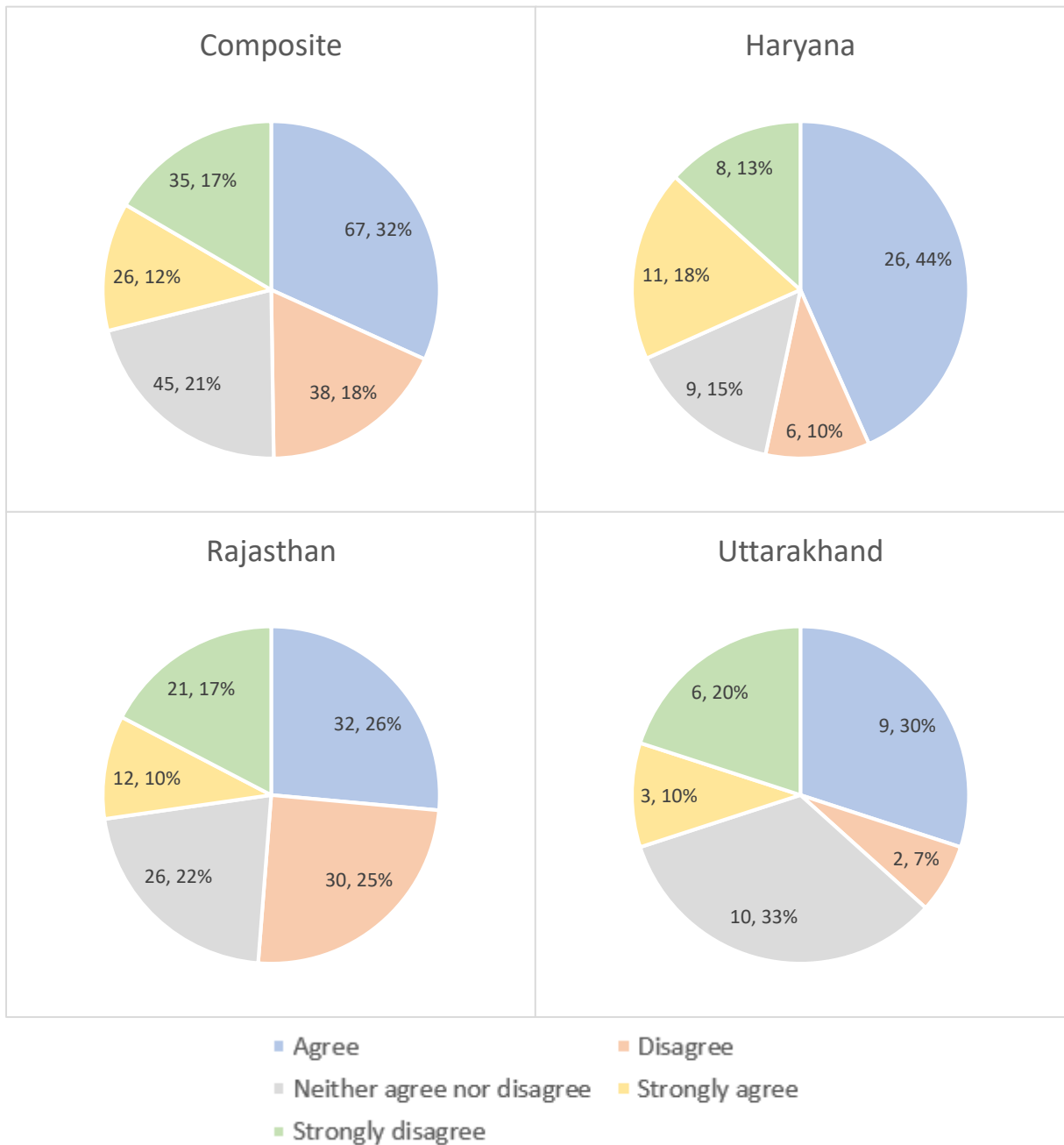


Figure 37: I have experience of downloading app from Google PlayStore / AppStore

As farmers would need to download the e-NAM app for it to be used, we also checked whether they had the experience of downloading any app from the widely popular Google PlayStore or Apple AppStore. Figure 37 graphically represents their response to this question. Farmers from Rajasthan scored the lowest with a mean of 2.87, whereas those from Haryana scored the highest (mean = 3.43). Farmers from Uttarakhand had a mean value of 3.03 in response to this question.

Table 93: ANOVA- I have experience of downloading app from Google PlayStore / AppStore

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12.842	2	6.421	3.980	.020
Within Groups	335.584	208	1.613		
Total	348.427	210			

Through ANOVA test, statistically significant difference was confirmed among three groups of farmers from the three different states (Table 93).

Table 94: Comparison between groups- I have experience of downloading app from Google PlayStore / AppStore

(I) State	(J) State	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Rajasthan	Haryana	-.566*	.201	.015	-1.04	-.09
	Uttarakhand	-.166	.259	.799	-.78	.45
Haryana	Rajasthan	.566*	.201	.015	.09	1.04
	Uttarakhand	.400	.284	.338	-.27	1.07
Uttarakhand	Rajasthan	.166	.259	.799	-.45	.78
	Haryana	-.400	.284	.338	-1.07	.27

Tukey's post-hoc analysis (Table 94) shows that farmers from Rajasthan differs significantly from those coming from Uttarakhand.

We also checked the response based on the education level of farmers. ANOVA test found that the responses varied significantly for different levels of education (Table 95).

Table 95: ANOVA (Education)- I have experience of downloading app from Google PlayStore / AppStore

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	106.590	2	53.295	45.839	.000
Within Groups	241.836	208	1.163		
Total	348.427	210			

Farmers with different levels of education varied significantly in their experience of downloading apps from the Google PlayStore or Apple AppStore.

Table 96: Comparison between groups (Education)- I have experience of downloading app from Google PlayStore / AppStore

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-1.304*	.159	.000	-1.68
	Higher secondary	-2.573*	.364	.000	-3.43
Secondary school	Primary school	1.304*	.159	.000	.93
	Higher secondary	-1.269*	.354	.001	-2.10
Higher secondary	Primary school	2.573*	.364	.000	1.71
	Secondary school	1.269*	.354	.001	.43

Farmers having only primary level of education have the least experience of downloading apps (mean = 2.13), whereas those with higher secondary level of education has the highest mean score of 4.70. Farmers having secondary level of education scored 3.43.

Experience [I have experience of using mobile apps for different purposes]

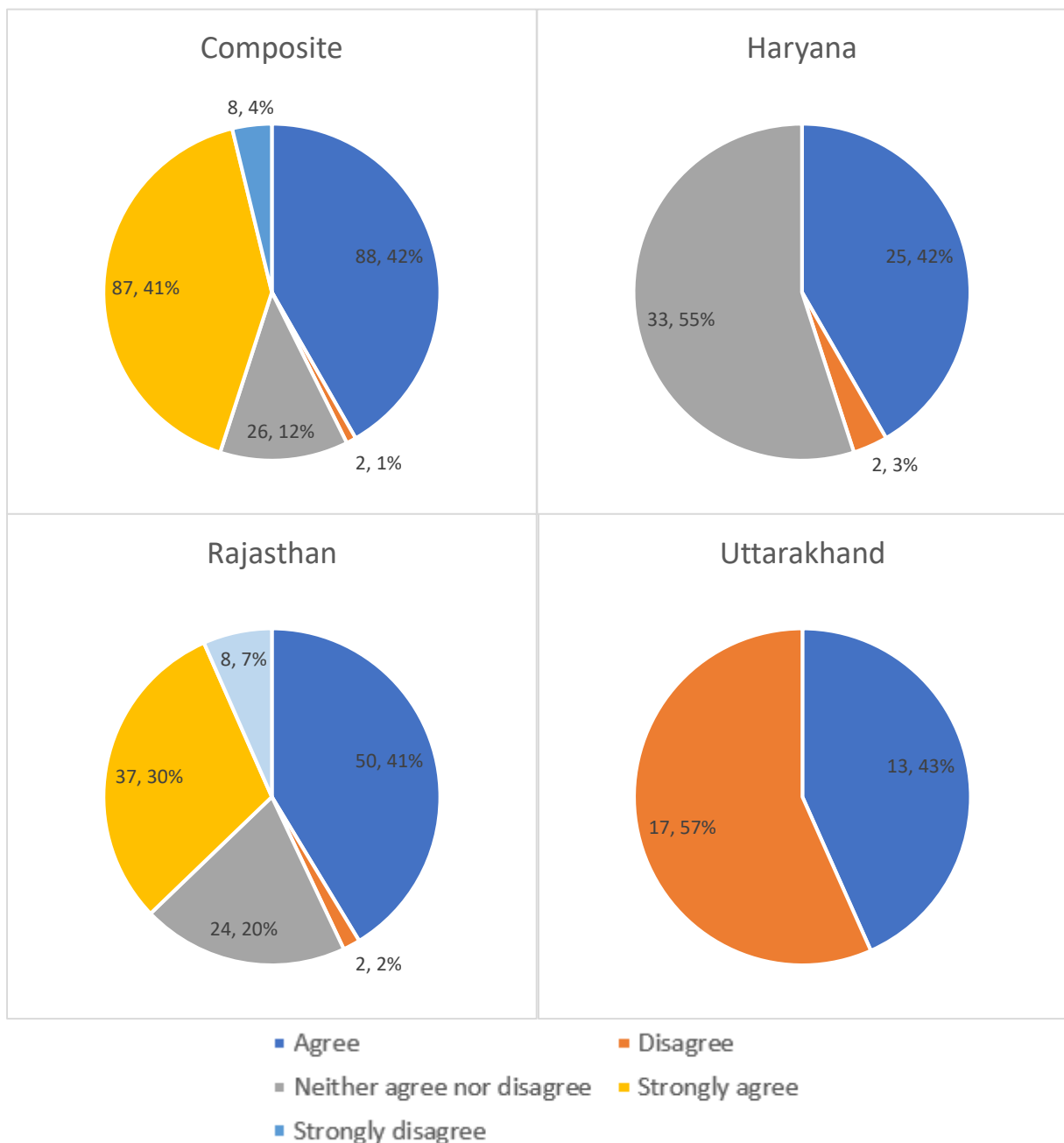


Figure 38: I have experience of using mobile apps for different purposes

Farmers revealed their level of experience of using mobile apps for different purposes, as shown in Figure 38. Farmers from Rajasthan scored the lowest with a mean value of 3.88, whereas those from Uttarakhand scored the highest with a mean value of 4.57. Farmers from Haryana scored a mean of 4.52.

Table 97: ANOVA- I have experience of using mobile apps for different purposes

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	22.348	2	11.174	14.044	.000
Within Groups	165.490	208	.796		
Total	187.839	210			

This difference was found to be significant using ANOVA test (Table 97).

Table 98: Comparison between groups- I have experience of using mobile apps for different purposes

(I) State	(J) State	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Rajasthan	Haryana	-.641*	.141	.000	-.97	-.31
	Uttarakhand	-.691*	.182	.001	-1.12	-.26
Haryana	Rajasthan	.641*	.141	.000	.31	.97
	Uttarakhand	-.050	.199	.966	-.52	.42
Uttarakhand	Rajasthan	.691*	.182	.001	.26	1.12
	Haryana	.050	.199	.966	-.42	.52

Tukey's post-hoc analysis (Table 98) revealed that farmers of Rajasthan differed significantly from the farmers of Haryana or Uttarakhand.

Table 99: ANOVA (Education)- I have experience of downloading app from Google PlayStore / AppStore

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	106.590	2	53.295	45.839	.000
Within Groups	241.836	208	1.163		

Total	348.427	210			
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We checked the same set of response based on the education level of farmers. Here also ANOVA test could detect existence of significant difference among farmers (Table 99).

Table 100: Comparison between groups (Education)- I have experience of downloading app from Google PlayStore / AppStore

(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval
					Lower Bound
Primary school	Secondary school	-1.304*	.159	.000	-1.68
	Higher secondary	-2.573*	.364	.000	-3.43
Secondary school	Primary school	1.304*	.159	.000	.93
	Higher secondary	-1.269*	.354	.001	-2.10
Higher secondary	Primary school	2.573*	.364	.000	1.71
	Secondary school	1.269*	.354	.001	.43

Tukey's post-hoc analysis (Table 100) revealed that all three groups of farmers differed significantly. Those having primary level of education scored a mean of 3.55, whereas farmers having secondary level of education scored a mean of 4.43 and the others having higher secondary level of education scored the highest mean of 4.90.

Measurement Model Analysis

To test the hypothesis and to determine the causal relationship among the constructs, structural equation modeling (SEM) (Anderson and Gerbing, 1988) was employed, and we used the maximum likelihood estimation method (Bentler, 1995) to estimate the parameters. We used Confirmatory factor analysis (CFA) to identify the relationship between the observed measures and underlying constructs. We used the lavaan package (Rosseel, 2012) in R to perform the CFA and SEM analysis. To examine the goodness of fit criterion using the eight dimensions, we used CB-SEM methods. Our analysis identified that the loading of items P1, H3, Pr1, Ha2, Ha3, and B2 found to be 0.686, 0.114, 0.670, -0.201, 0.510 and 0.202, respectively, and thus isolated from the further analysis (Carmines and Zeller, 1979). Results of the CFA after removing P1, H3, Pr1, Ha2, Ha3 and B2 are provided in Table2 and Table3. Figure 40 presents the factor loadings of all measurement items of the proposed model. In figure2, we presented a correlation matrix plot (correlogram) among the remaining items. The plot highlights that a "bunch" of items are positively correlated, indicating that most of the measures within a construct are well connected.

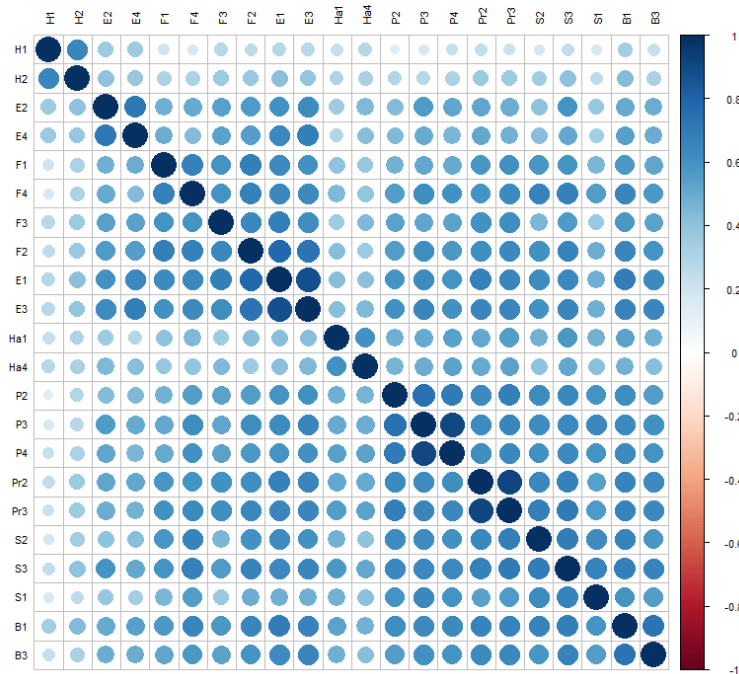


Figure 40: Correlation Plot

In Table 101, the loadings of the remaining items were presented. From Table 101, it can be observed that the loadings between the manifest variables and their associated latent variables

are reasonably high. As discussed earlier we used only those manifest variables in the analysis whose loadings are more than the threshold value (≥ 0.70). We also observed that the t-values for all the factor loadings of the manifest variables are highly significant ($p < 0.001$). Table 101 also presented reasonably high 'squared multiple correlation' values indicating that all the items could reasonably explain the latent factors' variance.

Table 101: Confirmatory factor analysis (CFA): Measures (N = 211)

Construct	Item	Standardized loading	$P(> t)$	R^2^*	Scatter Matrix Plot
Performance expectancy (P)	P2	0.784	0.000	0.614	
	P3	0.962	0.000	0.926	
	P4	0.932	0.000	0.869	
Effort expectancy (E)	E1	0.93	0.000	0.864	
	E2	0.7	0.000	0.487	
	E3	0.927	0.000	0.859	
	E4	0.733	0.000	0.538	
Social influence (S)	S1	0.752	0.000	0.565	
	S2	0.814	0.000	0.662	
	S3	0.874	0.000	0.765	
	F1	0.782	0.000	0.611	

Facilitating conditions (F)	F2	0.867	0.000	0.752	
	F3	0.753	0.000	0.568	
	F4	0.807	0.000	0.651	
Hedonic motivation (H)	H1	0.712	0.000	0.506	
	H2	0.924	0.000	0.853	
Price value (Pr)	Pr2	0.937	0.000	0.879	
	Pr3	0.971	0.000	0.943	
Habit (Ha)	Ha1	0.802	0.000	0.643	
	Ha4	0.755	0.000	0.570	
Behavioral intention (B)	B1	0.888	0.000	0.788	

	B2	0.823	0.000	0.677	

* R^2 = Squared multiple correlation; “****” (p<0.000), “***”(p<0.001), “**”(p<0.01),

In Table 101, we also presented a scatter matrix plot to understand the relationship between all pairs of measures within a construct. We can retrieve the following information from the plots about each pair of measures.

- The diagonal shows the density plots of each measure.
- In the lower half of the diagonal, bivariate scatter plots are presented
- In the upper half of the diagonal, the correlation value between the measures is presented with corresponding significance levels.

Scatter matrix plots of Table 101 show a strong positive relationship between all pairs of measures. Moreover, the plots also reveal a high significant correlation between all pairs of measures indicating the presence of common factors.

Table 102 presents the values of the proposed measurement model's reliability and fit characteristics. To check the internal reliability or consistencies of the constructs, values of Cronbach's alpha coefficient and the Average Variance Extracted (AVE) (Anderson and Gerbing 1988, Hair et al., 2010) are examined. Table 102 reveals that Cronbach's alpha coefficient and the AVE values for all constructs are greater than the minimum threshold of 0.7 and 0.5, respectively (Carmines and Zeller, 1979). The composite reliability of each construct was also found to be greater than the cut-off level, i.e. 0.7 (Hair et al. 2010). Tenenhaus et al., (2005) suggested that along with Cronbach's alpha coefficient and the Average Variance Extracted, it is also essential to check the eigenvalue of the correlation matrix. Tenenhaus et al. (2005) suggested that a construct can be considered unidimensional if its first eigenvalue of the correlation matrix is more than one and the succeeding eigenvalue is lesser than one or must have sufficient distance from the former.

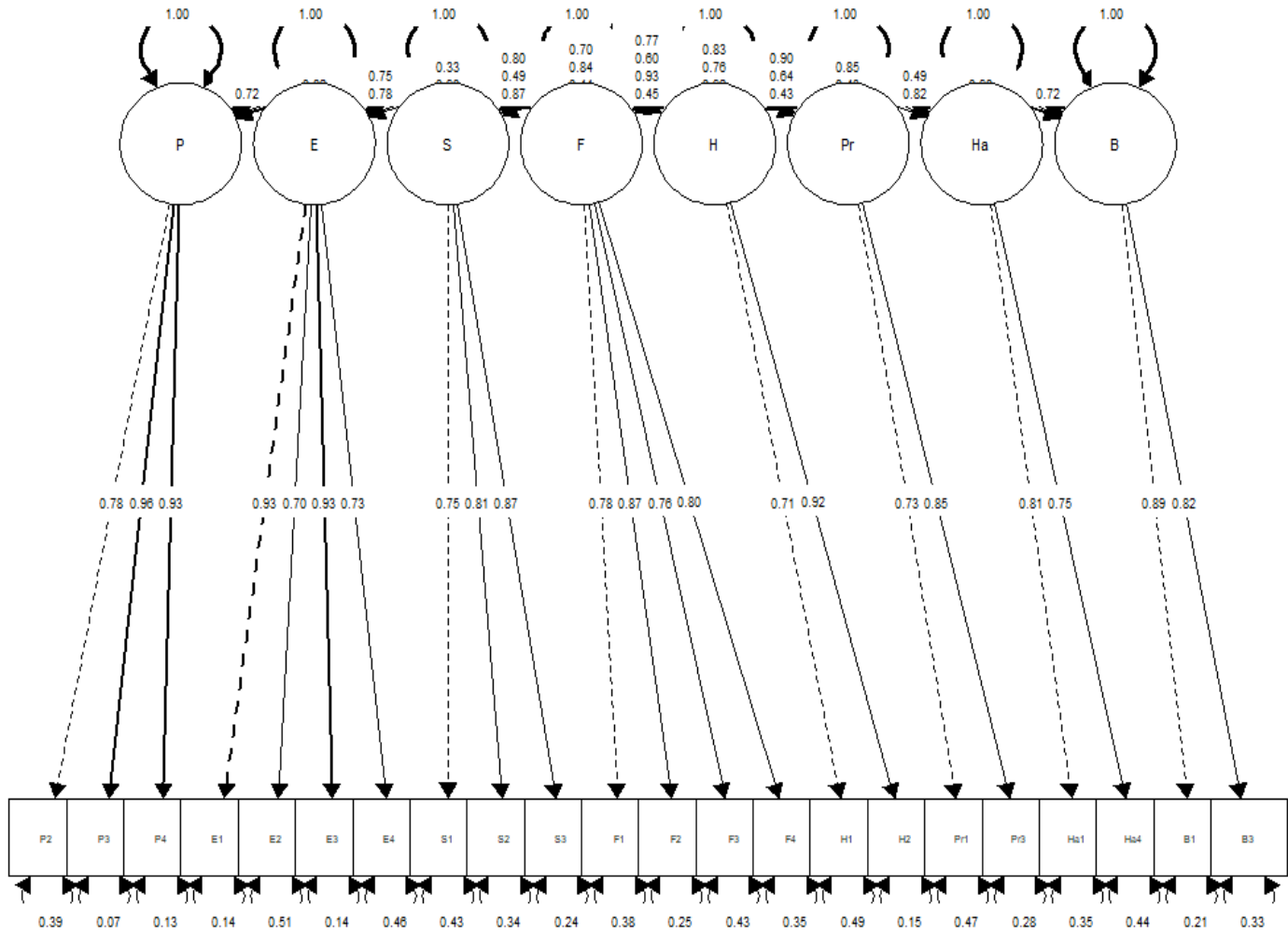


Figure 41: CFA – Measurement Model

Thus from the values presented in Table 102, we can conclude that the manifest variables are a good representative of the latent constructs, ensuring convergent validity. The measurement model displayed a satisfactory level of fit (GFI = 0.959, AGFI = 0.938, NFI = 0.921, NNFI=0.951, CFI = 0.962, RMSEA=0.07, SRMR=0.041, TLI = 0.951, $\chi^2/df = 1.83$).

Table 102: Confirmatory factor analysis (CFA): Reliability Values (N = 211)

Construct	Composite reliability	AVE	Cronbach's Alpha (α)	First Eigenvalue	Second Eigenvalue	Fit
Performance expectancy (P)	0.926	0.808	0.917	2.574	0.332	$S - B\chi^2$ $= 331.162$ df= 181 (p=0.000) $\chi^2/df = 1.83$ GFI = 0.959 AGFI = 0.938 NFI = 0.921 NNFI=0.951 CFI = 0.962 RMSEA= .063 SRMR=0.041 TLI = 0.951
Effort expectancy (E)	0.896	0.688	0.899	3.075	0.518	
Social influence (S)	0.861	0.679	0.852	2.327	0.379	
Facilitating conditions (F)	0.883	0.660	0.875	2.938	0.435	
Hedonic motivation (H)	0.809	0.684	0.793	1.657	0.343	
Price value (Pr)	0.954	0.912	0.953	1.911	0.089	
Habit (Ha)	0.756	0.609	0.754	1.606	0.394	
Behavioral intention (B)	0.847	0.735	0.844	1.730	0.270	

To verify the discriminant validity, we compared the AVE value's square root to each factor's correlations (Fornell and Larcker 1981). Discriminant validity was confirmed as the AVE value for each one of the factors is higher than the correlations among the factors, as given in Table 103.

Table 103: Discriminant Validity

	P	E	S	F	H	Pr	Ha	B
P	0.899							
E	0.724	0.829						
S	0.815	0.784	0.824					
F	0.746	0.801	0.816	0.812				
H	0.329	0.488	0.444	0.450	0.827			
Pr	0.714	0.735	0.815	0.793	0.392	0.955		
Ha	0.700	0.600	0.763	0.636	0.433	0.712	0.780	
B	0.768	0.812	0.807	0.805	0.490	0.789	0.724	0.857

From the above analysis, the parameters and measurement indices provide evidence of reliable measures of the overall measurement model. In the next section, we will use the above eight constructs for testing the structural model.

Path Analysis - Hypotheses Testing

After establishing the reliability and validity of the measurement model, the structural equation model (SEM) was used to check the predictive relationships among the constructs. The maximum likelihood estimation technique was used to check the proposed hypothesis.

Table 104 displays the results of the estimated structural model. It displayed a satisfactory level of fit ($\chi^2/df = 3.46$, TLI = 0.951, CFI = 0.962, RMSEA = 0.063, SRMR = 0.043). From Table 104 and Figure 41, it can be observed that only two parameters are found to be statistically significant, one at $p < 0.05$ and the other one at $p < 0.006$. The result shows that Effort expectancy (E) has a significantly positive effect on Behavioral intention (B) ($\beta_2 = 0.242$, t-value = 1.928) and Social influence (S) has a significant positive effect on Behavioral intention (B) ($\beta_3 = 0.62$, t-value = 2.752), hence supporting hypothesis H₂ and H₃.

Table 104: Summary of SEM Analysis

Hypotheses	Estimate	Std.Err	t-value	P(> t)	Test Result	Model Fit
P ---> B	0.02	0.093	0.212	0.832	Rejected	$\chi^2 =$ 331.16, df=181 (p<0.000), $\chi^2/df = 3.46,$ CFI: 0.962; TLI: 0.951; RMSEA: 0.063 SRMR: 0.043
E ---> B	0.242	0.126	1.928	0.050	Accepted	
S ---> B	0.62	0.225	2.752	0.006	Accepted	
F ---> B	0.066	0.266	0.25	0.803	Rejected	
H ---> B	0.076	0.079	0.951	0.341	Rejected	
Pr ---> B	0.038	0.089	0.428	0.669	Rejected	
Ha ---> B	0.08	0.11	0.729	0.466	Rejected	

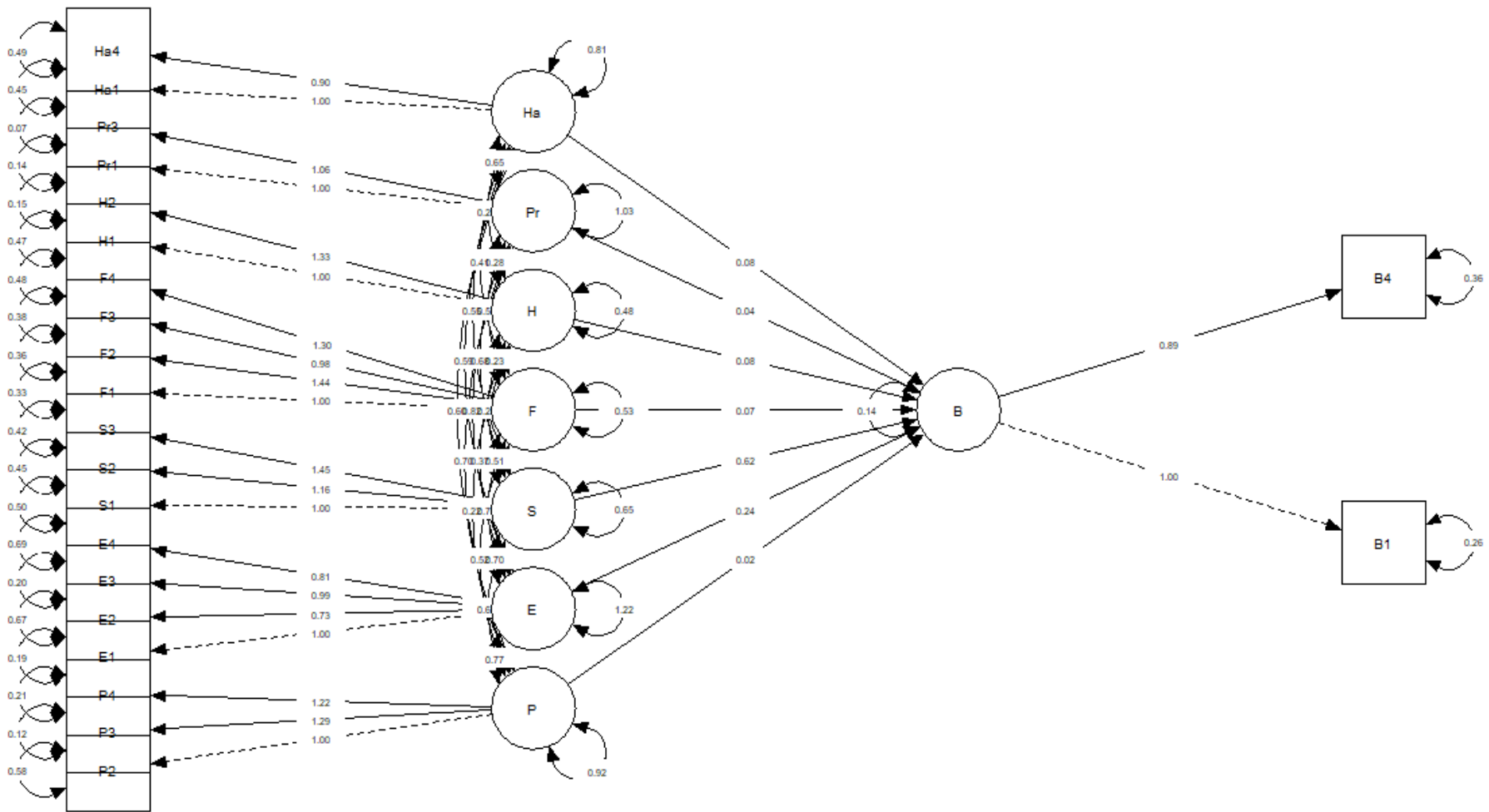


Figure 42: Results of the Path model SEM Estimates

Chapter 5: Discussion

The Government of India initiated this excellent initiative almost seven years ago in 2016. With proper implementation and adoption, this initiative could be a game changer in the field of agricultural marketing. The Government of India also started some more auxiliary services to facilitate the implementation of e-NAM, including the logistics services, especially Kisan Rath. Both website and mobile apps were made available for benefit of the farmers. However, for various reasons the actual adoption has not been quite satisfactory.

Thus, we took up the project to identifying factors influencing adoption of e-NAM platform and conduct a comparative analysis to explore underlying reasons behind difference in attitude toward adoption of e-NAM.

As we started with the data collection process, various mandis in Rajasthan, Haryana and Uttarakhand were visited. As a major activity, we collected data from the farmers to understand their attitude toward the e-NAM initiative. In total, 1364 farmers were approached in 37 mandis located in 10 districts of these three states. 211 usable responses could be received, as most of the farmers showed ignorance of the e-NAM. This shows a major challenge toward adoption of the e-NAM portal / app. The ratio of people unaware or vaguely aware of the e-NAM initiative could be much higher had we not started collecting data through snow ball sampling. Hence, the Government should run intensive campaign, besides conducting demonstration and training sessions for the farmers.

Our discussion with farmers revealed a few more extremely important insights. Firstly, farmers generally do not find the e-NAM portal useful. They rarely use the portal or app themselves. Many of the respondents who said that they used the e-NAM portal once in a month or year actually referred to their presence while the app or portal was being used. Some of them referred to the training sessions they attended earlier. Rest of their response was based on this experience that they had. Although this initial impression of the farmers about the initiative is very important, still it shows that the e-NAM portal or app has not been well adopted in the farmer community.

Secondly, some of the farmers told that they were still averse to using the e-NAM initiative as the payment made would often be available to them after a few days. The rest of the payment structure remained almost same as would have been in the case of physical transactions. Moreover, by engaging in physical transactions they built a relationship with the traders, who would help them in case of any financial emergency.

Thirdly, the farmers as well as some operators in the e-NAM enabled mandis revealed that currently the e-NAM portal works in exactly the opposite way than was envisaged initially. Whereas the initial focus was on building a platform to facilitate online auction of agricultural produce so that farmers could get the best price, presently the auctions take place physically in most of the mandis, like earlier scenario only. Later on, the price for that day is fed into the system for knowledge of the various stakeholders. Although this has its own set of benefits (e.g. giving some idea about the market price of a produce), still it fails the actual initiative. Farmers still have to come to mandis to sell their produce and get into auction with the buyers. The traders and other middlemen still get their commission from the total payment.

The initial phase of the e-NAM implementation witnessed massive protests from various stakeholders. Traders in Madhya Pradesh, Andhra Pradesh, Haryana etc. protested against the implementation of the e-NAM initiative on various grounds. Later, the Government bowed down to some of their demands. Although these might have been a temporary action, the effects continue to this day. The e-NAM initiative in many instances is limited only to the paper work. Rather than decreasing the burden of farmers and other stakeholders, this enhances their pain.

Another important revelation by some of the mandi secretaries is that the initiative could have been better for selected crops with high shelf life. For vegetables and some of the fruits, this system fails to work. The mandis require appropriate mechanism of assaying, grading, packaging and warehousing for the e-NAM system to be implemented. Still in some of the mandis this work has either not started or is incomplete.

Apart from these revelations by the farmers, mandi secretaries, traders and e-NAM operators, we also gained insight through our analysis process based on data collected from the farmers of three states- Haryana, Rajasthan and Uttarakhand. The data was collected in our physical presence. The questionnaire items were adopted from previous studies, primarily based on UTAUT-2 framework. We recorded farmers opinion on a total of 31 questions during the survey. The questions were explained to them in Hindi or their preferred language with the help of someone else who could work as a translator. Thus, the language was not a big barrier in the data collection process.

We used descriptive analysis and other advanced analytical procedure to come up with rich insights. Table 105 gives a glimpse of the insight, which we have described to some extent in Chapter 4.

Table 105: Major findings from the ANOVA test

	States			Level of Education		
	Haryana	Uttarakhand	Rajasthan	Primary	Secondary	Higher Secondary
1. I find the e-NAM portal / app useful for my agriculture related activities				Red	Green	Green
2. Using the e-NAM portal / app increases my chances of achieving things that are important to me				Red	Green	Green
3. Using the e-NAM portal / app helps me accomplish things more quickly				Red	Green	Green
4. Using the e-NAM portal / app increases my productivity	Green	Green	Red	Red	Green	Green
5. Learning how to use the e-NAM portal / app is easy for me				Red	Yellow	Green
6. My interaction with the e-NAM portal / app is clear and understandable				Red	Green	Green
7. I find the e-NAM portal / app easy to use				Red	Yellow	Green
8. It is easy for me to become skillful at using the e-NAM portal / app	Red	Red	Green	Red	Yellow	Green
9. People who are important to me think that I should use the e-NAM portal / app				Red	Green	Green
10. People who influence my behavior think that I should use the e-NAM portal / app				Red	Green	Green
11. People whose opinions that I value prefer that I use the e-NAM portal / app				Red	Green	Green
12. I have the resources to use the e-NAM portal / app				Red	Green	Green
13. I have the knowledge necessary to use the e-NAM portal / app				Red	Yellow	Green
14. The e-NAM portal / app is compatible with other technologies that I use				Red	Yellow	Green
15. I can get help from others when I have difficulties using the e-NAM portal / app				Red	Green	Green
16. Using the e-NAM portal / app is fun	Red	Green	Green			
17. Using the e-NAM portal / app is enjoyable				Red	Green	Green

18. Using the e-NAM portal / app is very entertaining						
19. The e-NAM portal / app is reasonable priced				Red	Yellow	Green
20. The e-NAM portal / app is good value for money				Red	Yellow	Green
21. At the current price the e-NAM portal / app provides a good value				Red	Green	Green
22. The use of the e-NAM portal / app has become a habit for me				Red	Green	Green
23. I am addicted to use the e-NAM portal / app						
24. I must use the e-NAM portal / app	Green	Green	Red	Red	Green	Green
25. Using the e-NAM portal / app has become natural for me				Red	Green	Green
26. I intend to continue using mobile internet in the future				Red	Green	Green
27. I will always try to use the e-NAM portal / app in my daily life						
28. I plan to continue to use the e-NAM portal / app frequently				Red	Green	Green
29. I have experience of browsing the internet				Red	Green	Green
30. I have experience of downloading app from Google PlayStore / AppStore	Green	Green	Red	Red	Yellow	Green
31. I have experience of using mobile apps for different purposes	Green	Green	Red	Red	Yellow	Green

Despite the various odds, farmers in Haryana and Uttarakhand have positive opinion compared to the farmers of Rajasthan regarding the role of e-NAM portal / app to increase their productivity. Thus they feel that they must use the e-NAM portal / app. It is worth noting that farmers in these two states also stated that they had more experience of downloading apps from the Google PlayStore or Apply AppStore and they used mobile apps for various purposes. This may indicate that as farmers become more comfortable with the related technology, they become more supportive of new technological innovation.

Surprisingly, farmers in Rajasthan appeared confident that it was easy for them to become skilful in using the e-NAM portal / app. Although the mean value for this question item was quite low, this indicates that farmers in Rajasthan can be easily trained to use the e-NAM portal or app with a little bit of guidance and training.

Farmers in Haryana did not feel that it was any fun using the e-NAM portal or app. This was different from the farmers of Rajasthan and Uttarakhand. Once again, the mean value for this particular question item is quite low. The Government should keep in mind that the adoption rate would be much higher if the users really enjoyed and find fun in using the new technology.

The rest of the question items did not show any difference based on the states. A closer look at the mean score for each of the states and the composite score for these questions would reveal the opinion of the farmers regarding those aspects. Any value less than the half-way mark of 2.5 should be scrutinised very carefully and appropriate measures should be taken to improve those.

As we checked for difference in farmers' opinion regarding various question items based on their level of education, it became quite clear that education is an important differentiator. In general, farmers having higher level of education had better opinion about the e-NAM initiative. For 18 of the 31 question items, farmers having only primary education were found to have statistically significant poor opinion compared to those having secondary or higher secondary education (Table 105). For nine of the question items, it was clear that higher level of education reflected in better opinion for all three groups of farmers having primary education, secondary education or higher secondary education. However, as could be seen, in 18 of the cases, secondary level of education was found to be reflected in similar opinion as those with higher secondary level of education.

For four question items, education levels of farmers were not found to be important in their opinion. The farmers generally found that the e-NAM portal or app lacks fun quotient and is not entertaining in nature. They generally do not find the app or portal to be addictive, which could have given rise to higher usage of the same. As a result, they do not feel that they would be using the facility in their daily lives.

The advanced analysis using confirmatory factor analysis showed that effort expectancy and social influence impact the adoption and usage of the e-NAM portal or app. The farmers showed indifference to rest of the items. The indifference, however, does not necessarily indicate that ignoring those would not impact the adoption or usage. These need to be carefully studied for their effects.

Based on the above, we recommend the following to the Government.

- Educating the farmers up to at least the primary level. They should not only be able to read and write, but real education is reflected when one internalizes and applies that education, thereby exhibiting wisdom. The Government of India is already doing a lot in this regard. However, ground level reality indicates that farmers are not yet quite educated. The ray of hope is that with time the demographics is changing.
- The Government should conduct more demonstration and training sessions of the e-NAM app or portal for educating the farmers regarding its usage. The system will fail if farmers do not find it to be useful for increasing their productivity and achieving their personal goals. The inhibition related to acceptance of the new technology should be dealt with. Various government agencies should work closely to achieve this goal.
- The payment mechanism through the system should be further streamlined. In the recent years, boosted by various government initiatives and the COVID-19 pandemic, people have started accepting digital payments more. The push should continue for farmers and the financial system should be further developed.
- The Government should run campaigns to highlight the benefits of using the e-NAM. The mandi secretaries, the panchayat pradhans etc. can play a major role. In primary or secondary level of education, the government should introduce children about the benefits of using technology in different domains, especially in agriculture. This will help the children to understand its importance better and when they grow up they will be open to new technological innovation.
- The portal or app should have some fun quotient. Farmers should look forward to opening the portal or app after a days' hard work, or when they are relaxing. Certain aspects of social media may be integrated with the app or the portal. This will help in making farmers used to the system and also in exchanging of useful information among different stakeholders.
- The farmers generally agree that the e-NAM portal or app provides them with good value for money. The slight hesitation can be removed if they can be provided free internet and at least some basic mobile device, till they understand the utility of the system. Doing this at a larger scale may be quite difficult. However, with the help of state government, private mobile manufacturing firms and NGOs, selected farmer families can be provided with this facility.
- Studies have found that people generally uninstall apps if they are not regularly used. Presently farmers rarely use the apps. Hence, the Government needs to rethink on the

utility of the apps. Undoubtedly, apps are powerful tools as technological innovations. A lot of information can be made available easily with apps. Hence, if the apps are to be continued, they should have more fun element and provide more useful information to the farmers. The Government can enhance adoption of the apps if they provide more useful information from different aspects of a farmer's life. This may include information about weather, advice regarding soil condition, availability of financial help, advanced scientific technique to increase crop production etc.

Chapter 6: Limitation of the Study and Future Direction of Research

The current study was an attempt to understand the e-NAM system better and find out the factors which could facilitate or inhibit its adoption and usage. It was undertaken within a duration of one year and focused on three states- Rajasthan, Haryana and Uttarakhand. Farmers growing different types of crops were surveyed for the purpose of this study.

However, as we are considering a nation-wide available system, an in-depth study should be undertaken which could collect insights from farmers spread across the country.

Although we have obtained information from farmers producing variety of crops, future studies should also consider farmers' opinions based on different types of crops. This may more clearly indicate the issues related to the use of the e-NAM system for different produces, and later the Government can arrange to remove those bottlenecks.

Future studies should also consider other stakeholders in agricultural marketing, e.g. traders, FPOs, Mandi Secretaries and Commission Agents. This would require more time and financial help for a proper execution.

Appendix: Questionnaire

Name:

Gender:

Age:

Highest education

Profession: Farmer / Commission Agent (Trader) / Associated with Farmer Producer Organization (FPO) / Mandi Secretary

What type of agricultural product do you deal with:

<input type="checkbox"/> Cashewnuts	<input type="checkbox"/> Other cereals
<input type="checkbox"/> Coriander	<input type="checkbox"/> Paddy
<input type="checkbox"/> Fruits	<input type="checkbox"/> Pulses
<input type="checkbox"/> Meat, Poultry, Egg, Marine Products	<input type="checkbox"/> Sugarcane
<input type="checkbox"/> Milk	<input type="checkbox"/> Vegetables
<input type="checkbox"/> Oilseeds	<input type="checkbox"/> Wheat

If any other, please mention below.

Mark your agreement with the following statements on a scale of 5 [1: Strongly disagree; 5: Strongly agree]

PE1: I find the e-NAM portal / app useful for my agriculture related activities

PE2: Using the e-NAM portal / app increases my chances of achieving things that are important to me

PE3: Using the e-NAM portal / app helps me accomplish things more quickly

PE4: Using the e-NAM portal / app increases my productivity

EE1: Learning how to use the e-NAM portal / app is easy for me

EE2: My interaction with the e-NAM portal / app is clear and understandable

EE3: I find the e-NAM portal / app easy to use

EE4: It is easy for me to become skilful at using the e-NAM portal / app

SI1: People who are important to me think that I should use the e-NAM portal / app

SI2: People who influence my behaviour think that I should use the e-NAM portal / app

SI3: People whose opinions that I value prefer that I use the e-NAM portal / app

FC1: I have the resources to use the e-NAM portal / app

FC2: I have the knowledge necessary to use the e-NAM portal / app

FC3: The e-NAM portal / app is compatible with other technologies that I use

FC4: I can get help from others when I have difficulties using the e-NAM portal / app

HM1: Using the e-NAM portal / app is fun

HM2: Using the e-NAM portal / app is enjoyable

HM3: Using the e-NAM portal / app is very entertaining

PV1: The e-NAM portal / app is reasonable priced

PV2: The e-NAM portal / app is good value for money

PV3: At the current price the e-NAM portal / app provides a good value

HT1: The use of the e-NAM portal / app has become a habit for me

HT2: I am addicted to use the e-NAM portal / app

HT3: I must use the e-NAM portal / app

HT4: Using the e-NAM portal / app has become natural for me

BI1: I intend to continue using mobile internet in the future

BI2: I will always try to use the e-NAM portal / app in my daily life

BI3: I plan to continue to use the e-NAM portal / app frequently

EP1: I have experience of browsing the internet

EP2: I have experience of downloading app from Google PlayStore / AppStore

EP3: I have experience of using mobile apps for different purposes

Please choose your usage frequency for the following:

	Never	Sometimes in a month	Sometimes in a week	Once a day	May times per day
e-NAM portal					
e-NAM app					

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