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Modelling the Enablers for Risk Management in Milk Processing Industry

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Abstract

The Food Processing Industry is the domain which involves a vast area of research. Dairy industry has been selected as a particular area of research work for the study where both dairy farming industry and dairy processing industry suffers a lot of risks in its functioning. The paper discusses about the research work carried out in the field of risk management of the dairy industry. The main objective of this study is to analyse the various enablers of risk management involved inthe dairy sector with the help of Interpretive Structural Modelling (ISM) tool. The tool has helped in identifying the enablers as driving factors and dependent factors. The enablers were selected on the basis of secondary data obtained from the literature review.

1. Introduction

India is one of the world's largest producers of food as it has the best natural resources for the food and agricultural sector. In terms of overall production, consumption, export and growth, India is ranked as fifth in the field of food processing industries [1].Dairy industry is one of the important industry which serves as a backbone for the population of the country where families either below poverty line or rich need to fulfil their nutritional requirement.

As India is making its impact at the global level, it needs to raise the standard of both quantity and quality of milk and its product. Thus it has to manage both production and quality standards by assessing its risk management system.

British Standards Institute defines risk as a "combination of probability or frequency of occurrence of a defined hazard and magnitude of the occurrence" [9]. Majority of the dairy farmers and processors face many types of risks such as financial

risks, example credit risks where payment not done, compliance risks such as not maintaining quality standards, market risks or climatic risks such as adverse weather conditions. These risks need to be managed through proper study on the risk management for both dairy farm sector and dairy processing industry.

There is always a need to determine the factors or variable which are vital for better management of risks. Study of these risks help to analyse the factors or variables and accordingly apply enablers which will not only determine the risk management for the processors but also for the dairy farmers who form an integral part of the industry. This will ultimately help the dairy industry for future growth and in turn boost the economy of the country.Thus the major objectives of the study were to identify the risk factors affecting the dairy industry, Determine the enablers for the efficient dairy industry and to create hypothetical model for various risk factors

2. Literature Review

2.1 High Milching Cattle

The government need to formulate new policies in order to achieve the growing demand of the population and that is possible through genetic up-gradation of cattle and buffalos [9].If hybrid quality breed are developed then there will be a rise in 10-15% rise in milk production [6].

2.2 Feed Management

Feed management improves the opportunities available in the dairy industries [4].Precision feeding management by the farmers requires various nutritional models [14].

2.3 Financial Management

Dairy Farmers having detailed financial planning for their production costs need help to apply for loans in the financial organisations like bank [2]. Having access to financial management will increase the output of dairy and assist commercial processors [11].Increased investment in logistics for milk collection and supply chain can be done with the help of the financial management. [9].

2.4 Supply Chain Management

Systematic investment in the logistics and infrastructure development is needed to obtain maximum utilization and benefits [9].Improper handling and erratic power supply cause significant milk spoilage for milk cooler operators and milk processors [13]. Logistical-related risks account for more than two third of the risks at processing plant level [7].

2.4 Marketing Strategy

Price regulation and marketing strategies help in getting better product in the market [12], [13].High capital cost, few/ insufficient processing centres, high handling, transport and packaging expenses, do affect the marketing strategy [13].

3. Standard Operating Procedure (SOP) of Dairy Products

Dairy industry requires SOP as different individuals share responsibility for a single task, and variation in these tasks can have detrimental consequences [8].Processors need new ventures in new equipment and training in product improvement and standard operating procedure (SOP)[11].The processing plants are encouraged to operate their own laboratory based quality programs [10].

4. Education of Farmers

Educational programmes provide the farmers with improved knowledge on dairy animals [3]. Marketing of dairy products can be improved through education [13].Financial organizations should have special policies such as educational loans for the dairy farmers to encourage them for educational activities [2].

5. Training Programmes

Training programmes improve the standard of living and offer ample opportunities to the women who are dependent on these dairy farms [3].Government funding plays an important role in encouraging these training and developmental programmes [15].

6. Quantity and Quality of Milk

Quantity of milk can be improved if high milching cattle and better feed management is done Milk processors need to raise their standard of obtaining quality milk from the dairy farmers[3].

7. Disaster Management

Hazard risks during transportation is one of the major issue in the transport agency level [7].Even infrastructure development for roads, construction and maintenance are of prime importance so as to access the dairy farms [13].Logistics support for proper supply chain network forms a very important part of management as it result in losses in terms ofproduct and financial losses which has a huge impact on the industry [13].

8. Data Analysis

The data used here is based on the literature review of secondary data source. **Interpretive structural modelling** which co-relates the relationship between the different factors obtained from the secondary data is used. This model interprets the complex factors through proper graphical and pictorial representation of the enablers and is used:

1. To identify the factors which are affecting the most and then to use suitable enablers to it.
2. Relationship between the variables is established and after that a structural self-interaction matrix (SSIM) of variables is formed;

3. Reachability matrix is developed from the SSIM and then matrix is checked for transitivity where transitivity is defined by ISM that if variable 1 is related to 2 and 2 is related to 3 then 1 is related to 3;
4. Different levels for the reachability matrix is obtained by partitioning is obtained.
5. Digraph is drawn on the basis of the reachability matrix and removing the transitive matrix and finally the digraph is converted into the ISM based model by replacing with statements;
6. Then the model is reviewed and it is check if there is any modification required [5]

ISM methodology has been obtained on the basis of the literature review and this has finally given the shape of the relationship between the enablers. Analysis of the enablers has been done by using different symbols which are denoted by (i and j) where V is defined for relation from i and j; A is defined for relation from j and I; X is defined for relation from both i and j and O denotes no relation between i and j or j and i.

9. Reachability Matrix

The SSIM has been described by converting into binary matrix which is obtained by substituting into 0 and 1 and it is called as reachability matrix. Here, following rules are followed to obtain the matrix. If the (i,j) in SSIM entry is V, for (i,j) entry it is defined by 1 and it is 0 for (j,i) entry; if the (i,j) in SSIM entry is A, for (I,j) entry it is defined by 0 and opposite for (j,i) entry; if (I,j) in SSIM entry is X, both entries becomes 1 and for O both becomes 0 (Table1).

Table 1: Relationship between the enablers.

Elements	10R	9	8	7	6	5	4	3	2
1	O	A	O	A	O	V	A	A	X
2	O	O	O	A	O	X	A	A	
3	V	V	O	X	V	V	X		
4	V	V	V	X	V	V			
5	O	V	O	A	O				
6	V	O	O	A					
7	V	V	O						
8	O	V							
9	V								

10. Partitioning of levels and building of ISM model

Final reachability matrix is obtained by adding 1* entries into the gap to incorporate transitivity from the intial matrix (Table 2). Iteration levels are obtained by the help of reachability matrix and antecedent matrix where reachability set is obtained from

horizontal axis of final reachability matrix and antecedent set is obtained from vertical axis of final reachability matrix. After all iterations level is obtained we build the digraph and final model of ISM.

Table 2: Initial Reachability matrix.

Elements	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	1	1	0	0	1	0	0	0	0	0
2	1	1	0	0	1	0	0	0	0	0
3	1	1	1	1	1	1	1	0	1	1
4	1	1	1	1	1	1	1	1	1	1
5	0	1	0	0	1	0	0	0	1	1
6	0	0	0	0	0	1	0	0	0	1
7	1	1	1	1	1	1	1	0	1	1
8	0	0	0	0	0	0	0	1	1	0
9	1	0	0	0	0	0	0	0	1	1
10	0	0	0	0	0	0	0	0	0	1

Table 3: Ranking of enablers on the basis of driving power and dependency power.

ELEMENTS	10	5	6	1	2	9	8	3	4	7	DRIVING POWER	RANKS
10	1	0	0	0	0	0	0	0	0	0	1	VI
5	1	0	0	0	1	1	0	0	0	0	3	IV
6	1	0	1	0	0	0	0	0	0	0	2	V
1	0	1	0	1	1	0	0	0	0	1	4	III
2	0	1	0	1	1	0	0	0	0	1	4	III
9	1	0	0	1	0	1	0	0	0	1	4	III
8	0	0	0	0	0	1	1	0	0	0	2	V
3	1	1	1	1	1	1	0	1	1	1	9	II
4	1	1	1	1	1	1	1	1	1	1	10	I
7	1	1	1	1	1	1	0	1	1	1	9	II
DEPENDENCY	7	5	4	6	6	6	2	3	3	6		
RANKS	I	III	IV	II	II	II	VI	V	V	II		

11.Digraph and MICMAC Analysis

Here, MICMAC analysis has been done to analyse the enablers where training and education of farmers are found to be driving factors (Figure1). Driving factors are independent and they try to improve the whole system. Dependency factors are those which are dependent upon driving factors. Linkage factors have high driving and dependency factors. Autonomous factors are weak factors.

To mitigate risk in a dairy industry it is important to provide training facilities along with education programmes for the staff and dairy farmers. Financial management of the dairy farms and the dairy plants is very important enabler which

will help to obtain better profit margin and growth for the economy. Feed management and high milching cattle which are dependent variables which help to obtain good quantity and quality of milk if these two factors are better managed. Supply chain and disaster management for both dairy farmers and dairy processors are important as these factors are co-related with proper channelling of products to market and finally to customers. SOP and market strategy are not correlated but these weak factors do play a significant role in the long run.

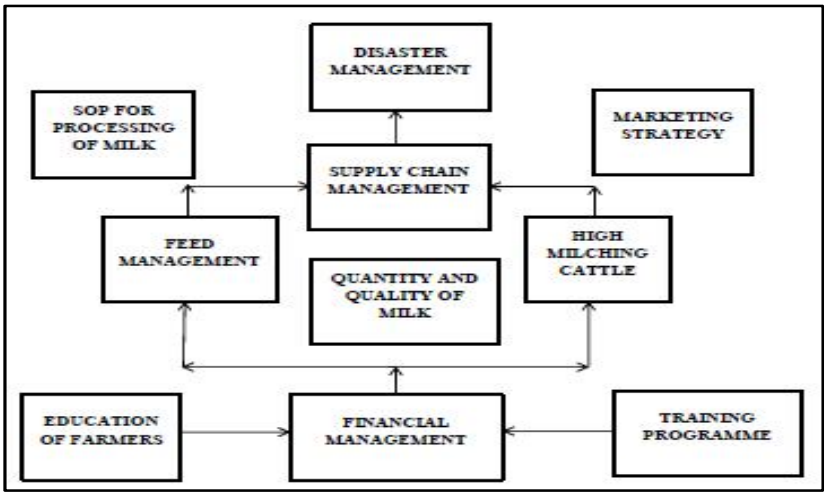

Fig. 1: Digraph for the enablers on the basis of driving and dependency powers.

References

[1] ASA & Associates LLP (2013)"A brief report on food processing sector in India"

[2] Brendan Smith, T.D., "Implementation of Food Harvest 2020 in the Dairy Sector" Extract from DAFF Press Release 179/10

[3] Dairy Hub: A Community Dairy Development Programme, by TetraPak

[4] Frank M Mitloehner (2007) "Feed Efficiency and Sustainability of the Cattle Industry", University of California

[5] Kumar, S., and R. Kant (2013) "Supplier selection process enablers: an interpretive structural modelling approach", International Journal of Mechanical and Industrial Engineering (IJMIE) ISSN No. 2231-6477, Vol-3,Iss-1.

[6] Milking supplements for all they are worth (2005) Australian Centre for International Agricultural Research

[7] Mishra, P. K., and B. Raja Shekhar (2012) "Evaluating supply chain risk in Indian dairy industry: a case study", Int. J. Decision Sciences, Risk and Management, Vol. 4, Nos. ½

[8] Maunsel, F., (2012), "Effective Use of Standard Operating Procedures on Dairies to Improve Herd Health", Proceedings 48th Florida Dairy Production Conference, Gainesville.
[9] Ohlan, R., (2013) "Efficiency and Total Factor Productivity Growth in Indian Dairy Sector", Quarterly Journal of International Agriculture 52 (2013), No. 1: 51-77
[10] Plant Construction, Equipment and Operation Standards by BC Centre for Disease Control
[11] Rwanda National Dairy Strategy–Final Report, Ministry of Agriculture and Animal Resources
[12] Risk Management in the Dairy Industry, California Dept. of Food & Agriculture
[13] Sikawa, G. Y., and J. Mugisha (2011) "Factors influencing south-western Uganda dairy farmers' choice of the milk marketing channel: a case study of kirihura district south western Uganda", Moshi University College of Co-operative and Business Studies
[14] Staal, S. J., and W. N. Kaguongo (2003) "The Ugandan Dairy Sub-Sector Targeting Development Opportunities", The International Food Policy Research Institute
[15] Training& Skills Development Opportunities for Dairy Farming, (2005) Milk Development Council.