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Analysis of key challenges facing potato farmers in Nalanda district, Bihar

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Abstract
The garret ranking and its techniques of calculation were discussed in this paper. Garrett's ranking technique was applied to determine the most important element influencing the respondent. The percent rank estimated is transformed into scores using Garrett's Table. After adding up each person's scores for each factor, the overall score value and mean score values are determined. Additionally, it provided a concrete explanation of how users prefer to use electronic tools. The study the constraints faced by the farmers in Nalanda district of Bihar was conducted in agriculture year 2020-21. Multistage sampling technique was used. The study pertains to the major constraints faced by the farmers in production of Potato are High Prevalence of Pest and Disease was thought to be the biggest issue facing potato growers, high labour scarcity, uncertain weather, lack of knowledge and improved technology, inadequate credit, poor soil fertility, delayed crop loan approval, high interest rates on loans, high input costs, and poor irrigation facility.

Keywords: Garrett's ranking, calculation methods, user preferences

Introduction
A problem in research can be solved in a methodical manner by using research methodology. It could be viewed as a field of study where investigation is conducted using scientific methods. It contains a variety of actions that are typically taken by a researcher when researching a problem. J.W. Best (1999) stated that "Research is regarded to be a formal, systematic, and time-consuming process of continuing the scientific method of analysis. It entails a more structured, methodical approach to the inquiry, which typically yields a formal record of the steps taken as well as a report of the findings or conclusions.
Potato (Solanum tuberosum Linn.) ranks fourth among the staple food crops of the world. It is the stable food of almost half of the world's population. The global area under potato during 2009 was about 18.28 million ha, with a total production of 343.91 million MT (Saxena and Mathur, 2013). It is a short duration (110-120 days); and a fertilizer responsive crop and is successfully grown on a wide variety of agro climatic conditions. Potato is an economical food and provides a source of low-cost energy to human diet. It is as balanced vegetable food crop as any other cereal like wheat, rice and maize. It also contains important minerals like calcium, phosphorus, potassium, iron and magnesium. In world scenario, India is the second largest producer of potato (Scott and Suarez, 2011, 2012). Producing 42.34 million MT covering 1.86 million ha with an average yield of 22.72 t/ ha (Agricultural statistics at a glance, 2012). Potato is highly remunerative crop in Nalanda district. Nalanda is a leading cash crop in Bihar province. Knowledge of these constraints is essential to undertake appropriate measures which need to enhance the potato production in the state. (Mishra et al., 1987 pointed out that not more than 15-20% of available technology has reached to the Indian farmers as against 80-85% in some of the developed countries.High Prevalence Of Pest and Disease was thought to be the biggest issue facing potato growers, receiving an average score of 82.33 percent in the Garret ranking, followed by problems with high incidence of diseases, high labour scarcity(70.15 percent), uncertain weather (63.76%) lack of knowledge and improved technology, (58.24%) inadequate credit (52.10%) poor soil fertility (48.38%), delayed crop loan approval (42.27%), high interest rates on loans (36.65%), high input costs (29.41%), and poor irrigation facility (18.23%), each receiving an average score of 82.3 percent.

Methodology
Sampling design
Samples were chosen using a multi-stage sampling technique.

Selection of the study area
The current study on the topic an economic study of Potato Cultivation towards livelihood security of farmers in Nalanda District of Bihar would be helpful to policymakers in creating a framework for formulating plans for enhancing and using policies connected to potato production. This study might offer helpful information on the current potato production in the Bihar district of Nalanda, which could then aid in streamlining the use of resources for potato cultivation, which could ultimately help in achieving the best yield and maximum income.

First stage - Selection of district
There are 38 districts in Bihar, and Nalanda was purposefully chosen as it has the most area and production of potato.

Second stage - Selection of blocks
The Nalanda district has 20 blocks, out of these blocks, Bihar Sharif and Noor Sharai was selected purposively based on potato cultivation's largest area.

Third stage – Selection of villages
All of the villages are listed here in each selected block were obtained from the block development office. Bihar Sharif and Noor Sharai comprises of 75 Villages and 61 villages respectively. Out of which 6 percent village in Bihar sharif Block and 8 percent village in Noor Sharai Block was selected randomly. I have taken data of 1500 farmers in which I taken sampling of 10% farmer which is 150 on the inference making.

Data Collection
Primary Data
Primary data was gathered from 150 randomly chosen farmers during the years of 2021 and 2022 through personal interviews in order to address the study's purpose.

Secondary data
The data regarding cropping patterns, land utilizations, area, production and productivity of potato and general information on districts both the Bihar Agriculture Department and the District Statistical Department provided the data.

Method of enquiry
First, the District Agriculture Office in Nalanda provided general information on the village. The data included details about how the land was used, how the crops were rotated, demographic statistics, marketing resources, and more. The survey method was used to conduct a thorough investigation of each potato grower.
By individually interviewing them with the use of a schedule, information regarding various elements of potato production and marketing was gathered. The employed timetable is detailed in Appendix I.

Tabulation and analysis
The unprocessed data were then collated and analyzed so that the final product, which was presented in tabular form, was relevant to the study's goals. First, the data was distributed on various sheet, village by village. The ensuing master tables were created in accordance with the study's numerous goals. The entirety of the data was organized to serve as a foundation for additional analysis, making it easier to evaluate the outcome.

Analytical Tools: The following statistical tools were used in analysis of data and interpretation of result

Henry Garrett's ranking technique
This techniques was used to evaluate the problems faced by the researchers. The orders of merit given by the respondents were converted in to rank by suing the formula. To find out the most significant factor which influences the respondent, Garrett's ranking technique was used. As per this method, respondents have been asked to assign the rank for all factors and the outcomes of such ranking have been converted into score value with the help of the following formula:

$$\text{Percent position} = 100 = \frac{(Rij-0.5)}{Nj}$$

Where
Rij = Rank given for the ith variable by jth respondents
Nj = Number of variables ranked by jth respon

With the help of Garrett's Table, the percent position estimated is converted into scores. Then for each factor, the scores of each individual are added and then total value of scores and mean values of score is calculated. The factors having highest mean value is considered to be the most important factor.

Review of Literature: Thakur and moorti (1991) Studying potato economics in Himachal Pradesh. They said that the absence of cornerstone and breeder seed, the inadequate extension services, the delay in receiving fertilisers, and the shortage of both people and bullock labour were the issues encountered by the farmers in Lahaul and Spiti.
Sikka and Vaidya (1992) Potato production and marketing in Himachal Pradesh were researched. They said that the lack of good grade seed was the main issue. High seed costs, insufficient storage facilities, difficulties obtaining certification for their seed, high transportation costs, delayed market and intelligence information, middlemen who do not obtain farmers' permission before buying their produce, and quoted prices that are lower than actual ones are all issues. Farmers frequently experienced issues with low prices, delayed price announcements, and making partial payments.
Jagtap (1996) [3] the limitations in using the suggested kharif potato crop production technology. Adoption of the suggested crop production technology has been hampered by the large extension gap that has been found. Since it was revealed that ignorance of the advice was the greatest barrier to adoption in all cases involving major practises, Lack of financial options, inadequate extension services, delays in receiving fertiliser deliveries, and a shortage of both human and bullock labour are all factors that affect the supply of base and breeder seed.
Kumar (2008) revealed that the recommended method and the method used for planting potato were comparable in terms of costs and yield. TPS technology was identified as a potential substitute to address the issue of the scarcity of high-quality seed. Biswas and Nath (2013) discovered that low levels of education, big family sizes, sparse lands, and little cultivable area in Tripura were the main barriers to the adoption of the suggested True Potato Seed (TPS) production technology.
Biswas and Nath (2013) found that the main socioeconomic restrictions were stated to be the absence of widespread adoption of technology, followed by a shortage of agricultural labour, an insufficient supply of loans, and low output.

Table 1: Garrett's ranking

Percentage	Score	Percentage	Score	Percentage	Score
0.09	99	20.93	66	80.61	33
0.2	98	22.32	65	81.99	32
0.32	97	23.88	64	83.31	31
0.45	96	25.48	63	84.56	30
0.61	95	27.15	62	85.75	29
0.78	94	28.86	61	86.89	28
0.97	93	30.61	60	87.96	27
1.18	92	32.42	59	88.97	26
1.42	91	34.25	58	89.94	25
1.68	90	36.15	57	90.83	24
1.96	89	38.06	56	91.67	23
2.28	88	40.01	55	92.45	22
2.63	87	41.97	54	93.19	21
3.01	86	43.97	53	93.86	20
3.43	85	45.97	52	94.49	19
3.89	84	47.98	51	95.08	18
4.38	83	50	50	95.62	17
4.92	82	52.02	49	96.11	16
5.51	81	54.03	48	96.57	15
6.14	80	56.03	47	96.99	14
6.81	79	58.03	46	97.37	13
7.55	78	59.99	45	98.72	12
8.33	77	61.94	44	98.04	11
9.17	76	63.85	43	98.32	10
10.16	75	65.75	42	98.58	9
11.03	74	67.48	41	99.82	8
12.04	73	69.39	40	99.30	7
13.11	72	71.14	39	99.22	6
14.25	71	72.85	38	99.39	5
15.44	70	74.52	37	99.55	4
18.69	69	76.12	36	99.68	3
18.01	68	77.68	35	99.80	2
19.39	67	79.12	34	99.91	1
				100	0

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Study on Preference and Ranking of E-Resources Accessed By the Faculty The preference and Ranking of Electronic Resources accessed by the Faculty in higher educational institution are shown in table.

Results and Discussions: Calculation of Garret Value and Ranking The calculation of Garret value and ranking of the E-Resources accessed by the Faculty in higher educational institutions are shown in the table no.2.

Table 1: Calculation of Garret Value and Ranking

		Rank Given by the Respondents												
Si. No.	**Constraints**	**1th**	**2nd**	**3th**	**4th**	**5th**	**6th**	**7th**	**8th**	**9th**	**10th**	**Total**	**%**	**rank**
1	High Prevalence of Pest and Disease	1900	1105	1200	780	825	855	638	882	1190	1066	14250	82.33	I
2	Labourer scarcity	1045	1530	1500	780	935	630	870	882	910	1312	12750	70.15	II
3	Uncertain weather	1330	1785	1275	1170	880	540	812	819	700	1230	12300	63.76	III
4	Lacks of Knowledge & improve technology	1235	1190	1125	1170	1045	495	696	1071	1050	1312	11250	58.24	IV
5	Inadequate credit	1425	1020	750	1105	715	630	928	1260	980	1558	10500	52.10	V
6	Poor soil fertility	2185	935	900	845	550	630	928	1071	1050	1558	9750	48.38	VI
7	Delay in sanction	950	1700	1650	715	880	765	754	945	840	1148	9450	42.27	VII
8	High interest rate on loan	1805	765	825	1365	660	495	986	756	1750	1066	8700	36.65	VIII
9	High cost of input	760	1105	900	1105	880	900	1102	1008	980	1230	8250	29.41	IX
10	Poor irrigation facility	1615	1615	1125	715	880	810	986	756	1050	820	6750	18.23	X

Table 2: Production constraints faced by sample potato growers

Si. No.	Constraints	Garret score	Rank
1	High Prevalence of Pest and Disease	82.33	I
2	Labourer scarcity	70.15	II
3	Uncertain weather	63.76	III
4	Lacks of Knowledge & improve technology	58.24	IV
5	Inadequate credit	52.10	V
6	Poor soil fertility	48.38	VI
7	Delay in sanction	42.27	VII
8	High interest rate on loan	36.65	VIII
9	High cost of input	29.41	IX
10	Poor irrigation facility	18.23	X

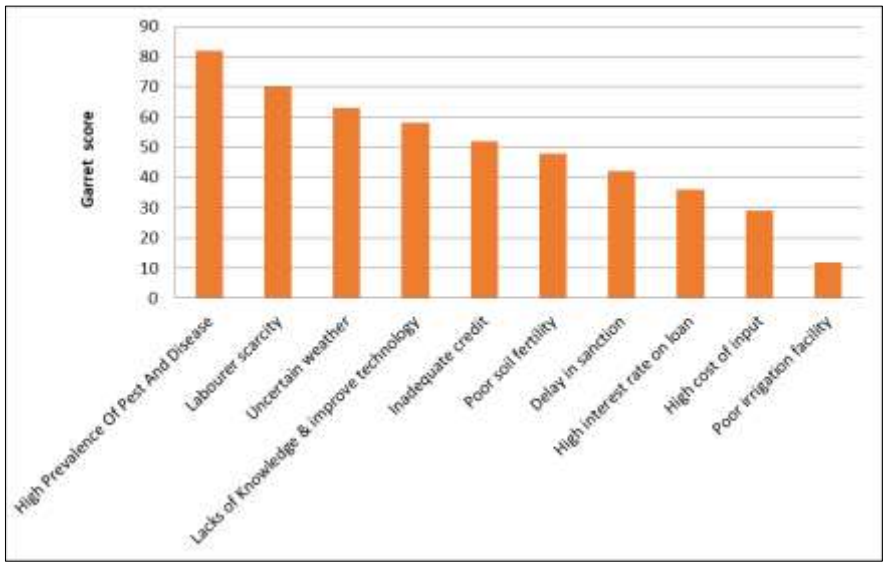

Fig 1: Garret score

The table showed that High Prevalence Of Pest and Disease was thought to be the biggest issue facing potato growers, receiving an average score of 82.33 percent in the Garret ranking, followed by problems with high incidence of diseases, high labour scarcity, uncertain weather, lack of knowledge and improved technology, inadequate credit, poor soil fertility, delayed crop loan approval, high interest rates on loans, high input costs, and poor irrigation facility, each receiving an average score of 82.3 percent.

The main cause for the peak fruiting period, in the perspective of potato growers, was migration of labour to other industrially advanced states in anticipation of a high frequency of illnesses. Another factor for this constraint may be that other industries, such the brick business in the study area, offer greater compensation to the workers during the busy season. Because potato is a product that requires a lot of labour and more seeds per hectare than other vegetables and grains, the respondents ranked high input costs as the second most critical constraint.

Conclusion

The Chi square test is very essential to identify the level of significance and association among the variable. It is convenient to calculate the association among the expected vale and the observed the value. Similarly, the Garret ranking method may be used the researcher to know the preference among the variable. It is very simple to use by the each and every researcher. But the researcher must know the Chi-square and Garret ranking tolls where to be used and why should be used. In terms of the constraints that the sample potato growers encountered during the production process, the high prevalence of pest and disease during the peak season was ranked first with an average score of 82.33 percent followed by labour scarcity, with an average score of 70.15 percent. Lack of knowledge, a definite scarcity, and improved technology, insufficient credit, poor soil fertility, high interest rate on loan, high cost of input, and poor irrigation facility were other constraints identified in the study area.

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