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Development and assessment of the quality of a mobile application on canine health care and management for veterinarians

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Abstract
Over the last decade, India witnessed a spike in pet care. In the year 2018, the number of pet dogs in India was about 19.5 million. By the end of 2023, the population is expected to surpass 31 million. The surge in the number of pet dogs in India has contributed to an improvement in sale of pet food too, from around $139 million in 2014 to around $285 million in 2018 (Keerlery, 2020). Information Technology (IT) has emerged over the last few years as a means of collecting, storing and distributing information. Information Communication Technology, commonly referred to as ICT, is an expanded synonym for information technology but actually encompasses much more and also covers the role of systems integration and the convergence of telecommunications (telephone lines and wireless signals, including mobile telephony), sophisticated building management networks, and interactive media systems in integrated IT. ICT (Information and Communication Technology) involves the use of computers and other electronic devices and systems for electronically capturing, recording, using and transmitting data. Mobile systems are a part of this ICT family, but are in particular intrinsically linked to Expert Systems. Another significant development in this area has been the development and increased application of the use of mobile applications in the daily life of people. The advent of mobile apps can play a fundamental role in future client veterinary interactions as the number of mobile carriers, especially smartphones, are on the rise. If veterinarians can properly harness this ICT tool, it will prove to be a boon in the long run, in the ever-changing technological landscape.

Keywords: canine health care, management, veterinarians

Introduction
Concurrent with other developments in technology has been the spurt in computing power and mobile networking which has now gained considerable leverage as the basis for mobile health technology (mHealth). The implications of this technology are immense and it has the potential to transform veterinary clinical research and the mode and quality of veterinary healthcare. In Kerala the delivery of animal health care is the mandate of the state Department of Animal Husbandry (AHD) and its vast network of veterinary establishments. The department delivers these facilities to various stakeholders and clientele through this network of institutions that include District Veterinary Centers, Veterinary Poly Clinics and Veterinary Hospitals at the district level to Veterinary Dispensaries at the panchayat level. Kerala is also endowed with higher literacy levels that afford significant advantages to its citizens including dog breeders. This together with the ready markets and the intensive and well wired network of veterinary health care facilities has also made dog breeding and rearing a popular vocation in the state.

The development of a mobile application with information for veterinary practitioners and breeders would have significant implications for improving the practice of veterinary medicine in the state besides serving as an important aid for dog owners in their daily engagement with their animals. Of date, there has not been any attempt to create such an application for veterinarians and dog breeders. It was against this background that the present study was undertaken with the objective of developing a mobile application on canine health care and management for veterinarians and assessing their perceptions about its quality.

Materials and Methods
The Mobile Application Development Best Practices Model (Flora *et al.* 2014) with slight modifications and involving the following steps was used to develop the mobile application.

The broad areas to be included in the application were arrived at through discussions with veterinarians and scientists, accordingly three broad areas identified were diseases, management and other important features of the application that the respondents wished to be included in the application. The content of the application was arrived at through vetting by 5 veterinarians and 5 scientists with instructions to rate each item on a three-point continuum, *viz.,* marginally important, moderately important and extremely important with scores of 1,2 and 3 after which prioritisation of the list by calculating means scores was done as per the procedure by Wentling (1993) [16]. The mean of means under each broad area was calculated and items with mean scores higher than mean of means were selected for content development. Content for each of these areas was prepared through review of literature after which the content was send to a purposive sample of five experienced veterinarians and five scientists as suggested by Bernard (2002) [3] and Seidler (1974) [13] to ensure content validity of the application. The final content was then prepared after taking into account the corrections made by the judges. The application interphase design including functionality and application framework in terms of easy modification and reconfiguration, use of appropriate user-friendly texts and ease of navigation was arrived at by consultation with software experts. The content under broad headings for veterinarians was converted into the electronic format.

Quality assessment was done across four major dimensions *viz.,* engagement, functionality, aesthetics and subject information and subjective quality as well as in terms of its perceived impact on criteria of extension educational importance such as user knowledge, attitudes and intention to change by using the Mobile App Rating Scale by Stoyanov *et al.* (2015) [14]. The items were adapted to the present application and this was pretested in a non-sample group of ten veterinarians.

The final schedule was then sent to an accidental sample of ten veterinarians from each of the four corporations of the state with the highest domestic canine population as per the Census of the Department of Animal Husbandry 2012, *viz.,* Thiruvananthapuram, Ernakulam, Kollam and Thrissur using Google forms.

Results and Discussion

Table 1: Distribution of veterinarians based on age (n = 40)

Sl No.	Category	Frequency (f)	Percentage
1	Young (Below 35 years)	5	12.50
2	Middle aged (35-45 years)	17	42.50
5	Old (Above 45 years)	18	45.00
	Total	40	100.00

The findings of the study found that 45 percent and 42.5 percent were in the old and middle-aged groups, respectively in relation to the age of the veterinarians surveyed. A little over twelve percent were young. These findings are quite identical to those documented by the Federation of Veterinarians of Europe (2019) for Denmark, Ireland and the Netherlands, where 30 per cent of veterinarians were over fifty years of age. However, the results of the present study were grossly different from those reported by the Federation of Veterinarians of Europe (2019) for the countries Russia, Portugal, Estonia and Poland which had the highest proportion of veterinarians in the age group 30 to 34 years.

However, the findings of the current research and the University of California survey (UCLA, 2015) [15], where 35 percent of the veterinarians surveyed were over 55 years of age, were quite comparable. The results of this study were also contrary to the overall results for 30 European countries, where 46% of respondents were under 40 years of age (Federation of Veterinarians of Europe, 2019). However, the findings of the present study were more comparable to the results stated by Devi *et al.* (2019) [4], where 35% of respondents were over thirty-five years of age. The results of this research also vary from those reported by Kogan *et al.* (2017) [10], who found that 35.4 per cent of veterinarians studied in the United States were aged between 20 and 39 years of age while 52.6 were between 40 and 59 years and 13.3 per cent were 60 or older.

Table 2: Distribution of veterinarians based on gender (n = 40)

Sl. No.	Category	Frequency (f)	Percentage
1	Male	24	60.00
2	Female	16	40.00
	Total	40	100.00

It can be seen from Table 2 that 60.00% of the veterinarians reviewed were male, whereas only 40.00% were female. Results on the distribution of veterinarians based on gender for the present study indicated that 60 per cent of the veterinarians under study were male while only 40 per cent were female. This was in contrast to the general distribution of veterinarians reported by the Federation of Veterinarians of Europe (2019) where 58 per cent of the responding veterinarians were female and 42 per cent were male. The results of the present study were also grossly different from the report of the Federation of Veterinarians of Europe (2019) for nations like Finland, Latvia and Sweden where 80 per cent of veterinarians were female as well as the report of the University of California (UCLA, 2015) [15] that revealed that 52 per cent of practicing veterinarians in California were female and this trend was forecasted to grow to 71 per cent by 2030. The result of the present study was however similar to those mentioned by Devi *et al.* (2019) [4] where 78 per cent of the veterinarians studied in an assessment of an offline application for veterinarians were male and just 22 per cent were female. Jelinski *et al.* (2015) [8] however observed that though veterinary profession in Western Canada was more heavily weighted towards women, a higher percentage of males (76%) were working full time when compared to females (58%).

Table 3: Distribution of veterinarians based on marital status Table 4. Distribution of veterinarians based on educational status (n = 40)

Sl. No	Marital status	Frequency (f)	Percentage
1.	Married	40	100.00
2.	Unmarried	0	0.00
	Total	40	100.00
	Educational status	**Frequency (f)**	**Percentage**
1	Undergraduate	25	62.50
2	Post graduate	15	37.50
3	Doctorate	0	0.00
	Total	40	100.00

It can be seen from Table 3 that all the surveyed veterinarians were married and 62.5% of the veterinarians evaluated were graduates, while 37.5% had accomplished post-graduation. None of the participants held a Ph.D. degree. Data on the distribution of veterinarians based on marital status revealed that all the veterinarians studied in the present study were

married. It was also noticeable that 62.5 per cent of the veterinarians studied in the present investigation were undergraduates and that quite a a considerable number of them (37.5%) were post graduate holders. This finding was much greater than that reported by the University of California (UCLA,2015) [15] where it was observed that just 12 per cent of American veterinarians were specialists, though the number of specialists seeking advanced specialist training was also reported to be on the rise. Higher figures for Kerala could be due to the advantages of subsidised professional

education in the veterinary sector that is the sole purview of the Government and the sharp contrast with the American system of education which resulted in a rising number of students with high debts on account of educational loans taken to meet the costs of very expensive veterinary undergraduate education as reported by the University of California (UCLA, 2015) [15]. Huge unsettled expenses incurred at the undergraduate level on the American scene could have prevented them from pursing higher specialty training.

Table 4: Distribution of veterinarians based on working experience (n = 40)

S. No.	Working experience	Frequency (f)	Percentage
	Low (below 10 years)	8	20.00
2	Medium (11-20 years)	16	40.00
3	High (above 20 years)	16	40.00
	Total	40	100.00

The results on the working experience of the veterinarians in the present study revealed that 40 cent of the veterinarians studied had a working experience of eleven to twenty years while those with less than 10 years of experience were 20 per cent and the rest of the 40 per cent had an experience of over twenty years. The results of this study are similar to those reported by the Federation of Veterinarians of Europe (2019) where it was observed that 50 per cent of veterinarians had a

work experience of more than 15 years for the whole of Europe and especially in countries such as Latvia, Ireland and Turkey, two thirds of veterinarians had a work experience of over 15 years.

Perception of veterinarians towards various dimensions of the quality of the application

Table 9: Perception of veterinarians towards various dimensions of the quality of the application (n = 40)

Quality of the mobile app	Scores	F	%
Engagement	Less engaging (1 – 2.33)	4	10.00
	Average engagement (2.33 – 3.66)	29	72.50
	Highly engaging (3.66 – 5)	7	17.50
	Total	40	100.00
Functionality	Non-functional / Less functional (1 – 2.33)	0	0.00
	Substantially functional (2.33 – 3.66)	26	65.00
	Highly functional (3.66 – 5)	14	35.00
	Total	40	100
Aesthetics	Inadequate aesthetics (1 – 2.33)	0	0.00
	Medium aesthetics (2.33 – 3.66)	19	47.50
	Pleasant aesthetics (3.66 – 5)	21	52.50
	Total	40	100.00
Information	Little/No information (3.66 – 5)	0	0.00
	Adequate information (2.33 – 3.66)	18	45.00
	Highly informational (1 – 2.33)	22	55.00
	Total	40	100.00

f - Frequency;% - Percentage

Perception of veterinarians about the application was assessed across four dimensions of engagement, functionality, aesthetics and information aspects of the application. Perception of veterinarians about the application revealed that 72.5 per cent of veterinarians studied reported that the application had an average level of engagement while 17.5 per cent felt that the application was highly engaging and one tenth of the veterinarians studied observed that the application was less engaging. Regarding the functionality of the application, 65 per cent of the veterinarians found the mobile app to be substantially functional while 35per cent reported that the application was less functional. Panda *et al.* (2018) [12] reported that slow functionality of applications was reported to be an important perceived constraint impeding the use of mobile applications by veterinarians. Functionality of an app was reported to be a major quality of an application that influenced the veterinarians desire to use the application the aesthetic experience provided by the application was graded as pleasant by just over half of the veterinarians studied while

47.5 per cent reported that the aesthetics of the application was of a medium quality. The last aspect of assessment of the application centered around the information contained in the application to which 55 per cent of the respondents reported that the information contained was towards the higher range. Devi *et al.* (2019) [4] observed that 86 per cent of veterinarians of Tamil Nadu reported the application being assessed as extremely useful. Gehrt and Yale (1993) [6] also remarked that improving the convenience of the application was a key factor influencing consumer behavioral intention. The results of the present study also shed light on further enhancement that was possible to increase the acceptability of the application such as increasing its content so that the application is perceived to be more useful (Lee and Lehto, 2013) [11] as well as improving the comprehensiveness of the content in terms of timeliness, relevance and sufficiency (Tung and Chang 2008).

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