



DEVELOPMENT OF A SCALE TO MEASURE INNOVATIVENESS OF DAIRY ENTREPRENEURSHIP

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Abstract

Measurement is often intuitively defined as the assignment of numerals to objects or persons according to a rule. It enables researchers to verify the true nature or characteristics of an object or person in order to make a decision and draw a relationship to other objects or persons in a social set up. The study was designed to develop a scale to measure innovativeness of dairy entrepreneurship. Quota sampling was used to select 72 judges who were experts in dairy, veterinary extension, agricultural economics and agricultural extension. Their opinions were sought through use of questionnaire sent by mails and physical contacts. Six steps were used for the construction of the scale namely: (1) Definition of the trait (2) Collection of large pool of statements, (3) Statements editing, (4) Statements analysis, (5) Scale reliability and validity and (5) final scale development. The scale was developed using Likert's Summated Rating Scale Technique. The validity of the scale was examined with the help of face and content validity. Test retest method was used to test reliability. Cronbach's coefficient alpha of 0.8711 suggests the scale is reliable in measuring innovativeness of dairy entrepreneurial behavior. From an original pool of 88 statements the final scale was reduced to 34 items based on experts' judgement.

Keywords: Measurement, Scale, Innovativeness, Dairy, Entrepreneurship.

INTRODUCTION

Innovativeness is the degree to which an individual adopt new ideas relatively earlier than the other members of his social system (Rogers,2003; Frankelius,2009). Entrepreneurship innovation is in many cases driven by the need to maintain grades and standards within the value chain, not only in the case of export markets, but also in evolving domestic and urban markets and value chains (World Bank, 2009). Success in dairy entrepreneurship depends critically on creating synergies between market-led and knowledge-based innovations and strong linkages within and beyond the marketing chains. The structure of the whole agricultural innovation system also critically plays a role in the successes in dairy entrepreneurship.

Measurement is defined as the process of associating numbers or symbols to observations obtained in a research study (Clark & Walton, 1975; Kothari & Garg, 2014, p.66). The observations could be qualitative or qualitative. According to Kothari & Garg (2014), the quality of scientific research depends on the fruitfulness of the measurement procedures employed. Measurement of the innovation capacity is critical for both practitioners and academics, yet the literature is characterized by a diversity of approaches, prescriptions, and practices that can be confusing and contradictory Empirical studies have found that many organizations tend to focus only on the measurement of innovation inputs and outputs in terms of cost, speed to market, and numbers of new products and disregard the technological innovativeness [Linda and Ridgway, 1983].

To seize new market opportunities, farmers need to innovate—to become more efficient producers and effective entrepreneurs. In order to innovate, farmers need new technologies and information on how to access and manage them, as well as better support services for the delivery of inputs and knowledge, and better infrastructure for delivering produce to the market. (Schreiber, 2002). This paper describes development of a scale to measure innovativeness of Dairy entrepreneurship.

METHODOLOGY

Sampling Technique and Sample Size

Quota sampling was used for the study. In this technique, the population is segmented into mutually-exclusive sub-groups and then a non-random set of observations is chosen from each sub-group to meet a predefined quota (Bhattacharjee, 2012). A total of 88 statements were mailed to 110 experts' judges in the field of dairy and animal science, veterinary extension, agricultural economics and agricultural extension. They were requested to record their opinion about the relevancy of each statement in measuring innovativeness of dairy entrepreneurship. Only 72 responses were recorded.

Methods of Data Collection and Analysis

Six steps were used for the construction of innovativeness scale namely: (1) defining the trait, (2) collection of large pool of items based on the definition, (3) statement editing, (4) statement analysis (5) scale reliability and validity and (6) Final innovativeness scale

Definition of the Trait

Innovativeness refers to the degree to which an individual adopts new ideas relatively earlier than others in his/her social



system (Rogers, 2003). In this study, it is a behavioral parameter of dairy groups who has interest and desire to seek new changes in farming techniques and ready to introduce such changes into their farm operations when it seems practical, feasible and profitable.

Creating Large Pool of Statements

A total of eighty eight (88) statements were collected based on review of literature on various measures of innovativeness in dairy entrepreneurship. The statements were then discussion with experts in the field of dairy and animal science, veterinary extension, agricultural economics and agricultural extension. All the statements were arranged in logical sequence for coherent flow from one to the other.

Statements Editing

The statements were mailed to 110 experts' judges and requested to record their opinion about the relevancy of each statement in measuring innovativeness of dairy entrepreneurship.

The responses were recorded on a four point continuum namely most relevant (MR), relevant (R), list relevant (LR) and not relevant (NR). They had, of course, liberty to add /delete or modify any of the statements. In all, only 72 judges responses were received back accounting for 65.45% responses. The responses were signed weight of 3, 2, 1 and 0 for most relevant, list relevant, relevant and not relevant, respectively for editing using the formula;

$$\text{Mean score} = \frac{\text{Total score of that statement}}{\text{Maximum obtainable score (i.e. 3 x No. of judges)}}$$

The statements having mean score value higher than the overall mean score 0.81 were selected for item analysis.

Statement Analysis

Formula given by Edwards (1969) and Chaudhari (2007) was used to analyse judges responses based on Relevancy Weightage (RW) and mean relevancy score (MRS) as follows:-

Relevancy weight

$$RW = \frac{(MR \times 3) + (R \times 2) + (LR \times 1) + (NR \times 0)}{216 \text{ (i.e Max possible score (3) \times No. of Judges (72))}}$$

Where,

- RW = Relevancy Weightage
- MR = Most Relevant (Total MR score for each statement)
- R = Relevant (Total R score for each statement)
- LR = Least Relevant (Total LR score for each statement)
- NR = Not Relevant (Total NR score for each statement)

Mean relevancy score

$$MRS = \frac{(MRR \times 3) + (RR \times 2) + (LRR \times 1) + (NRR \times 0)}{\text{Number of judges (i.e 72)}}$$

Where,

- MRR = Most relevant response
- RR = Relevant response
- LRR = List relevant response

NRR = Not relevant response

Reliability and Validity of the Scale

Test-retest method was employed to test the reliability. The scale was administered to 20 identical non-sample respondents and their responses recorded. The second administration took place 30 days later. This yielded two independent sets of results which were correlated and correlation coefficient value computed. The "r" value of 0.8711 was found to be significant, thereby indicating the evidence of reliability (Kothari & Gaurav, 2014).The scale was subjected to face and content validity through extensive review of literature and discussions with experts in the field of animal science, dairy science, agricultural economics, extension education and veterinary extension.



Final Innovativeness Scale

The final scale was thus developed consisting of 6 components and 34 statements.

RESULTS AND DISCUSSION

The final scale consisted of six (6) components - dairy farm structures; husbandry practices; reproductive practices; quality control and milk handling; value addition for milk; disposal and utilization of dairy farm wastes; dairy products marketing - and 34 statements (Table 1).

Table 1: Item Total and Mean Score for Final Scale

S/No	Statement	Relevancy score	
Innovativeness of dairy group farmers			
I	Dairy farm structures	Item Total	Mean score
1.	A dairy barn should be constructed at a higher elevation to help maintain hygiene in the barn	207	0.96
2.	A dairy barn should be located to adequate exposure of sun & protection from prevailing wind	190	0.88
3.	Fresh, clean and soft drinking water should be provided ad-libitum (24x7) for dairy animals	205	0.95
4.	The floors of a dairy barn should be constructed in such a way that they are easy to clean	206	0.95
5.	Dairy shed should be in an areas where you can sell products profitably & regularly	193	0.89
6.	Electricity is the most important sanitary method of lighting & for economical handling of modern dairy equipment	185	0.86
7.	Tail to tail system is convenient because animal on heat or any reproductive problem can easily be detected & attended immediately	185	0.86
II	Husbandry practices		
1.	Animal identification, registration and recording with the Kenya Stud Book (KSB) for marketability	182	0.84
2.	Use bolus (e-identification) for control of cattle rustling	191	0.88
3.	Culling and insurance of animal to reduce risk	178	0.82
4.	Organic fodder production e.g. <i>Tumbukiza</i> (9 splits per hole) for productivity and health reasons	178	0.82
5.	On-farm feed formulation to reduce costs of concentrate feeding	193	0.89
6.	Fodder conservation (hay/silage/feed milling) to ensure continuous feed supply & profitability.	181	0.84
III	Reproductive practices		
1.	Purchase of dairy animal from organised farms based on history or pedigree sheet is preferred.	194	0.90
2.	Use of modern technologies such as ultra-sound for pregnancy detection increases fertility.	176	0.82
3.	Use of sexed semen to improve fertility and profit	182	0.84
4.	<i>The AI "service hub model"</i> - Cryopreservation of gametes and embryos makes AI successful and economical.	198	0.92
5.	Use of Transgenic Animals (TA/GMA) improves disease control and productivity.	176	0.82
6.	Synchronization of estrous improves fertility	188	0.87
IV	Milk Quality control and handling		
1.	Milking techniques that avoid damage to udder and teats and transfer of disease (not pulling)	192	0.89
2.	Proper handling, storage and transport of milk to avoid contamination including personnel.	187	0.86



3.	Collection, transportation and delivery of milk without undue delay to avoids introduction of contaminants and growth of micro-organisms.	185	0.85
4.	Observing food safety systems (TQM – Total Quality Management) for competitive milk trade.	187	0.86
5.	Proper records keeping for enhanced ability to verify the effectiveness of the control systems.	179	0.83
6.	Daily washing of the animal to remove loose hair and ensure clean milk production.	201	0.93
V	Value addition for milk		
1.	Chilling/cooling/bulking to increase milk shelf life	193	0.89
2.	Milk processing and packaging (use of biodegradable material for safe use)	178	0.82
3.	Curd/Yoghurt/Cheese making for diversification & profitability	203	0.94
4.	Reformulation of dairy products to meet a range of tastes and health needs (Filtered & fortified/ pro-biotic milk products)	191	0.89
VI	Disposal and utilization of dairy farm waste		
1.	Use animal waste as manure/fertilizer – compost making	178	0.82
2.	Use animal waste as a source of energy – biogas production/clean energy	178	0.82
VII	Dairy product marketing		
1.	Use of cashless platform (e-commerce (e.g. Mpesa) improves efficiency in milk trade	198	0.92
2.	Use of low cost market information system (LCMIS) – use of ICT - provides accurate and relevant market information	182	0.84
3.	Improved milk packaging method as a marketing strategy – Eco-packaging	184	0.85

CONCLUSION AND RECOMMENDATION

The scale for measuring innovativeness of dairy entrepreneurship consists of six (6) components - dairy farm structures; husbandry practices; reproductive practices; milk quality and handling; value addition for milk; disposal and utilization of dairy farm wastes; dairy products marketing - and 34 statements. The highest and lowest score on the scale was 207 and 176 respectively. The scale makes it possible to measure innovativeness of dairy entrepreneurship. Researchers could follow the procedure outlined in this study to develop a scale for measurement of innovativeness.

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