

An information technology enabled Poultry Expert System: Perceptions of veterinarians and veterinary students

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ABSTRACT

The Poultry Expert System (PES) was developed using Visual Basic 6.0 and MS Access on selected dimensions of poultry farming. Its efficacy was tested among the Veterinarians and Veterinary students. PES had greater utility, less complexity and moderate compatibility. It possessed good technicality, feasibility, designed in a user friendly and aesthetic manner and brought improvement in the user attributes. Both the groups were significantly differing on few items of applicability. The study concludes that PES is an IT enabled tool for faster dissemination of expert advice in multiple locations at the same time.

Key words : *Poultry Expert System; Veterinarians; Students; Design; Utility; Complexity; Technicality; Compatibility; Feasibility*

INTRODUCTION

Information and Communication Technologies (ICTs) are bringing significant changes to India, as elsewhere. Such ICTs can be exploited to design cost-effective systems to provide expert advice particularly to rural communities, helping increase productivity and livelihoods. (Swaminathan,2003). An Expert System, one such ICT, is an intelligent computer program that uses knowledge and inference procedures to solve problems difficult enough to require significant human expertise to solve (Feigenbaum, 1982). Expert Systems provide a framework for presenting the latest scientific knowledge and decision-making tools. Although Expert Systems have been developed in many agricultural science disciplines, such systems do not always adequately address the end user. The issues and challenges in the development of such systems include involving the user in development, building consensus between developer and user on the definition of usefulness, delivering computer based technologies and the challenges of implementing the system rather than its parts (Ostergard *et al* 1982). Poultry Expert System (PES) attempts to address these issues and was developed using Visual Basic 6.0 and MS Access on four dimensions of poultry farming i.e. diseases, biosecurity, summer management and drugs used. The present study was carried out to test its applicability among end users - veterinarians and veterinary students.

MATERIALS AND METHODS

Veterinarians of Nizamabad district and pre final year students of College of Veterinary Science, Hyderabad, Andhra Pradesh, India were selected randomly @ 30 respondents, representing each group. Poultry Expert System was demonstrated to the respondents by the investigator through a lap top computer. The respondents recorded their response on the interview schedule which had three point continuum i.e. agree, undecided and disagree. The applicability of Poultry Expert System was measured on 29 items, categorized into seven criteria - utility, complexity, compatibility, technicality, feasibility, design and user attributes.

Utility: Ability of PES to be more useful in taking poultry farming decisions, especially when experts are not available; result in saving of time, money and efforts.

Complexity: Denotes easiness in its operation, navigation and understanding of the content through simple language, compared to traditional way of using knowledge system.

Compatibility: The users' rationality in retrieving the knowledge and consequent decision making is indicated by the compatibility of the system, as the traditional system emphasizes more on consultation of the expert.

Technicality: Credibility and accuracy of the content reflects technicality. System with the content derived from experienced expert professional knowledge managers had high reliability and validity.

Feasibility: It is denotes end users adoptability of PES, in lieu of existing mechanism. Adoption Relies on attributes innovation attributes such as relative advantage, trialability, usability, affordability etc.

Design: Holistic presentation of the content; in a more user friendly manner with all the required and satisfy the end user while using.

User attributes: Manifestations of the end users' knowledge, attitude and skills (KSA). User attributes chiefly reflects the end users interest, attitude, confidence and ability to use effectively. The data were subjected to statistical tests and Mann Whitney test was applied to identify significantly differing items between the two groups.

RESULTS AND DISCUSSIONS

The various items of the perceptions of practicing Veterinarians and Veterinary students on the applicability was categorized into 7 different criteria and presented in the following paragraphs.

Utility

Veterinarians and Veterinary students found the utility of Poultry Expert System (PES) (Table1) to a grater extent. The utility of PES expressed in terms of its usefulness in day to day poultry farming, handy to use the same and perceived it's advantageous over the traditional methods. However the two groups did not had the consensus as to its usefulness in saving the time and money (Chandrakandan *et al* 2003). Veterinary Students are in the traditional learning process and not experienced the work pressure of a Veterinarian in a government position. The multifarious activities of the Veterinarian and limited availability of time resulted in the significant difference as revealed by Mann Whitney test. Field Veterinarians require more such aids to manage their time effectively.

Table 1: Responses of Veterinarians and Students on the Utility of Poultry Expert System

Sl. No	Item	Veterinarians n=30			Students n=30			Mann Whitney Test U
		Agree f	Un decided f	Dis agree f	Agree F	Un decided f	Dis agree f	
1)	Very much useful	30 (100.00)	---	---	27 (90.00)	---	3 (10.00)	405.00
2)	Handy to use	26 (86.66)	2 (6.66)	2 (6.67)	26 (86.67)	2 (6.67)	2 (6.66)	450.00
3)	Saves time and money	30 (100.00)	---	---	23 (76.67)	4 (13.33)	3 (10.00)	345.00**
4)	Advantageous over the traditional methods	30 (100.00)	---	---	28 (93.33)	2 (6.67)	--	420.00

(Figures in parenthesis indicate percentages)

* Significant at 5% level of significance

** Significant at 1% level of significance

PES established itself as a means of IT supported delivery system. It benefited the users of a traditional knowledge acquisition mode, who had limited time

Complexity

Simpler operation, easily understandable content language and navigation in real time use reveal the users attitude towards system's complexity. Except few responses, both students and veterinarians had favorable attitude towards PES (Rao *et al*, 1999). Hands on experience on computers and exposure to software by veterinarians had resulted in the significant differences on items of simple to operate and easy navigation. PES was a user-friendly device for majority of respondents.

Table 2: Responses of Veterinarians and Students on the Complexity of Poultry Expert System

Sl. No	Item	Veterinarians n=30			Students n=30			Mann Whitney Test U
		Agree f	Un decided f	Dis agree f	Agree f	Un decided f	Dis agree f	
1)	Simple to operate	26 (86.66)	2 (6.66)	2 (6.67)	19 (63.33)	6 (20.00)	5 (16.67)	346.00*
2)	Simple language	25 (83.33)	5 (16.67)	---	24 (80.00)	5 (16.67)	1 (3.33)	432.00
3)	Easy navigation	27 (90.00)	3 (10.00)	--	18 (60.00)	10 (33.33)	2 (6.67)	312.00**
4)	Simple to understand	29 (96.67)	1 (3.33)	---	30 (100.00)	---	---	435.00

f= frequency

(Figures in parenthesis indicate percentages)

* Significant at 5% level of significance

** Significant at 1% level of significance

Compatibility

A habituated traditional existing decision support system dominates the new system provided the later had the inherent advantages over the former. PES established itself as a supplementary aid to the existing practice (Table 3) among the three fourth respondents. Lack of real time use of PES by students and veterinarians resulted in skepticism over its efficacy in replacing and substitution of an expert, as the PES was demonstrated only once (Rao *et al*, 1999). The response pattern shall improve over time on repeated use as the content was generated by the experienced poultry scientists of Indian Nation Research Institutes. The reliability and validity of the content had high order of excellence.

Table 3: Responses of Veterinarians and Students on the Compatibility of Poultry Expert System

Sl. No	Item	Veterinarians n=30			Students n=30			Mann Whitney Test U
		Agree f	Un decided f	Dis agree f	Agree f	Un decided f	Dis agree f	
1)	Replacement of an expert	9 (30.00)	15 (50.00)	6 (20.00)	11 (36.67)	9 (30.00)	10 (33.33)	432.00
2)	Supplement to the existing practice	23 (76.67)	7 (23.33)	---	22 (73.33)	7 (23.33)	1 (3.33)	431.50
3)	Substitution of an expert	12 (40.00)	11 (36.70)	7 (23.30)	13 (43.33)	9 (30.00)	8 (26.67)	447.50

f= frequency

(Figures in parenthesis indicate percentage)

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** Significant at 1% level of significance

PES can be utilized as a means of decision-making tool, in case of non-availability of an expert.

Technicality

Technical content incorporated into the system yield better adoptability and precision in the decision making. The content is obtained from the experienced experts of poultry farming which implies credibility of the source, accuracy of the content, agreement with human expertise and lack of discrepancy of the message (Somasekhar, 1999). Both Veterinarians and students endorsed the credibility of the content. Due to lack of judging capacity of the students; as they stand in the pre final year of study, led to difference in the perception on credibility (Table 4), as evidenced by Mann Whitney Test. Content had roots from strong knowledge base. Credibility of the source, accuracy of the content and experts' agreement with the end results strengthened the PES to be used widely in day-to-day activities.

Table 4: Responses of Veterinarians and Students on the Technicality of Poultry Expert System

Sl. No	Item	Veterinarians n=30			Students n=30			Mann Whitney Test U
		Agree f	Un decided f	Dis agree f	Agree f	Un decided f	Dis agree f	
1)	Credibility	25 (83.33)	5 (16.67)	---	18 (60.00)	11 (36.67)	1 (3.33)	342.50*
2)	Accuracy	23 (76.67)	7 (23.33)	---	18 (60.00)	6 (20.00)	6 (20.00)	354.00
3)	In line with the agreement of experts	21 (70.00)	8 (26.67)	1 (3.33)	22 (73.33)	6 (20.00)	2 (6.67)	440.00
4)	No discrepancy in the message	20 (66.67)	7 (23.33)	3 (10.00)	17 (56.67)	8 (26.67)	5 (16.66)	399.50

f= frequency

(Figures in parenthesis indicate percentage)

* Significant at 5% level of significance

** Significant at 1% level of significance

Feasibility

Innovation with attributes such relative advantage, trialability, usability, affordability reflects in early continued adoption. Cost effective PES is a decision making tools which satisfied the information needs of farmers as voiced by Veterinarians (86.67%) and students (83.33%) (Table 5). Cost effectiveness is a prime factor of adoption of IT enabled innovations in animal husbandry, which the developer should consider. Due to non existence or non availability of expert systems in India in livestock sector, particularly poultry, Veterinarians (86.67%) and students (93.33%) perceived PES as a new aid of technology transfer, which can be used at farmer's level. Development of end user oriented PES resulted in better feasibility, which is not true in many instances. (Ostergard, 1992) In future, knowledge base expansion makes it a comprehensive extension delivery system.

Table 5: Responses of Veterinarians and Students on the Feasibility of Poultry Expert System

Sl. No	Item	Veterinarians n=30			Students n=30			Mann Whitney Test U
		Agree f	Un decided f	Dis agree f	Agree f	Un decided f	Dis agree f	
1)	Suitable to existing information needs of farmers	26 (86.67)	3 (10.00)	1 (3.33)	25 (83.33)	5 (16.67)	----	437.50
2)	Affordability / cost effective	20 (66.67)	6 (20.00)	4 (13.33)	13 (43.33)	8 (26.67)	9 (30.00)	334.00
3)	New aid for transfer of technology	26 (86.67)	3 (10.00)	1 (3.33)	28 (93.33)	1 (3.33)	1 (3.33)	421.00
4)	Can be used at farmers level	18 (60.00)	8 (26.67)	4 (13.33)	16 (53.33)	2 (6.67)	12 (40.00)	376.00

f= frequency

(Figures in parenthesis indicate percentage)

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Design

PES was a user friendly design which is not so in many instances as the user was not adequately addressed in the development of the system (Table 6). Design aimed at user satisfaction results in better utility, as the user feels comfortable. User satisfaction is reflected by its aesthetic nature, user centered design and interactive ness, which are embedded in PES. User centered design ensured the users to identify themselves with the system which is developed for them only. User interactive ness of the PES satisfied the end users' basic instinct to interact, be the computer or human beings.

Table 6: Responses of Veterinarians and Students on the Design of Poultry Expert System

Sl. No	Item	Veterinarians n=30			Students n=30			Mann Whitney Test U
		Agree f	Un decided f	Dis agree f	Agree f	Un decided f	Dis agree f	
1)	User friendly	24 (80.00)	5 (16.67)	1 (3.33)	27 (90.00)	2 (6.67)	1 (3.33)	406.50
2)	Aesthetic	24 (80.00)	6 (20.00)	---	25 (83.33)	3 (10.00)	2 (6.67)	441.00
3)	User centered design	22 (73.33)	8 (26.67)	---	24 (80.00)	5 (16.67)	1 (3.33)	424.00
4)	User centered interactive ness	25 (83.33)	5 (16.67)	---	25 (83.33)	2 (6.67)	3 (10.00)	442.50

f= frequency

(Figures in parenthesis indicate percentage)

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** Significant at 1% level of significance

User attributes

Significant changes in the users' Knowledge, Attitude and Skills (KSA) are the consequences of an innovation, which provides the direction for future. Computer Training is one such requirement of most of Veterinarians and students of Veterinary profession (Table 7). Hard ware adjustments such as touch screen computer is one alternative to use PES effectively even without training. Improved self confidence is the positive outcome of PES, which always enhances its utility. User friendly design contributed for the same. PES enriched the users' capability of effective decision making, in the absence of experts, which is because of its content. The PES developed favorable attitude among Veterinarians and students.

Table 7: Responses of Veterinarians and Students on the User attributes of Poultry Expert System

Sl. No	Item	Veterinarians n=30			Students n=30			Mann Whitney Test U
		Agree f	Un decided f	Dis agree f	Agree f	Un decided f	Dis agree f	
1)	Requires training	29 (96.67)	1 (3.33)	---	26 (86.67)	4 (13.33)	---	405.00
2)	Self confidence is improved	26 (86.67)	4 (13.33)	---	22 (73.33)	7 (23.33)	1 (3.33)	388.00
3)	Capable of taking decisions in the absence of expert	22 (73.33)	6 (20.00)	2 (6.67)	15 (50.00)	11 (36.67)	4 (13.30)	420.00
4)	Enhances the effectiveness of Decision making	27 (90.00)	2 (6.67)	1 (3.33)	24 (90.00)	3 (10.00)	3 (10.00)	344.00
5)	Creates interest	28 (93.33)	---	2 (6.67)	30 (100.00)	---	---	403.50
6)	Leads to favorable attitude towards Expert System	25 (83.33)	5 (16.67)	---	28 (93.33)	2 (6.67)	---	405.00

f= frequency

(Figures in parenthesis indicate percentage)

* Significant at 5% level of significance

** Significant at 1% level of significance

PES was an effective tool of extension advisory system as it boosted the self-confidence, which reflected in their capacity to take effective poultry farming decisions in the absence of experts and a favorable change in the attitude and interest of Veterinarians and students.

SUMMARY

Veterinarians and students strongly felt that Poultry Expert System is an effective tool in dissemination the expert advice on poultry farming. Derivation of content from the experienced poultry experts made the PES, a reliable tool of dissemination. Veterinarians and students' perceived equally all items except few significant items, which is due to variation in the experience, exposure of both groups. Exposure of PES to Veterinarians and Students further strengthened that PES is a user-friendly decision support system. Such decision support system / delivery system shall be developed on various aspects of livestock farming for faster dissemination of information in multiple locations at the same time.

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