ICAR WINTER SCHOOL

on

LIVESTOCK BUSINESS AND MARKET INTELLIGENCE

TAMIL NADU VETERINARY AND ANIMAL SCIENCES UNIVERSITY

Organized by

DEPARTMENT OF ANIMAL HUSBANDRY ECONOMICS

Madras Veterinary College, Chennai - 600 007

2011

ICAR sponsored Winter School
on

LIVESTOCK BUSINESS AND MARKET INTELLIGENCE

Compendium of lectures of winter school

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PREFACE

With the advent of globalization, agriculture and its allied activities have become more commercial and is bracing for a crucial role in economic development. In the agricultural sector, animal husbandry has occupied a renowned position in generating income and employment to the resource poor rural farmers. During 2008-09, the country produced 108.5 million tonnes of milk, 55.6 billion eggs, 42.7 million kg of wool and 3.8 million tonnes (from organized sector alone) of meat. As per the NABARD (2008-09) estimates, agricultural sector contributed 17 per cent of total GDP and livestock sector contributed 25 per cent of agricultural GDP. To achieve the projected 4 per cent growth rate in agriculture sector during the XI five year plan period, the role of livestock sector becomes crucial. Constraints in livestock production such as lack of market information and acumen on marketing of live animals and livestock products severely constrain the profitability of livestock business.

In an agricultural economy, healthy marketing system is a *sine qua non* for economic development, as forward strides achieved in production await simultaneous improvements in marketing. Marketing of livestock is associated with a unique set of conditions which make it highly risky and laborious, besides prevalence of relative imperfection in the marketing mechanism. Against this backdrop, Winter school is being organized to sensitize and provide necessary information on prevailing marketing systems in the livestock sector and also ways to improve the efficiency of livestock farming. The policy makers find themselves handicapped while making decision on implementation of various livestock marketing programmes. To this end, they often look towards academic institutions and researchers for appropriate reference material.

As such, the need for a training programme on "Livestock Business and Market Intelligence" was clearly felt by the organizers of this Winter school, who thus conceived the programme which is sponsored by the Indian Council of Agricultural Research, New Delhi. The training manual covers all the important topics like present status of livestock sector, livestock and poultry farming principles, principles of livestock production and marketing, principles of management, market intelligence, etc., which will be very useful for academicians, researchers, decision makers and other persons involved in livestock and related sectors.

We are extremely thankful to the Vice Chancellor, Registrar, Director of Research, TANUVAS, Chennai and the Dean, Faculty of Basic Sciences, Madras Veterinary College, Chennai for their constant encouragement and administrative support in organizing Winter school at this institute. We are grateful to the Indian Council of Agricultural Research, New Delhi for extending financial assistance for the conduct of the Winter school. We wish to place on record our appreciation for the excellent spirit of work by the faculty and other staff of this department and our colleagues in the institute who have offered every help and support.

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PRESENT STATUS OF INDIAN LIVESTOCK AND POULTRY SECTOR

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Livestock play a vital role in rural economy. The combination of livestock and crop farming enables complementarily through productive utilization of farm by-products and conservation of soil fertility, thus increasing rural farm income. Apart from providing food products like milk, egg and meat, livestock sector generates productive employment and valuable supplementary income to the vast majority of rural households, majority of whom are small and marginal farmers and landless labourers. Growing human population, increasing urbanisation, rising domestic incomes and changing lifestyles in the country have led to increasing demand for livestock products. This sector contribute to many other socio-economic spin offs like slowdown of rural-urban migration, mitigation of farmers' suicides, empowerment of rural women and protection of environment. Livestock sector also has strong backward and forward linkages which in turn promote livestock based food processing and leather industries.

Value of output from agriculture commodities

According to the Central Statistics Organization (CSO), The gross value of output from livestock and fisheries sectors were about Rs.2,40,601 crores (at current prices) during 2007-08 compared to Rs.118367 crores during 1998-99. The value of output from livestock and fisheries sectors contribute about one third of the total value of output from agriculture and allied activities. The Value of output from milk alone contributes almost at par (about 17 per cent) with the combined output value of wheat and paddy.

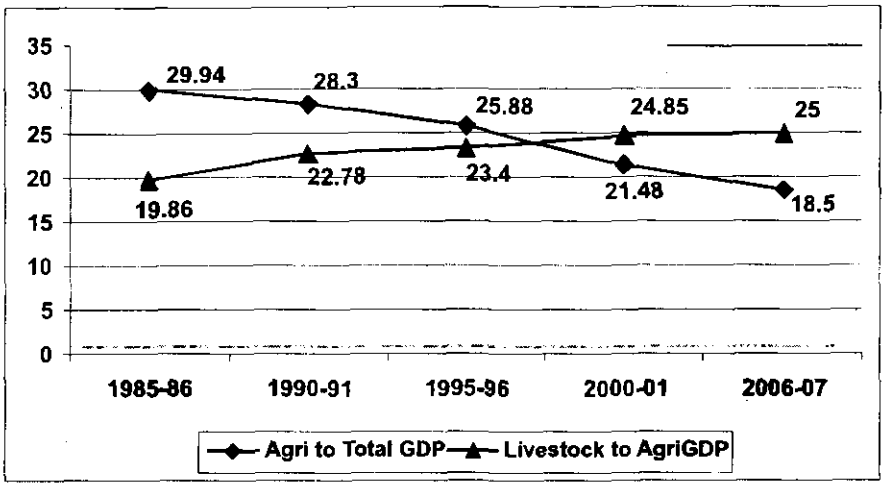
Table :1 Value of output from livestock sector (2007-08)

Particulars	Value in Rs. Crores	% to total
Milk group	162136	67.39
Meat group	40399	16.79
Eggs	8630	3.59
Wool and hair	361	0.15
Dung	18498	7.69
Increment in stock	9054	3.76
Silk worm cocoons and honey	1523	0.63
Value of output from Livestock sector	240601	100.00

Source : National Accounts Statistics, CSO, GOI (2009)

The livestock sector contributed nearly 4.4 per cent of the total GDP and 26.45 per cent of the agriculture and allied activities. The contribution of livestock sub-sector to agricultural GDP has shown an impressive growth in the last three decades from just less than 13.88 per cent in the 1980-81 to 25 per cent in 2006-07, while the contribution of agricultural sector to total GDP was in decreasing trend from 29.94 per cent to 18.50 per cent during the same period. Further, the fisheries sector also contributes 1.04 per cent to the country's GDP and 5.34 per cent to the agricultural GDP.

Fig.1. Share of agriculture and livestock sector to the national GDP (in per cent) at current prices



Livestock Population

India has vast resource of livestock and poultry, which play an important role in improving the socio-economic conditions of the rural masses. As per 2003 livestock census, India possessed with 485 million livestock and 489.01 million poultry. More than one half of the global buffaloes are the Indian buffaloes (98 million). About one-sixth of cattle (185 million) and goat (124 million) exists in India. The livestock population shows high degree of diversity in its composition. India possess rich livestock genetic resource in the World. There are 27 recognized breeds of cattle and seven breeds of buffalo in our country.

The perusal of the annual growth rate of total livestock population during 1997-2003 implied that cattle marginal negative trend at 0.01 per cent. Among different livestock species cattle alone had a negative annual growth rate of 1.18 per cent. The buffaloes and sheep had notable positive growth rate of 1.43 per cent and 1.12 per cent respectively. However, the goat and pig had annual growth rate of less than one per cent and stood at 0.22 and 0.28 per cent respectively. Poultry population had an inspiring positive growth rate of 5.85 per cent during 1997-2003. Although total cattle population had a negative growth rate, the total adult female cattle population had a positive growth rate of 0.02 per cent which had the direct positive impact in national milk production.

Livestock Production

In the past four decades, Indian livestock production sector has undergone tremendous changes due to various developmental programmes. Before starting the World's largest dairy development programme "Operation Flood", the milk production in India was stagnating at around 20 million tonnes and quality of milk supplied was also poor. The then secretary of Milk Marketing Board of England made a remark on quality of milk supplied in India at a press meet in 1944 which reads as follows "The milk sold in Bombay had a bacterial count higher than the sewage of London". But, now India is the largest producer of milk with an annual production of 108.5 million tonnes during 2008-09 and milk is the largest commodity (by value) in our country.

As for as Poultry sector is concerned, it has evolved from a backyard to a vertically integrated and organized sector. Poultry industry has achieved a remarkable growth during last 30 years in India. Its development has not only been in size but also in productivity and quality. The egg production of 55.6 billion in 2008-09 is nearly six fold increase compared with 1979-80 production. On the other hand, Meat sector in India is still unorganized. Mutton (Sheep meat), Chevon (Goat meat), Chicken, Beef and Pork are the main sources of meat for domestic market. India has produced 6.3 million tonnes of meat, which includes 2.5 million tonnes of poultry meat.

Table :2. Livestock and Poultry Production

Year	Milk (in million tonnes)	Egg (billions)	Wool (in million kgs)	Meat (in million tonnes)	Per capita availability of milk (gms/day)	Per capita availability of egg (no.s/ annum)
1989-90	51.4	20.20	41.7	-	173	25
1990-91	53.9	21.10	41.2	-	176	25
1991-92	55.7	21.98	41.6	-	178	26
1992-93	58.0	22.93	38.8	-	182	26
1993-94	60.6	24.17	39.9	-	187	27
1994-95	63.8	25.98	40.6	-	194	29
1995-96	66.2	27.20	42.4	-	197	30
1996-97	69.1	27.50	44.4	-	202	29
1997-98	72.1	28.69	45.6	-	207	30
1998-99	75.4	29.48	46.9	1.9	213	30
1999-2000	78.3	30.45	47.9	1.9	217	32
2000-01	80.6	36.63	48.4	1.9	220	36
2001-02	84.4	38.73	49.5	1.9	225	38
2002-03	86.2	39.82	50.5	2.1	230	39
2003-04	88.1	40.40	48.5	2.1	231	40
2004-05	92.5	45.20	44.6	2.2	233	42
2005-06	97.1	46.24	44.9	2.3	241	42
2006-07	100.9	50.66	45.2	2.3	246	45
2007-08	104.8	53.53	44.0	2.6	252	47
2008-09	108.5	55.6	42.7	3.8	258	47
Growth rate (1989-1998)	**4.34**	**4.50**	**1.45**	**-**	**2.40**	**2.43**
Growth rate (1999-2009)	**3.75**	**6.23**	**-1.56**	**6.06**	**1.90**	**3.98**
Growth rate (1989-2009)	**3.98**	**5.62**	**0.72**	**-**	**2.13**	**3.73**

Source : http://dahd.nic.in and Economic survey, various years

Productivity and Per capita availability of livestock products

Though the livestock production has shown impressive growth during the last four decades, the per animal productivity is comparatively lower in our country. The average milk yield per animal per day was 2.09 kg, 6.52 kg and 4.40 kg in case of non-descript cow, crossbred cow and buffalo respectively.

Despite being the largest milk producer in the World, the per capita availability of milk in India (258 gms/day) is one of the lowest in the World (the World average is 265 gms/day) although it is high in developing standards. The national average per capita availability of egg is 47 numbers per annum (2008-09) which is far below the ICMR recommendations (180 eggs per annum). The national average per capita consumption of livestock products is lower in rural areas compared to urban areas as per NSSO estimates.

Export earnings from Livestock and Fisheries sector

Total export earnings from the leather products, meat products and fish products was Rs. 13651 crores, Rs.

3314 crores and Rs.8001 crores respectively in the year 2006-07. The comparision between the agriculture alone and livestock including fisheries sector exports clearly indicate that the contribution from livestock including fisheries sector exports to the principal exports is comparable to that of agricultural exports at the ratio of 1:2, which itself shows its relative potentiality and strength.

Employment

In India, 70 per cent of the rural households own livestock. They are an important source of employment in rural India, especially for women. In spite of the fact that the average holding of livestock is small, the livestock sector has considerable potential for generating additional employment through milk, meat, wool and eggs production. Milk production alone involves more than 30 million small producers. Gender equity is more pronounced in livestock sector, as women participation is 71 per cent of the labour force while it is only 33 per cent in crop farming. As many as 75 million women are engaged in the livestock sector as against 15 million men. In the year 2005-06, the fisheries sector provided direct and indirect employment to 14.66 million persons.

Outlays for Agriculture and Allied sectors over five year plans in India

The outlays for agriculture and allied sectors over various five year plans in India is portrayed in the Table. The percentage contribution of agriculture and allied sectors in the total five year plan outlay is drastically declined from 14.89 per cent during first five year plan to 3.74 per cent in eleventh five year plan. The livestock and fisheries sector contribute only 0.21 per cent to total outlay of eleventh five year plan (Year : 2007-12) and 5.63 per cent to total agricultural outlay for the same plan period. Although, livestock and fisheries sector contribute about one-fourth of the total agricultural GDP, the allocation for these sectors are not praiseworthy.

Scenario of feed and fodder

In India, livestock feeding is almost dependent on crop by products like bran, husk, expeller cakes, cotton seed and crop residues like straws, stalks, tops, etc., Crop by products and residues which are poor in nutritive value constitute the major proportion of the livestock feed and fodder leading to the poor productivity of animals.

Concentrate Feed

The concentrates available for the livestock was worked out to be 48.27 million tonnes over the requirement of 130.55 million tonnes with the deficit of 63.03 million tonnes in the year 2006-07.

Table : 3. Status of concentrate feed (in million tonnes)

Particulars	2002-03	2003-04	2004-05	2005-06	2006-07
Concentrates available	41.96	43.14	44.35	45.63	48.27
Concentrates required	117.44	120.52	123.59	127.09	130.55
Concentrate Deficit	64.27	64.21	64.12	64.10	63.03

Source : Draft report of the working group on animal husbandry and dairying for five-year plan (2002-2007, Govt. of India, Planning Commission, August – 2001).

Fodder requirement and availability

There is tremendous pressure of livestock on available feed and fodder, as land available for fodder production has been decreasing. The green and dry fodder production in the year 2002-03 was 377.688 million tonnes and 503.129 million tonnes respectively which is far below the requirement. The estimated demand and supply of fodder over years is portrayed in the table.

Table : 4. Demand and Supply of fodder (in million tonnes)

Year	Supply		Demand		Deficit as % of demand (actual demands)	
	Green	Dry	Green	Dry	Green	Dry
1995	379.3	421	947	526	59.95 (568)	19.95 (105)
2000	384.5	428	988	549	61.10 (604)	21.93 (121)
2005	389.9	443	1025	569	61.96 (635)	22.08 (126)
2010	395.2	451	1061	589	62.76 (666)	23.46 (138)
2015	400.6	466	1097	609	63.50 (696)	23.56 (143)
2020	405.9	473	1134	630	64.21 (728)	24.81 (157)
2025	411.3	488	1170	650	64.87 (759)	24.92 (162)

Source: Draft report of the working group on animal husbandry and dairying for five-year plan (2002-2007, Govt. of India, Planning Commission, August – 2001).

Conclusion

Though the livestock sector occupies an important position in the Indian economy, the plan investments made so far do not match with its contribution and future potential for growth and development. Hence, it is suggested that public investment in the livestock sector should be enhanced to help the small and marginal livestock farmers. Long term breeding policy, programmes to improve the fodder availability and quality and improvement in livestock services are some of the measures to be taken by the planners and policy makers. India has greater potential to increase and expand the export of livestock products. To give a boost to trade and exports of livestock products, compliance with sanitary and phyto-sanitary measures should be taken up vigorously to ensure international hygiene standards and to harness the untapped export potential.

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BASIC CONCEPTS IN LIVESTOCK PRODUCTION ECONOMICS

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Production

Production is the process by which resources are transformed into products usable by consumers either directly or indirectly.

Factors of production

Generally, resources or inputs of any production process are otherwise called as factors of production. These factors are broadly grouped into four viz. land, labour, capital and entrepreneurship (management).

Production Relationships

Efficient farm management to attain maximum profit requires answers atleast to three questions regarding farming.

They are:

1. How to produce?
2. How much to produce? and
3. What to produce?

These answers can be realized from various relationships that operate between inputs and outputs. Hence, it is essential for a farm manager to understand the basic concepts of these relationships.

Factor-Product (Input-Output) Relationship (How much to Produce?)

Level of output of a particular product depends upon the quantities of inputs used for its production. This relation between inputs and outputs can be characterized as a production function. Production function is thus a relationship describing the manner and the extent to which a particular output depends upon the quantities of input used.

Algebraically, Production function can be expressed as Y=f(x),

Where Y- represents dependent variable such as milk and x-represents independent variable such as feed, with 'f' denoting "function of".

If the independent variables are two, the production function can be written as $Y=f(X_1, X_2)$. For a number of independent variables (say 'n' variables) this function can be expanded as $Y=f(X_1, X_2, X_3, X_4, \ldots\ldots X_n)$. Normally, there are more than one independent variable involved in the production of any commodity.

In the case of single variable production function, only one variable is being varied, while others are held constant.

Such a production function can be expressed as follows.

$Y=f(X_1/ X_2, X_3, X_4, \ldots\ldots X_n)$

Here, X_1 is the variable input, and $X_2, X_3, X_4, \ldots\ldots X_n$ are called fixed inputs

Product concepts

Total Product (TP)

The given amount of output (Y) associated with a particular amount of input (X) is called the total product.

Average Product (AP)

It refers to the average productivity of a resource. It is the ratio of TP to the quantity of input used in producing that amount of product. i.e., AP=Y/X.

Marginal Product (MP)

It refers to the quantity of the additional unit of the input adds to Total Product. Thus the MP can be found by dividing the addition to total output by the addition to total input. i.e.,

MP = $\Delta Y/\Delta X$, where, 'Δ' refers to 'change'.

MP is the rate of change in TP as the quantity of input changes. MP can also be called as 'slope of the total product curve', because $\Delta Y/\Delta X$ measures the slope of TP curve.

Classical Production Curve

Region I (Irrational)

Starts from the point of origin up to the point of MPP remain greater than APP (or up to MPP = APP). The APP increases throughout this region indicating that the efficiency of all the units of variable input keeps increasing. As soon as MPP equals APP, it is the end of first zone. In this region APP keeps increasing and MPP remain greater than AP. Farmer must produce up to the level of input use where the APP is highest (or) if the output has a value, input use once it gives profits should be continued until stage II is reached, because the efficiency of variable input keeps increasing throughout the region I. This is the zone of increasing returns since ep>1 (MP>AP).

Region II (Rational)

This region begins where MPP is decreasing and is less than APP. i.e., the starting point is where MPP=APP and it ends where the MPP becomes 'zero'. In this region, TPP is increasing MPP keeps decreasing but remains positive and less than APP. The APP is also decreasing. Both APP and MPP are decreasing. This is the zone of diminishing returns, since MP<AP and 0<ep<1. Though region II is the rational zone, economically optimum point of input use or the most profitable level of input use cannot be determined by using physical production data alone. Cost of input and price of output are necessary to determine the level of production that is most profitable.

Economically optimum point or the maximum profit point of production

In majority of the cases, maximum production does not give maximum profit. As the cost factor plays a vital role in deciding the profitability of the farm-business, it is essential to inject the value information into the technical relationship of production. Economically optimum point of input use can be found out by incorporating the value information into the technical optimality. Finding the most profitable point of production demands satisfaction of two conditions, viz.,

1. Necessary condition, and 2. Sufficient condition.

Necessary conditions: It describes a circumstance under which the economically optimum input use can occur. The necessary conditions are • AP and MP must be decreasing; • MP < AP; and MP > 0

Sufficient conditions: is satisfied when

a. MVP = MFC or MVP/MFC = 1, and

b. MVP is decreasing. (MVP must intersect MFC from above).

Note: MVP means Marginal Value Product (MPP or MP * Py).

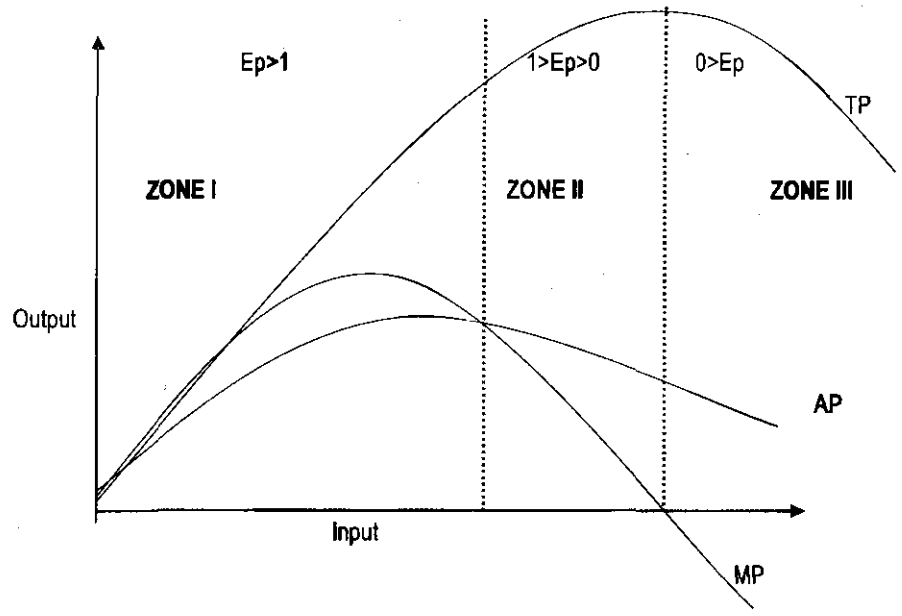
MFC means Marginal Factor Cost (price of input)

Optimum point of input use must be some where in this rational zone and the optimum point can be located only when input and output prices are known. It needs to be emphasized that this region of rational production embodies diminishing returns phase.

Region III (Irrational)

Begins where MPP crosses zero point and becomes negative. Negative MPP occurs when so much excessive quantity of the variable input is used that TPP begins to decrease. Since additional quantities of input results in the reduction of total output in this zone, it is not profitable region even if the additional quantities of the resources are available at free of cost. Both MPP and APP are falling and this stage is known as the zone of negative returns. For example, If a farmer operates in this region, it will be irrational because he will incur double loss. i.e., Reduced production and unnecessary additional cost of inputs.

Classical Production Curve

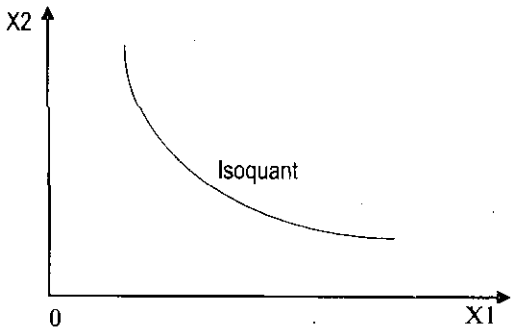


Principle of Factor Substitution (or) Factor – Factor Relationship (How to Produce?)

Factor-product relationship deals with a single input and a single output. However, in actual situations, large number of inputs are being used to produce a good. Thus, farmers often face the problem of choosing the right combination of these inputs. For example, it is a common problem with the farmers to decide on how much of concentrate and green fodder to be fed to a milch animal to get certain amount of milk or how much of different ingredients of poultry feed to be used for getting a particular level of poultry production. Here, the question is of

finding out optimum or least-cost combination of resources in producing a given amount of output. Cost minimization will not depend only on cost of inputs and price of outputs but also with marginal rate of substitution of factors. Our particular concern is with the possibilities of substituting one factor (X1) for another factor (X2) as product level (Y) is held constant. Hence functional relationship becomes Y= f(X1, X2,X3, X4,.....,Xn) where, 'Y' is the function of X1 and X2 while other inputs are kept constant. More specifically, X1 = f(X2). Consider the following table,

Paddy straw (kg) X1	Concentrate (kg) X2
2	12
3	8
4	5
7	3
10	2



Assume that each combination of X1 and X2 in the table produces 10 litres of milk. These different combinations of two inputs can be plotted on a graph as follows:

This curve is known as *Isoquant* or Iso-product curve. An *Isoquant* shows all possible combinations of two inputs that would produce the same level of output. Similarly, *Isoquants* may be traced for different levels of output. If a number of *Isoquants* are drawn on one graph, then the figure is known as Isoquant map. Higher *Isoquants* represent higher level of production or output. One important concept in Factor-Factor relationship is *Marginal Rate of Factor Substitution (MRFS)* or *Marginal Rate of Substitution.* MRFS or simply MRS of input X_1 for input X_2 is the number of units of input X_2 which can be replaced by one unit of input X_1 so that the level of output remains the same.

Estimation of least-cost combination of inputs in a production process

Least-cost combination of inputs can be estimated by the following three methods

Tabular method

Compute the total cost of production for various combinations of inputs and find the least-cost of production.

Algebraic method

a. Compute the Marginal Rate of Factor Substitution (MRFS) by dividing the number of units of replaced input by number of units of added input.

$$MRFS = \frac{\text{No. of units of replaced input}}{\text{No. of units of added input}} = \frac{\Delta X_2}{\Delta X_1}$$

b. Calculate the price ratio (i.e)

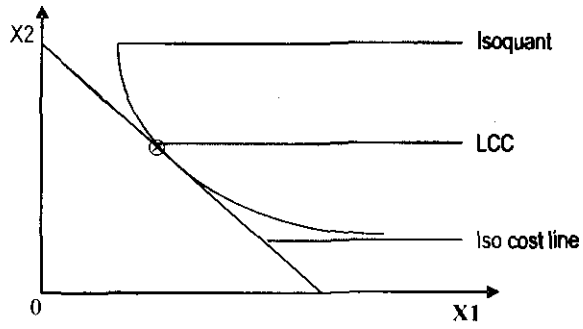
$$\text{Price Ratio} = \frac{\text{Price/unit of added input}}{\text{Price/unit of replaced input}} = \frac{Px_1}{Px_2}$$

c. Least-cost combination occurs where MRFS = Price Ratio.

$$\frac{\Delta X_2}{\Delta X_1} = \frac{Px_1}{Px_2}$$

Graphical method

Least-cost combination is the point at which Isoquant is tangent to the Iso-cost line (or) Least-cost combination is met when slope of Isoquant ($\Delta X_2/\Delta X_1$ or MRFS) is equal to the slope of Iso-cost line (Px1/Px2 or price ratio).



Iso-cost line

Iso-cost line shows all the input choices that would yield total cost. In other words, it is the locus of combinations of two inputs which would cost same total cost.

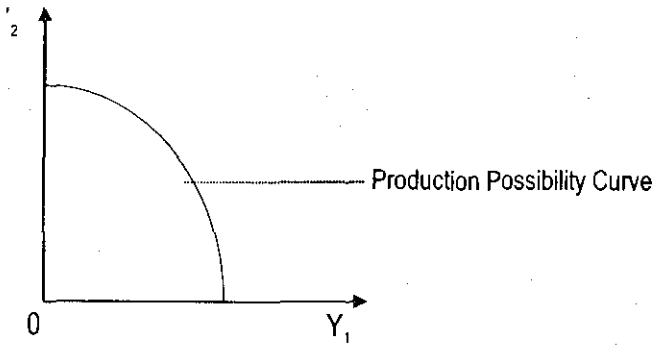
Product-Product Relationship (or) Principle of Substitution Between Products (or) Enterprise Combination (What to Produce ?)

As the resources at the disposal of farmers are limited and have alternative uses in different production processes, the decision maker is confronted with the problem of what combination of enterprises he should include in his farm plan to maximize profit from his limited resources. For example, the farmer must decide whether to go exclusively for one enterprise or for a combination of enterprises. The decision in this regard depends on the biophysical relationship between enterprises, product prices and the resource base available with the farmer.

Algebraically, the relationship can be written as Y1 = f(Y2). It must be noted here that inputs are held constant and try to analyse different levels of combinations of two products that can be produced with available inputs. Studying this relationship will help to achieve the maximum profit efficiently. Consider the following example, which gives combinations of two products that is cotton and maize that can be produced with the available 10 acres of land.

Cotton (qtls.)	0	8	15	21	26	30	33	35	36	50	75
Maize (qtls.)	120	108	96	84	72	60	48	36	24	12	0

These combinations of two products if plotted on a graph give a curve called Production Possibility Curve or Iso - Resource Curve which presents all possible combinations of two products produced with the same resources.



Marginal rate of product transformation (MRPT)

Like MRS in Factor-Factor relationship, here we have Marginal Rate of Product Transformation (MRPT). MRPT is defined as the rate of change in the quantity of one output for a one unit increase in the other output with the amount of inputs remaining constant. MRPT or MRT of Y_1 for Y_2 is the amount of Y_2 replaced by an unit of Y_1 with the resources remaining constant.

$$MRPT = \frac{\text{No. of units of replaced output}}{\text{No. of units of added output}} = \frac{\Delta Y_2}{\Delta Y_1}$$

MRPT or MRT is the slope of production possibility curve.

Iso-Revenue Line

Iso-revenue line defines all the possible combinations of the two products that provide same revenue.

Determination of optimum product combination

There are three methods to find the optimum product combination, which can yield maximum possible profit.

Tabular method

By this method, total revenue for each output combination is computed and then the maximum revenue combination is selected.

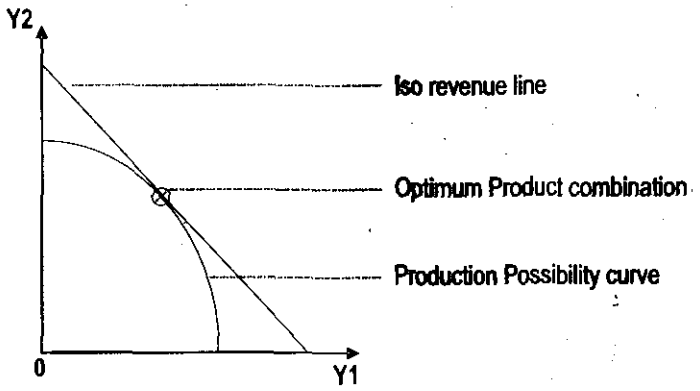
Algebraic method

Optimum product combination is found where Marginal Rate of Product Transformation Ratio (MRPT) is equal to Inverse price ratio.

$$MRPT = \frac{Py_1}{Py_2} \text{ (or) } \frac{\Delta Y_2}{\Delta Y_1} = \frac{Py_1}{Py_2} \text{ (or) } Py_1 . \Delta Y_1 = Py_2 . \Delta Y_2$$

Graphical method

The condition for maximum revenue is that the Iso-revenue line should be tangent to Iso - resource or Production possibility curve. i.e., the slope of the Iso-revenue line must be equal to the slope of Production-possibility or Iso-resource curve. No other combinations of products except this combination where the slopes of the two curves are equal will produce maximum return with available resource.



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CONCEPTS IN CONSUMPTION AND DEMAND

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Consumption

Consumption is the process through which human wants are satisfied. Consumption may be direct or indirect.

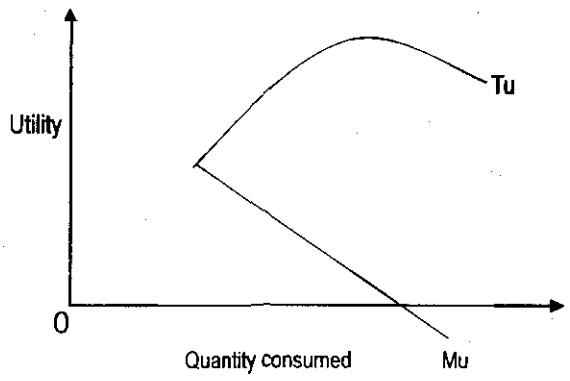
Marginal Utility Analysis

Utility means capacity to satisfy wants, i.e. want satisfying power. Total Utility (TU) may be defined as the total satisfaction derived from the consumption of all the goods or services at the disposal of the consumer, i.e. aggregate utilities derived. Utility is a subjective term like pain or joy which can only be felt and which cannot be measured. Suppose a person starts eating egg one after another. The first egg gives him great pleasure. By the time he takes the second it gives him less satisfaction as the second egg is meeting with a less urgent want. The satisfaction of the third will be lesser than of second, that of the fourth is lesser than that of the third and so on. The additional or incremental satisfaction i.e the marginal utility with every successive unit of egg will go on decreasing till it drops down to zero. If the consumer is forced to take more, the satisfaction becomes negative and the utility changes to disutility.

Marginal Utility (MU) is defined as the change in total utility resulting from one unit change in consumption of commodity per unit time.

$$\text{Marginal Utility} = \frac{\text{Change in total utility}}{\text{Change in quantity consumed}}$$

Units (eggs)	Total Utility (units of satisfaction)	Marginal Utility (units of satisfaction)
1	25	25
2	45	20
3	60	15
4	70	10
5	75	5
6	75	0
7	71	-4



Total Utility curve increases at beginning and reaches maximum and decline eventually with increase in quantity of goods consumed. Marginal utility slopes downward from left to right. It reaches Zero when total utility reaches maximum and becomes negative if more of goods consumed after that. It shows that as the quantity of goods consumed increases, marginal utility decreases . It is notable point that marginal utility is zero when total utility is maximum.

Law of Diminishing Marginal Utility

As more and more units of a commodity are consumed, the additional satisfaction or utility derived from the consumption of each successive unit will decrease.

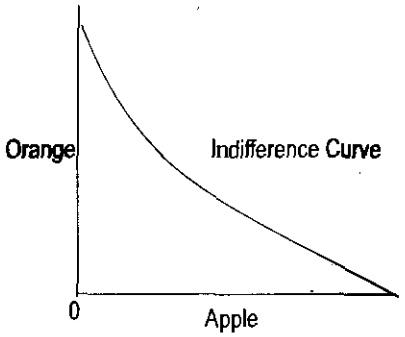
Indifference Curve Analysis

Modern economists like, J.R. Hicks and R.G.D. Allen had developed a new technique called Indifference Curve Technique for the analysis of demand.

An Indifference schedule may be defined as a schedule of various combination of two goods that would give the same level of satisfaction to the consumer.

Indifference schedule

Combinations	No. of Apples	No. of Oranges	Satisfaction level
I	1	20	Same for all combinations
II	2	15	
III	3	11	
IV	4	8	
V	5	6	
VI	6	5	



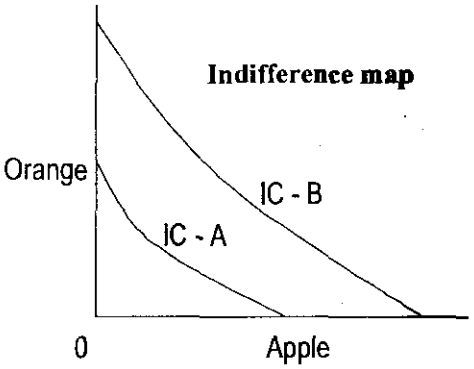
Assume a person has the choice of spending a part of his resources on two commodities, apples and oranges. The table shows various combinations of apples and oranges, which give the same level of satisfaction to the consumer. Since each combination given the same level of satisfaction, the consumer is indifferent to which combination he consumes.

Indifference curve

The figures in the table, if plotted on a graph gives the Indifference curve. Indifference curve depicts the same on a graph. An Indifference curve may therefore be defined as the locus of various combinations of two commodities which yield the same total satisfaction to the consumer. This curve is also known as Iso-utility curve (Iso means same).

Indifference map

Two or more indifference curves drawn on a same graph are collectively called as indifference map. In other words indifference map represents a collection of indifference curves where each curve shows a certain level of satisfaction to the consumer. While the higher indifference curve implies higher level of satisfaction, lower indifference curve yields lower utility.



Properties of indifference curves

- An indifference curve has a negative slope, which denotes that if the quantity of one commodity decreases the quantity of the other must increase if the consumer is to stay on the same level of satisfaction.
- Indifference curves do not intersect.
- The indifference curves are convex to the origin. This is because as the consumer adds more of the commodity, he gives up only less and less of the other.
- Any movement of the indifference curves to the right is a movement to greater total utility.

Consumer Equilibrium

Consumer Equilibrium is one where the consumer attains maximum satisfaction with the available amount of resources. Consumer Equilibrium can be obtained by two methods in Indifference curve technique ie. Graphical method and Algebraic method.

Algebraic Method

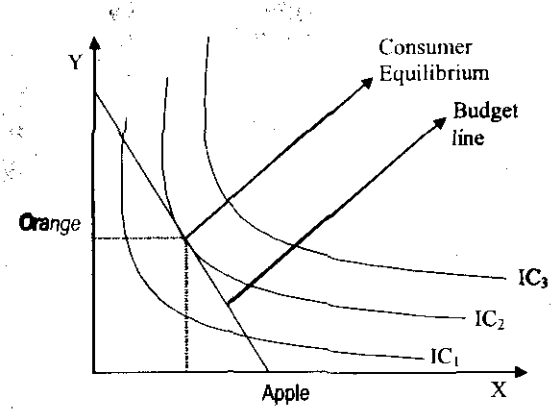
Consumer Equilibrium position can be found at a point, where the Marginal Rate of Substitution of commodity X for commodity Y is just equal to the ratio of price of X to the price of Y.

$$\text{i.e. } MRS_{xy} = \frac{\Delta Y}{\Delta X} = \frac{P_x}{P_y}$$

Graphical Method

Consumer is said to be in equilibrium, when he has allocated his spending power in the way, which gives him the highest level of satisfaction attainable at the given level of income and prices. The optimum combination or the best combination of two commodities which gives highest satisfaction can be attained by the consumer at the point where the budget line and Indifference curve are tangential.

Consumer Equilibrium



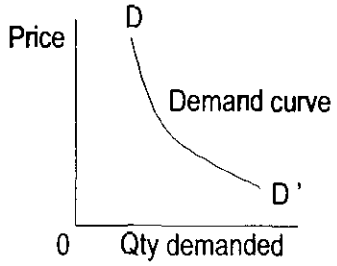
Demand

Demand in economics is the desire for goods and services plus the willingness and ability to pay a certain price in order to possess it. The demand for any good or service may be defined as the amount of which will be bought at the given price and time.

Demand schedule

Demand schedule is a statement which shows varying quantities of a commodity purchased at alternative prices in a given time. Demand Schedule represents a functional relationship between price and quantity demanded. It is usually represented in the form of a table.

Price of Egg(Rs./100 Eggs)	Quantity Demanded (No.)
150	13000
140	14000
125	15500
110	17000



Demand Curve

The graphical representation of demand schedule is demand curve. Usually the demand curves slopes downward from left to right indicating inverse relationship between price and demand for the commodity.

Law of demand

A greater quantity of a commodity is demanded at a lower price and a smaller quantity is demanded at a higher price. Other things remaining constant, the inverse relationship between price and quantity demanded is called the law of demand. Thus demand is a function of price and it can be expressed as D = f(P), where D is demand and P is price.

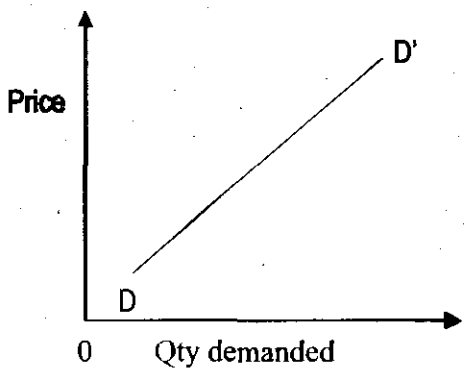
Types of demand

- Price Demand: It refers to various quantities of a commodity or a service that a consumer would purchase at a given time in market at various prices.
- Income demand: It refers to various quantities of a commodity or a service that a consumer would purchase at a given time in market at various levels of income.
- Cross demand: It means quantities of a good or service which will be purchased with reference to changes in price not of this good but of other related good. Eg. Changes in quantity demanded of coffee with respect to changes in price of tea.
- Joint demand: Certain goods are to be used together to satisfy a particular want. Eg. Pen and Ink. The demand for such commodities is known as Joint demand.
- Composite demand: A commodity can be put to several uses and that commodity may be demanded to satisfy any one want or more of such uses. The demand for such commodity is known as the composite demand. Eg. Electricity may be demanded for household uses, industrial purpose etc.
- Derived demand & Direct demand: The demand for food grains is direct demand whereas the demand for organic fertilizer to increase food production is derived demand.

Exceptional Demand Curve

The demand curve, instead of sloping downwards may rise upwards when there is an increase in price showing that more quantity would be demanded when the price rises. This tendency was first observed by Sir Robert Giffen in 19th Century. Hence this exceptional process is called Giffen paradox. The reasons for such exceptional behaviour may be

- Fear of scarcity of goods in feature
- Possession of a goods conferring distinction in the society.



Determinants of demand

The amount of a good that a consumer wishes to purchase is called as quantity demanded of that good. Purchase of this quantity is influenced by several factors which are called as determinants of demand. The relationship between the quantity demanded of a commodity and its determinants is expressed in the form of a functional equation known as demand function.

$Qd = f\{Pi, Pj, Y, T, C, P, I, ...\}$

where Qd = Quantity demanded

Pi = Price of the commodity

Pj = Prices of related goods (**substitutes and complements**)

Y = income of the consumer

T = Tastes and preferences of the consumer

C = Climate or weather

P = Size and composition of the population

I = Income distribution of the society

Thus the quantity demanded of a commodity is determined jointly by all these factors indicated. Changes in any one or two or more of the factors listed above would become the causes for the changes in demand.

Elasticity of Demand

The elasticity of demand is defined as proportionate change in quantity divided by proportionate change in price.

Price elasticity of demand: It is defined as relative responsiveness of quantity demanded of a commodity to the percentage change in it's price.

$$EdP = \frac{\text{\% change in quantity demanded}}{\text{\% change in price}}$$

$$EdP = \frac{\text{Change in the quantity demanded / Original quantity demanded}}{\text{Change in price / Original price}}$$

$$EdP = \frac{\Delta Q/q}{\Delta P/p} = \frac{\Delta Q}{\Delta P} \times p/q$$

Income elasticity of demand : It is the responsiveness of change **in quantity demanded to change in income.**

$$Edy = \frac{\text{\% change in quantity demanded}}{\text{\% change in income}}$$

Luxury goods will have high income elasticity while the necessaries have low income elasticity of demand.

Cross elasticity of demand: It is a measure of responsiveness of demand of a good to a given change in the price of related good.

$$Edxy = \frac{\text{Proportionate change in quantity demanded}}{\text{Proportionate change in price of related good}}$$

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MARKETING CONCEPTS

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'Market' is a derivative of Latin word 'marcatus' meaning merchandise, wares, trade or place where business is conducted.

It may mean and include

- A place as an open space (in village)or a larger building where actual buying and selling takes place.
- An assembly or a meeting together of people for their private purchases and sale of goods at a stated time and place e.g. village fairs or periodical markets.
- The act of buying and selling.

Marketing

Philip Kotler has defined, "Marketing, as the set of human activities directed at facilitating and consummating exchanges".

In simple words , it is defined that the marketing is the process of providing the right product in the right place at the right price and at the right time.

Concepts of marketing

The sales concept and marketing concept are clearly distinct from each other.

Sales concept : Starts with the firm's existing products and considers the task as one of using selling and promotion to stimulate a profitable sales.

Marketing concept: Starts with firm's existing and potential consumers and their needs; it plans a coordinated set of products and programmes to serve these needs; and it hopes to build its profits on creating meaningful value satisfactions.

Components of a Market

For a market to exist certain conditions (Necessary and sufficient) must be satisfied and there are known as components of a market.

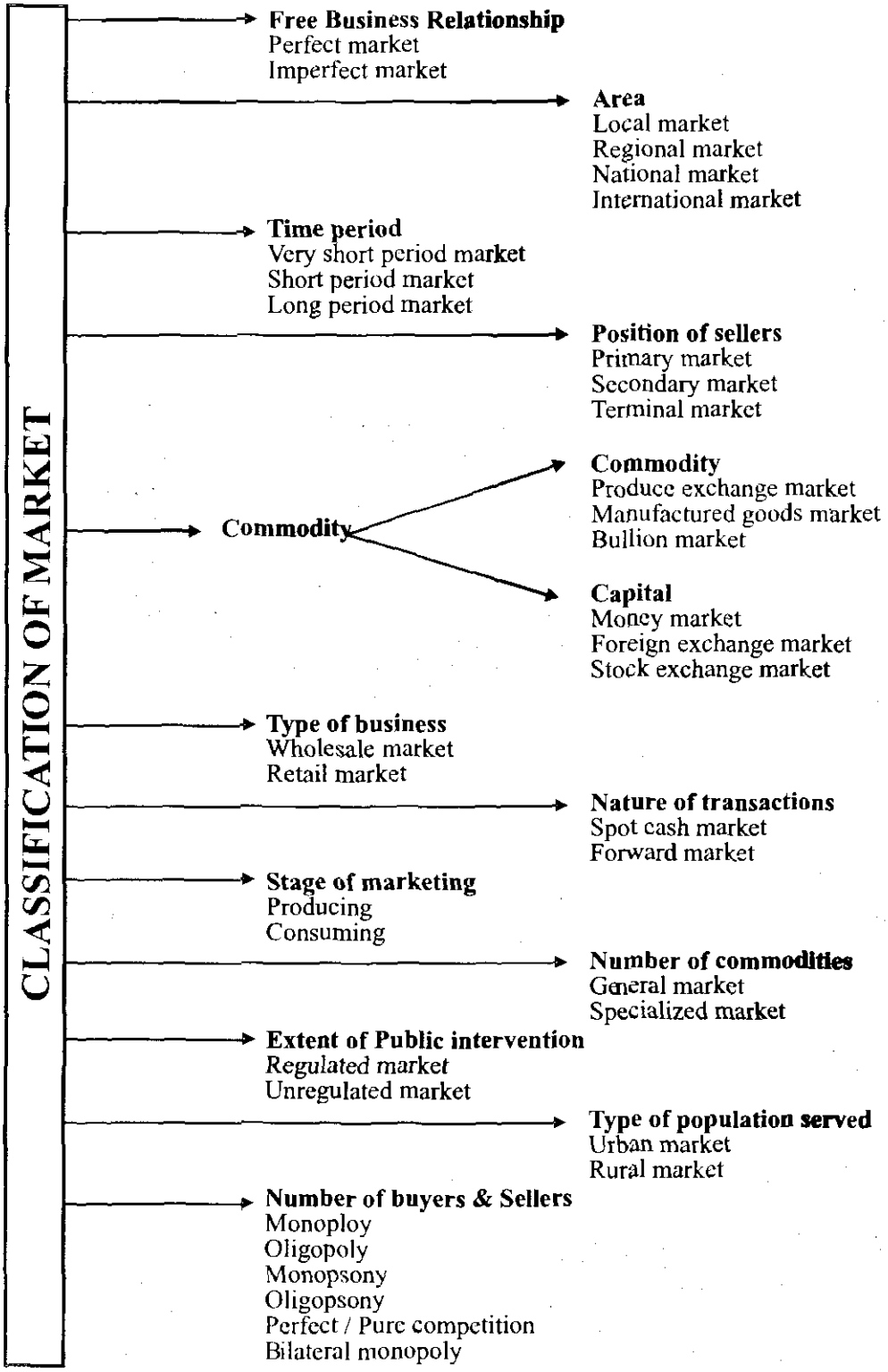
a) the existence of a commodity / product / good for transactions.

b) the existence of buyers and sellers.

c) Business relationship / inter course between buyers and sellers.

d) Demarcation of area such as place, region, country or the whole world.

e) The existence of perfect competition or a uniform price is not necessary.


CLASSIFICATION OF MARKET
Free Business Relationship
Perfect market
Imperfect market
Area
Local market
Regional market
National market
International market
Time period
Very short period market
Short period market
Long period market
Position of sellers
Primary market
Secondary market
Terminal market
Commodity
Commodity
Produce exchange market
Manufactured goods market
Bullion market
Capital
Money market
Foreign exchange market
Stock exchange market
Type of business
Wholesale market
Retail market
Nature of transactions
Spot cash market
Forward market
Stage of marketing
Producing
Consuming
Number of commodities
General market
Specialized market
Extent of Public intervention
Regulated market
Unregulated market
Type of population served
Urban market
Rural market
Number of buyers & Sellers
Monoploy
Oligopoly
Monopsony
Oligopsony
Perfect / Pure competition
Bilateral monopoly

Classification of markets

Types of markets are determined bas on various factors like volume of business, number of products, nature of competition, area, seller, etc.

I. Free Business Relationship

a) Perfect Market: One price rules for a commodity at the same time in market

b) Imperfect Market: Different prices are charged for a commodity at the same time in a market.

II. Area

a) Local Market: Sellers and buyers of a commodity are confined to a particulars locality. Producers can sell their produce and purchase their casual requirements.

Eg: Local Milk Market / Vegetable Market.

b) Regional Markets: Buyers and sellers are drawn from a large area

Eg: Food grain market

c) National Market: Buyers and sellers of a commodity are spread over one country.

Eg: Market for Egg / Rice / Jute / Tea

d) International Market: Buyers and sellers of commodity are spread over more than one country

Eg: Tea / coffee are produced only in few selected countries, but they have international market because of their spread consumption in many parts of the world.

III. Time

a) Very short period Market: These are the markets for highly perishable products like meat, milk, egg, etc. Generally, attention is not given to increase / decrease supply of the commodity and supply is more than available demand.

b) Short Period Market: Market demand is more than market supply and some consideration is given to meet the demand but sufficient time is not available. Hence, the demand stands still.

c) Long period Market: In this case of increase / decrease in demand simultaneous effect is given for production and sufficient time is also available to do it in this market.

IV. Position of the sellers

a) Primary Market: Primary producers are marketing their agricultural / Livestock goods or manufactured goods sell their goods to the whole sellers or to the agents.

b) Secondary Market: Whole sellers sell their goods to retailers for resale to consumers.

c) Terminal Markets: Here, consumers purchase the goods from the retailers.

V. Type of business

a) Wholesale Market: Goods are purchase from producers in a lot / bulk for the purpose of resale to the retailers.

b) Retail Market: Goods are sold by retailers directly to the consumer in small quantity.

VI – A: Commodity Market

Specific commodities are bought and sold. Area of production of different commodities have made specialization in such a way that thing are often described according to region of their production.

a) Produce exchange Market: These markets are big and well organized markets for raw products found in cities or developed centres of a country. One market deals with one commodity only but the sale of other produce is not at all restricted.

Eg: Cotton exchange of Mumbai

b) Manufactured goods Market: Different types of manufacturer / semi-manufactured commodities are bought and sold.

Eg: Leather market of Kanpur

c) Bullion Market: Concerned with purchase and sale of silver, gold and others precious stones. These are highly specialized and well organized markets of the world and located in every developed centres of a country.

Eg: Bullion market of Mumbai

VI – B: Capital Market

It refers to the market for long term securities

a) Money Market: On one hand these markets keep the public to invest / deposit their surplus funds either in industrial concerns or in banks and on the other hand to allow those who are in need of money, who taken loan through banks for a reasonable remuneration in return for interest or discount.

b) Foreign Exchange Market: It is an international market and is largely concerned with the export and import transaction of a country which is based on international currencies.

c) Stock Exchange Market: It is a market for investment of stocks, bonds, shares, debentures and other industrial securities, bought and sold in different part of the country.

Eg: Stock Exchange of Chennai

VII. Nature of Transactions

The people engaged in these markets are of two types

a) Spot Cash Markets: Goods are exchanged for money immediately after sale in this market.

b) Forward Markets: Purchase and sale of a good takes place at one date / time, but the exchange of commodity taken place on some specified date / time in future.

VIII. Stage of Marketing

There are two types of markets

a) Producing Markets: Which mainly assemble the commodity for further distribution to other markets are known as producing markets which are located in producing areas.

b) Consuming Markets: Which collect the good for final disposal to the consumer's population are called as consumer markets and they are generally located in areas where production is inadequate or in thickly populated urban centres.

IX. Number of Commodities

These markets may be general or specialized

a) General Markets: All types of Commodities such as milk and its products, different types of meat, egg, etc. are brought and sold. These markets deal in large number of farm inputs such as feed ingredients, utensils etc.

b) Specialized Markets: Transactions take place only for one or two commodities.

Eg: Wool / leather market

X. Extent of Public Intervention

Markets may be placed into two classes.

a) Regulated Markets: Business is done as per the rules and regulation framed by the statutory market organization. The marketing costs are standardized and practices are regulated in these markets.

b) Unregulated Markets: Business is conducted without any prescribed rules and regulations. These markets suffer from many problem ranging from unstandardized charges for marketing functions to imperfections in the determination of prices.

XI. Types of Population Served

It can be classified either Urban or Rural

a) Urban Market: It serves mainly the population residing in an Urban area. Demand for Livestock products arising from the urban population in characterised as urban market for livestock products.

b) Rural Market: Usually refers to the demand arising from the rural population. There is considerable difference in the mature of embedded services required with a livestock farm product between urban and rural demands.

XII . Based on number of sellers/buyers in the market

Monopoly	-	Only one seller
Oligopoly	-	Few number of sellers
Monopsony	-	Single buyer
Oligopsony	-	Few number of buyers
Perfect/Pure competition	-	Large no. of sellers and buyers
Bilateral monopoly	-	Single seller and single buyer.

Marketing of Milk

Marketing of agri and livestock commodities is different from manufactured or industrial goods. Most of the agri / livestock products are perishable in nature and the period of perishability varies from a few hours to few months. Most of the farmers are landless , marginal or small . Therefore the produce of individual is very less. Lastly, most of the farm products are processed before they are used, purchased and consumed by the ultimate consumers.

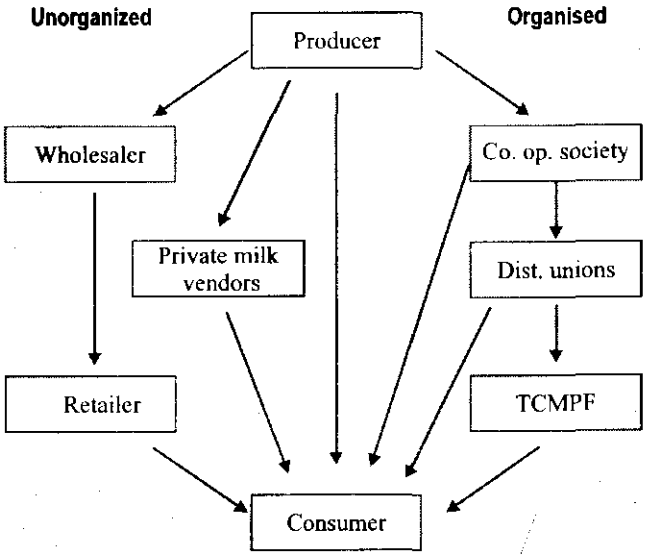
Selling of perishable products like fruits, vegetables, and livestock products (milk, meat, and egg) require fast movement of the commodities from the producers to the ultimate consumers. Marketing channel can be defined as a path through which product moves from producer to consumer. Hence a short channel of distribution will be an effective tool to reach the target consumers. However, distribution of products having lower unit value and high turn over like eggs involves a large number of middle men.

The channels of distribution serve as a network, which creates value for the consumer by generating possession, time and place utilities. There are number of middleman and merchants, including Government and co-operative agencies, who act as links between the producers and consumers.

Marketing Channel for milk

The possible visible Marketing channels of distribution for milk is shown below.

Marketing Channel for Milk



Marketing efficiency

The efficiency of different marketing channels can be measured based on the Price spread and Shepherd's formula.

Problems in Livestock / Livestock Products Marketing

- Lack of producer's organization
- Forced sale
- Superfluous middlemen
- Malpractices in the market
- Absence of grading and standardization and inadequate storage facilities
- Undeveloped modes of transportation
- Variability in Output
- Seasonality in production
- Raw materials
- Perishability

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PRICE FORECASTING FOR LIVESTOCK PRODUCTS

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Increasing disposable household income will continue to result in an expansion in the production and consumption of livestock and poultry products in Asia. By the year 2010 over 60% of the world's population will live in Asia; furthermore, the growth in disposable income and purchasing power coupled with rapidly changing food habits will make livestock products, one of the more popular protein-rich foods with both the rural and urban populations in Asia (Iddamalgoda et al., 2001). Indian livestock and Poultry sector witnessed drastic growth rate during the last two decades because of its comparative advantage (Nutritional, Economic and Availability) over its substitutes. The consumption of livestock products depends mainly on their prices and income status of the consumers. Hence, the time series analysis of livestock product prices will be useful in giving a scenario on their future demand and supply, which in turn would aid in suggesting suitable policy implications for the betterment of livestock producers and consumers.

Time Element in Prices

Changes in prices are associated with the passage of time. This is a phenomenon applicable to all agricultural commodities. One can observe price changes from hour to hour, day to day, week to week, month to month, season to season, year to year and one decade to another. This is because price movements are associated with the conditions that have a relation to time. Changes in the factors affecting the demand and supply of various commodities occur continuously but their effect on demand and supply and the resultant effect on prices require various lengths of time. Some factors exert their effect immediately, i.e., within a few hours or days while others take a longer time.

Conceptual Frame

Price changes are the net result of many forces acting in different directions. Some forces exert an upward pressure on prices while others exert a downward pressure. Prices keep on moving through time, always tending to settle at an ever-changing equilibrium. Price movements and adjustments are like the surface of an ocean, with an infinite number of multi-directional movements, never coming to a standstill, a permanent equilibrium.

In a comparative static framework, each price observation at a point of time represents the intersection of aggregate demand and supply schedules for the commodity in question. The movement in price from one point to another is the net effect of all the factors affecting shifts in these aggregate supply and demand schedules. This phenomenon holds true whether the price observation pertains to a single commodity or a group of commodities, a single market or a region and a point in time or a longer duration (telescoped at one point of time).

Time Series in prices

Understanding the nature and causes of price movements is facilitated by a systematic analysis of the time element in prices. Therefore, price movements are usually classified according to time. A time series of prices is a set of observations taken at specified times, usually at equal intervals. The intervening period or the interval may be an hour, day, week, month, season or year. Mathematically, a time series of prices can be expressed as follows:

$P_t = f(t)$

Where P_t is price of a commodity in time t and t is time variable.

The time series of prices for a commodity are available in the form of yearly farm harvest prices of districts and states, daily, weekly or monthly wholesale prices of various markets and daily or weekly retail prices. Many agencies, both in the public in marketing of products or forecasting the economic situation

A time series is a sequence of data points, measured typically at successive times spaced at uniform time intervals. Time series analysis comprises methods for analyzing time series data in order to extract meaningful statistics and other characteristics of the data. Time series forecasting is the use of a model to forecast future events based on known past events: to predict data points before they are measured. An example of time series forecasting in econometrics is predicting the opening price of a stock based on its past performance. Time series are very frequently plotted via line charts. Time series data have a natural temporal ordering. This makes time series analysis distinct from other common data analysis problems.

General exploration

- Graphical examination of data series
- Autocorrelation analysis to examine serial dependence
- Spectral analysis to examine cyclic behaviour which need not be related to seasonality. For example, sun spot activity varies over 11 year cycles. Other common examples include celestial phenomena, weather patterns, neural activity, commodity prices, and economic activity.

Benefits of forecasting

Forecasting can help you make the right decisions, and earn/save money. Here are a few examples.

Define better sale strategies

If a product is declining, maybe it is a good idea to consider stop producing it. Forecasting techniques provide answers to these questions – vital questions to your business.

Size your inventories optimally

Time is money. Room is money. So what you want to do is use all means at your disposal in order to reduce your stocks – without experiencing any shortages, of course.

The components of a time series economic data are:

- the ***Trend Component*** T_t that reflects the long term progression of the series (secular variation)
- the ***Cyclical Component*** C_t that describes repeated but non-periodic fluctuations, possibly caused by the economic cycle
- the ***Seasonal Component*** S_t reflecting seasonality (Seasonal variation)
- the ***Irregular Component*** I_t (or "noise") that describes random, irregular influences. Compared to the other components it represents the residuals of the time series.

Time series models

Time series models are used for predicting or forecasting the future behavior of variables. These models account for the fact that data points taken over time may have an internal structure (such as autocorrelation, trend or seasonal variation) that should be accounted for. As a result standard regression techniques cannot be applied to time series data and methodology has been developed to decompose the trend, seasonal and cyclical component of the series. Modeling the dynamic path of a variable can improve forecasts since the predictable component of the series can be projected into the future.

Time series models estimate difference equations containing stochastic components. Two commonly used forms of these models are autoregressive models (AR) and moving average (MA) models. The Box-Jenkins methodology (1976) developed by George Box and G.M. Jenkins combines the AR and MA models to produce the ARMA (autoregressive moving average) model which is the cornerstone of stationary time series analysis. ARIMA (autoregressive integrated moving average models) on the other hand are used to describe non-stationary time series. Box and Jenkins suggest differencing a non stationary time series to obtain a stationary series to which an ARMA model can be applied. Non stationary time series have a pronounced trend and do not have a constant long-run mean or variance.

Box and Jenkins proposed a three stage methodology which includes: model identification, estimation and validation. The identification stage involves identifying if the series is stationary or not and the presence of seasonality by examining plots of the series, autocorrelation and partial autocorrelation functions. In the estimation stage, models are estimated using non-linear time series or maximum likelihood estimation procedures. Finally the validation stage involves diagnostic checking such as plotting the residuals to detect outliers and evidence of model fit.

In recent years time series models have become more sophisticated and attempt to model conditional heteroskedasticity with models such as ARCH (autoregressive conditional heteroskedasticity) and GARCH (generalized autoregressive conditional heteroskedasticity) models frequently used for financial time series. In addition time series models are also used to understand inter-relationships among economic variables represented by systems of equations using VAR (vector autoregression) and structural VAR models.

Notation

A number of different notations are in use for time-series analysis. A common notation specifying a time series X that is indexed by the natural numbers is written

$X = \{X_1, X_2, ...\}$.

Another common notation is

Models

Autoregressive model

The general representation of an autoregressive model, well-known as AR(p), is

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 Y_{t-2} + ... + \alpha_p Y_{t-p} + \varepsilon_t$$

where the term εt is the source of randomness and is called white noise. It is assumed to have the following characteristics:

1. $E(\varepsilon_t) = 0$
2. $E(\varepsilon_t^2) = \sigma^2$
3. $E(\varepsilon_t \varepsilon_s) = 0 \qquad \forall_t \neq s$

With these assumptions, the process is specified up to second-order moments and, subject to conditions on the coefficients, may be second-order stationary.

If the noise also has a normal distribntion, it is called normal white noise (denoted here by Normal-WN):

$\{\varepsilon_t\}$ (t ∈T) : Normal - WN.

In this case the AR process may be strictly stationary, again subject to conditions on the coefficients.

Regression techniques

Regression models are the mainstay of predictive analytics. The focus lies on establishing a mathematical equation as a model to represent the interactions between the different variables in consideration. Depending on the situation, there is a wide variety of models that can be applied while performing predictive analytics. Some of them are briefly discussed below.

Linear regression model

The linear regression model analyzes the relationship between the response or dependent variable and a set of independent or predictor variables. This relationship is expressed as an equation that predicts the response variable as a linear function of the parameters. These parameters are adjusted so that a measure of fit is optimized. Much of the effort in model fitting is focused on minimizing the size of the residual, as well as ensuring that it is randomly distributed with respect to the model predictions.

The goal of regression is to select the parameters of the model so as to minimize the sum of the squared residuals. This is referred to as ordinary least squares (OLS) estimation and results in best linear unbiased estimates (BLUE) of the parameters if and only if the Gauss-Markov assumptions are satisfied.

Once the model has been estimated we would be interested to know if the predictor variables belong in the model – i.e. is the estimate of each variable's contribution reliable. To do this we can check the statistical significance of the model's coefficients which can be measured using the t-statistic. This amounts to testing whether the coefficient is significantly different from zero. How well the model predicts the dependent variable based on the value of the independent variables can be assessed by using the R^2 statistic. It measures predictive power of the model i.e. the proportion of the total variation in the dependent variable that is "explained" (accounted for) by variation in the independent variables.

Price trend

To identify the price trend, scatter diagram will be examined taking time in X-axis and monthly wholesale and retail livestock product prices in Y-axis. If the scatter diagram exhibits straight-line relationship, the following form of linear trend equation will be fitted. Seema (1990), Rajendran et al. (1991) and Serma Saravana Pandian et al. (2004).

$P = a + bt + \mu$

where, P - Monthly average wholesale / retail livestock product price

a - Intercept to be estimated

b – Slope / Regression parameter to be estimated

t - Time in months (t = 1 for August 2000, t = 2 for September 2000....., t = 108 for July 2009) and

μ - Error term.

Seasonal adjustment is a statistical method for removing the seasonal component of a time series used when analyzing non-seasonal trends. Whereas, not-seasonally-adjusted reflects the actual current data. It is normal to report not-seasonally-adjusted data for current unemployment rates. Seasonally adjusted data may be used for the longer term comparison

Unlike the trend and cyclical components, seasonal components, theoretically, happen with the same magnitude during the same time period each year. The seasonal component of a series are often considered uninteresting and cause a series to be ambiguous. By removing the seasonal component, it is easier to focus on other components.

A moving average is commonly used with time series data to smooth out short-term fluctuations and highlight longer-term trends or cycles. The threshold between short-term and long-term depends on the application, and the parameters of the moving average will be set accordingly. For example, it is often used in technical analysis of financial data, like stock prices, returns or trading volumes. It is also used in economics to examine gross domestic product, employment or other macroeconomic time series. Mathematically, a moving average is a type of convolution and so it is also similar to the low-pass filter used in signal processing. When used with non-time series data, a moving average simply acts as a generic smoothing operation without any specific connection to time, although typically some kind of ordering is implied.

Example : Seasonal variation in mutton prices

To find out the seasonality in wholesale / retail egg prices using multiplicative model, classical decomposition through centered moving average method was used because of its accuracy and forecasting ability. Mani et al. (1995), Mondal and Pandey (1995) and Serma Saravana Pandian et al. (2004).

Multiplicative model : $X_t = T_t * S_t * C_t * I_t$

where, X_t - Wholesale / Retail livestock product price at time 't'

T_t - Trend component

S_t - Seasonal component

C_t - Cyclical component and

I_t - Irregular component.

Classical Decomposition method : $S_t = \dfrac{T_t * S_t * C_t * I_t}{T_t * C_t * I_t}$

By calculating the moving average, '$T_t * C_t$' was separated and by taking average, centered moving average was constructed, thereby 'I_t' was also separated and finally the seasonal index 'S_t' was obtained.

The simple moving average

Intuitively, the simplest way to smooth a time series is to calculate a simple, or unweighted, moving average. The smoothed statistic st is then just the mean of the last k observations:

where the choice of an integer k > 1 is arbitrary. A small value of k will have less of a smoothing effect and be more responsive to recent changes in the data, while a larger k will have a greater smoothing effect, and produce a more pronounced lag in the smoothed sequence. One disadvantage of this technique is that it cannot be used on the first k −1 terms of the time series.

The weighted moving average

A slightly more intricate method for smoothing a raw time series $\{x_t\}$ is to calculate a weighted moving average by first choosing a set of weighting factors

$w_1, w_2, \ldots, w_k$, such that $\sum_{n=1}^{k} w_n = 1$,

and then using these weights to calculate the smoothed statistics {st}:

$$s_t = \sum_{n=1}^{k} w_n x_{t+1-n} = w_1 x_t + w_2 x_{t-1} + \ldots\ldots + w_k x_{t-k+1}$$

In practice the weighting factors are often chosen to give more weight to the most recent terms in the time series and less weight to older data. Notice that this technique has the same disadvantage as the simple moving average technique (i.e., it cannot be used until at least k observations have been made), and that it entails a more complicated calculation at each step of the smoothing procedure. In addition to this disadvantage, if the data from each stage of the averaging is not available for analysis, it may be difficult if not impossible to reconstruct a changing signal accurately (due to the fact that older samples may be given less weight). If the number of stages missed is known however, the weighting of values in the average can be adjusted to give equal weight to all missed samples to avoid this issue.

Exponential smoothing

Exponential smoothing is a technique that can be applied to time series data, either to produce smoothed data for presentation, or to make forecasts. The time series data themselves are a sequence of observations. The observed phenomenon may be an essentially random process, or it may be an orderly, but noisy, process. Whereas in the simple moving average the past observations are weighted equally, exponential smoothing assigns exponentially decreasing weights over time.

Exponential smoothing is commonly applied to financial market and economic data, but it can be used with any discrete set of repeated measurements. The raw data sequence is often represented by {xt}, and the output of the exponential smoothing algorithm is commonly written as {st} which may be regarded as our best estimate of what the next value of x will be. When the sequence of observations begins at time t = 0, the simplest form of exponential smoothing is given by the formulas

$s_t = x_0$

$s_t = \alpha x^{t-1} + (1-\alpha)\, s_{t-1}$, $t>1$

where α is the smoothing factor, and $0 < \alpha < 1$.

This simple form of exponential smoothing is also known as an exponentially weighted moving average (EWMA). Technically it can also be classified as an Autoregressive integrated moving average (ARIMA) (0,1,1) model with no constant term.

Double exponential smoothing

Simple exponential smoothing does not do well when there is a trend in the data. In such situations, double exponential smoothing can be used. Again, the raw data sequence of observations is represented by $\{x_t\}$, beginning at time t = 0. We use {st} to represent the smoothed value for time t, and $\{b_t\}$ is our best estimate of the trend at time t. The output of the algorithm is now written as F_{t+m}, an estimate of the value of x at time t+m, m>0 based on the raw data up to time t. Double exponential smoothing is given by the formulas

$s_0 = x_0$

$s_t = \alpha x_t + (1-\alpha)\, F_t$

$b_t = \beta(s_t - s_{t-1}) + (1-\beta)\, b_{t-1}$

$F_{t+m} = s_t + m b_t$

where α is the smoothing factor, and $0 < \alpha < 1$. where α is the data smoothing factor, $0 < \alpha < 1$, β is the trend smoothing factor, $0 < \beta < 1$, and b0 is taken as (xn-1 - x0)/(n - 1) for some n > 1. Note that F0 is undefined

(there is no estimation for time 0), and according to the definition F1=s0+b0, which is well defined, thus further values can be evaluated.

Simultaneous Equation Models

Interdependence is a reality in the economic world, with many variables having two-way causal relationships. For example, GDP and investment levels affect each other simultaneously. A single regression equation with only one dependent variable cannot capture such relationships.

Simultaneous equation models are a helpful forecasting tool when variables such as GDP, investment and others can be both a cause and effect. The simultaneous approach uses two regression models in which jointly determined, or endogenous, variables appear in both equations. An analyst could use a simultaneous equation approach to forecast the price and quantity of livestock product. One equation would express the quantity of livestock product as a function of consumers' incomes, livestock product prices, the costs of livestock products production and the prices of competing food items, while the second expresses beef prices as a function of livestock product quantity, prices of other food items and livestock products production costs.

A drawback of the simultaneous equation approach, however, is that it violates the classical econometric assumption that each explanatory variable and the error term (the amount of variance unexplained by a regression model) are independent of each other.

Neural Networks

During the last several years we observe the explosion of interest towards neural networks, successfully used in different spheres - business, medicine, technology, geology, physics. Neural networks are widely used in spheres that require forecasting, classification and management.

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RURAL POULTRY MARKETING

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Though poultry development in the country has taken a quantum leap in the last three decades, the growth has been mainly restricted to commercial poultry. Rural backyard poultry, though still contributing nearly 30% to the national egg production, is the most neglected one. This is in spite of the fact that their poultry eggs and meat fetch a much higher price than that from commercial poultry. 70% of the poultry products and eggs are consumed in urban and semi urban areas and the rural consumption is quite low. Private poultry producers are also not able to attend to the needs of major rural consumers. The major limiting factor in the way of increasing consumption of egg and poultry meat in rural area is poor availability. Most of the commercial poultry egg and meat production is centered in the urban and semi-urban areas. Due to their operation being of an industrial nature, the private sector is not inclined to go to the rural areas, particularly to small farmers and landless farmers including women. The private commercial sector is understandably reluctant to enter the rural backyard poultry sector as they aim at higher and quick profits, through larger investments. The commercial poultry sector is doing business, through integrated approach of contract farming using high-input and high-output birds. For the poorest of the poor and the landless, the major issues are food security and risk spreading through subsidiary income, which are not addressed by the private commercial sector. It is well known fact that a fairly significant proportion of the landless and marginal farmers eke out their living from poultry and other small ruminants. Backyard poultry requiring hardly any infrastructure set-up is a potent tool for upliftment of the poorest of the poor. Besides income generation, rural backyard poultry provides nutrition supplementation in the form of valuable animal protein and empowers women. It has also been noticed that the demand for rural backyard poultry is quite high in urban areas.

It may also be mentioned that groups of small rural producers cater to the needs of consumers who have a specific preference for colored birds and brown-shelled eggs, both of which are mostly produced in the rural sector/ backyard poultry. Thus there is a need to take up specific rural poultry production programs, to meet the requirements of the rural consumers while constituting a source of subsistence income as a subsidiary occupation by taking up colored bird units ranging from 20 to 50 birds per family in their backyards. Such units require very little hand feeding and can give a fairly handsome return with bare minimum night shelter. Selling of local chickens is one of the functions of keeping free-range chickens were observed and the cash from sales is used to buy household needs including food, to improve food security at household level. Some farmers barter their free-range local chickens for food and household items. Regardless of the mode of sales, this function ranks among the top three most important roles (food, income and socio-cultural) that are played by local chickens for the wellbeing of the household and community.

Formation of Commodity Interested Groups

The Krishi Vigyan Kendra, Kundrakudi will focus on organization of the poor at grassroots level through a process of social mobilization for poverty eradication through poultry activity. The SHG (self-help group) approach will be giving various advantages of binding each other and common arrangements for getting chicks, feed, deworming, disease control, marketing of eggs and culled birds. Social mobilization enables the poor build their own organizations (SHGs) in which they participate fully and directly and take decisions on all issues concerning poverty eradication. Simultaneously, SHGs have the advantage that they can ensure assistance – be it in terms of credit or technology or market guidance etc. - reaches the poor faster and more effectively.

Empowering women through smallholder rural poultry production

The Krishi Vigyan Kendra, Kundrakudi is made about the involvement of women in rural poultry development helping women to increase rural poultry production increases women's income and thus empowers them. An increase in food production as a result of increased rural poultry production increases equitable distribution of food in the household. Village chickens are easily managed within homesteads, and are therefore appropriate development projects for women; women are more resourceful in managing village chickens, and therefore their involvement in development programmes increases production efficiency. Backyard poultry production under semi-intensive production systems has been undertaken through the support of savings clubs. Egg production and chick survival data are probably the main determinant of the flock productivity. Chick mortality accounts for high losses in most village chicken production systems. Therefore, management factors that would have a positive impact on chick survival and egg production can be used to increase output from the village chicken flocks.

Survey

The preliminary survey has been carried out in all villages at Sivagangai District through PRA method. With the help of NABARD, Non Governmental organization and other private agencies the members are selected in different villages of self help group members.

Selection of members

The commodity interested groups of the District were identified and the beneficiaries / members of each group have been selected for the backyard poultry production.

Training

Several On-campus and Off-campus trainings are conducted for the poultry farmers regarding poultry rearing.

Procurement of chicks

The high performance day old chicks are procured from the Research Stattions such as Poultry Research Station, Nandanam and Veterinary College and Research Institute, Namakkal (TANUVAS), Central Poultry Development Organisation (South), Hessarghatta.

Brooding of chicks

Brooding has given to all day old chicks that are procured from the Research Stations for one week under summer season and two weeks under winter season.

Training on Vaccination

The hands on training have given to all the beneficiaries regarding how to do the vaccination at farm level.

Supply of chicks

The beneficiaries are supplied at a time with 10 pairs of chicks which are 4 weeks old.

Field visit

The scientist of this centre has visited to all the poultry farms at regular intervals and advises them properly on management activities.

Disease investigation

If heavy mortality occurs in the flock, the concern farmer approaches this centre for technical help. We visited the farm and conducting the post mortem.

Custom hatching

The farmers brought all the eggs and keep their eggs in the incubator for hatching at our centre.

Purchase of Homestead incubator

Few of them are purchased small homestead incubator for own use.

Marketing

Marketing is another aspect that requires institutional and organizational support. The marketing intervention introduced by the KVK, where specific field days were arranged for women to sell the chickens was welcomed by the farmers. Institutional support offered in marketing could be used to create employment for youths in rural areas.

Marketing channels

Marketing channels for local chickens include selling of chickens and eggs at households within the villages, on road sides, during entertainment ceremonies and even in local and city markets. On the other hand, free-ranging local chickens are claimed to be on demand and fetch high market prices in urban markets. The marketing channels of village chickens are

I - Producer → Consumer

II - Producer → Urban markets → Consumer

III - Producer → Village markets → Consumer

IV - Producer → Middle man → Urban markets → Consumer

V - Producer → Middle man → Village markets → Consumer

VI - Producer → Middle man → Urban markets → Middle man → Consumer

VII - Producer → Middle man → Village markets → Middle man → Consumer

Marketing structure

Local chickens were sold at all markets. Live broiler and culled layer chickens were also sold. Presence of local chickens showed that existing commodity markets are used to sell the chickens. Only male middlemen were involved in selling local chickens. It shows that the connected marketing strueture that transfers free-range chickens from producers in rural households to consumers in both rural and urban areas. Middlemen operating in the marketing of free-range chickens were also reported and observed that farmers could sell their chickens directly at local markets; thereafter, middlemen took over. The market is informal at household level and village trading centres where farmers participate and transactions through barter are also common. After that, middlemen operate local chicken marketing as their main business occupation.

The farmers sell chickens to meet their household needs especially food during the wet season. During the dry season, farmers sell their chickens instead of losing them through death from Newcastle disease. These factors operate at household (farm) level, influence bargaining power of farmers when selling their chickens and

contribute to the seasonal variations. Supply and pricing of chickens at a local market are bound to be affected. The current system of the live chicken markets attracts higher profit margins for female than male birds but not per unit of live weight. The influence of phenotype on number of chickens sold, just like the sex effect, merely reflected the relative prevalence of different phenotypes among flocks in rural households. All phenotypes were available for sale, hence improving all free-range chicken genetic resources have marketing justification. On per live chicken basis, pricing of free-range chickens was strongly and positively influenced by size of chickens. Sellers do not use weighing scales but estimate weight of chicken by assessing its size and by handling the chicken.

Marketing system and channels for scavenging local chickens in rural and urban areas

The marketing structure, players, prices and profit margins of local chickens in rural and urban areas were identified. Rural markets and urban markets were visited regularly during the dry season and wet season. Male middlemen sold both male and female local chickens of all phenotypes at all markets. Middlemen bought their chickens from farmers and trading centres in surrounding villages. Middlemen at urban markets bought chickens from rural and district markets and used public transport for the chickens. Purchasing, selling prices and profit margins were higher for urban markets than for the rural market. Selling prices for all markets were higher during the dry season. Profit margins at urban markets were higher during the wet than the dry season. Chickens sold during the dry season were heavier than during the wet season. Live weights positively influenced pricing and profit margins. It is observed that a marketing chain exists for local chickens. Farmers transact in form of cash and barter at village level, whereas afterwards male middlemen control the market.

Conclusions

Marketing at village level takes place through cash and direct barter transaction. Thereafter, marketing of local chickens is in cash and is controlled by middlemen. Farmers sell chickens to obtain household needs, but middlemen operate to make profits and reduce transaction costs. Prices, transaction costs and profit margins of the market chain from producer to consumer of local chickens at different levels. Rural assemblers, assembler-retailers and retailers are the three main key players involved marketing of poultry in rural areas. Rural assemblers in the village chicken marketing earn the highest profit margins compared to the other market players. The major chicken marketing channels are direct Producer-Consumer (PC), Rural Assembler-Retailer (RA-R) and Assembler-Retailer (AR) channels. Highest farm gate prices were obtained using the Assembler-Retailer channel (AR) channel while the lowest farm gate price was obtained using the Producer-Consumer channel (PC). Low prices, limited market outlets, long distances to reliable markets and low marketable output are the major problems affecting chicken marketing while disease outbreaks, especially, New Castle Disease, are the major production constraint. Improvements in production and marketing systems would lead to improved marketing of eggs and chickens in rural areas.

INTRODUCTION TO LIVESTOCK FARMING

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The objective of this article is to describe a reasonable classification of the world's livestock systems. As per FAO(1980), the systems classification aims at:

- Delineating and defining elements of a classification of livestock production systems.
- Quantitatively and qualitatively describing each livestock production system in terms of feed and livestock resources livestock commodities produced; production technology; product use and livestock functions; area covered; geographic locations; and human populations supported.
- Providing insights into the importance of livestock systems across world regions and agro-ecological zones and related trends in order to provide orientation to decision-makers involved in livestock development.

Definition of systems

Solely livestock production systems (L)

Livestock systems in which more than 90 percent of dry matter fed to animals comes from rangelands, pastures, annual forages and purchased feeds and less than 10 percent of the total value of production comes from non-livestock farming activities.

Landless livestock production systems (LL)

Subset of the solely livestock production systems in which less than 10 percent of the dry matter fed to animals is farm-produced and in which annual average stocking rates are above ten livestock units (LU) per hectare of agricultural land.

Grassland-based systems (LG)

Subset of solely livestock production systems in which more than 10 percent of the dry matter fed to animals is farm-produced and in which annual average stocking rates are less than ten LU per hectare of agricultural land.

Mixed-farming systems (M)

Livestock systems in which more than 10 percent of the dry matter fed to animals comes from crop by-products or stubble or more than 10 percent of the total value of production comes from non-livestock farming activities.

Rain-fed mixed-farming systems (MR)

A subset of the mixed systems in which more than 90 percent of the value of non-livestock farm production comes from rain-fed land use.

Irrigated mixed-farming systems (MI)

A subset of the mixed systems in which more than 10 percent of the value of non-livestock farm production comes from irrigated land use.

Under a given set of agro-climate the selection of farming system depends on

1. Demand and supply of products and marketing facilities.
2. Distribution of income over the year.
3. Opportunities of family labour employment.
4. Fixed and variable cost.
5. Net profit per unit area/ livestock per unit of time.

Features of livestock farming

Dairy farming

Dairy farming system can be of following types.

1. Specialised farming

A specialized farm is one on which more than 50% of the receipts are obtained from a single source i.e. milk. Farmers can secure complete mastery over the conditions, problems of production, processing and sale. Under favorable and specific condition it is highly profitable.

2. Mixed farming

Crop production is combined with dairy farming. Dairy enterprise is complimentary to crop production and vice-versa. Agriculture economists consider that for a farm to be called as mixed farm, 10-15% of its gross income must be contributed by livestock components. This systems utilizes the best use of land, labour and capital, maintains soil fertility and operational costs are reduced.

3. Diversified farming

This system consists of components such as crop and livestock that co-exist independently from each other. Livestock sub system comprises rearing of different farm animal species for profit.

Pig Farming Systems

There are four major systems of pig raising .They are

1. Scavenging pig farming

The pigs are let loose day and night as a self supporting management system. In this systems native or up graded strains of pigs are used because they are more tolerant to low quality feeds. Modern breeds of pigs cannot survive under this system. The scavenging pigs can be resistant to some parasites such as ascaris and ring worm. The pigs are generally marketed according to the financial needs of the owner. The qualities of meat produced from scavenger pigs is inferior.

2. Backyard Pig raising

The pigs are kept in simple sty up to 3 pigs in the backyard of the homestead feeding on swill. The reproductive performance of sow is poor as they receive minimum care and feeding management. The litter size at farrowing averages 8 to 10 pigs, of which half survive to weaning at 2 months of age.

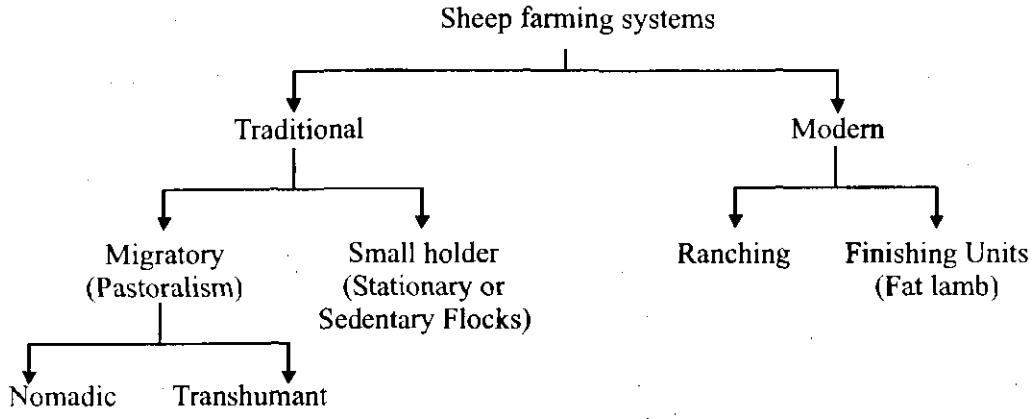
3. Medium sized pig units

The size of the herd ranges from 20 to 50 heads of all ages and the producer depends on feeding commercial feeds. The pig farmers are dependant on middle men for the marketing of their produce. The middle men may also be a medium scale pig producer.

4. Large scale commercial pig production

In this system feed production, pork production, processing of products and marketing are integrated. This may involve a total sow herd of from 50 to as much as 1000 head.

Small Ruminant Production



There exists three distinct sheep rearing systems in our country.

1. Migrating Systems

In India a bulk of sheep population possessed by nomads and tribal in northern temperate region of Jammu and Kashmir, Himachal Pradesh and UP hills are managed on migrating pattern . The flocks spend winters in warmer low altitude belt and with the onset of winter these shift to hills. In certain case the distance covered ranges from 300 to 400 km and altitude ranges from 500 to 4500 m. In Tamilnadu migratory sheep production systems is prevalent in southern districts involving Ramnad white and north western zone where coimbatore breed of sheep are reared.

2. Semi-Migrating systems

Short distance movement with in state/division or district with the change of season in search of grazing grounds is quite common .These sheep farmers invariably have small or marginal land holding . The flocks are taken away during crop cultivation in the area .The flocks return to their villages after harvest. Harvested field serve a grazing boon and manuring of field for next crop is also possible during the stop over period by night folding of flocks in agricultural land.

3. Sedentary or Stationary systems

Rearing of small number of sheep on stationary footing near the farmers homestead round the year is called sedentary system. The flock is taken in the morning for grazing and return back to the homestead in the evening. An economic unit size in stationary condition is 30 to 50 sheep.

Goat Production Systems

1. Traditional System

Goat rearing is in the hands of weaker sections of the community who do not possess land or their land holdings are so small that crop cultivation does not provide remunerative employment all the year round.

2. Extensive System

This system is seen in large areas of Deccan plateau where there are hills and large areas of land not fit for cultivation. This is the cheapest system where grazing land is available.

3. Semi- intensive system

This is widely practiced by small and marginal farmers. Goats are left to graze and browse on the crop residues after harvest and common property resources.

4. Intensive System

If the agro- climatic evolutions are such that land is mostly under perennial cropping, the only choice is to adopt intensive management system of goats. The pressure of increasing population in human and animals further justify this system for livestock in general and goats in particular to control the degradation of environment.

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COMMERCIAL LIVESTOCK FARMING IN INDIA - ISSUES AND IMPLICATIONS

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Status of commercial goat farming in India

Goats are among the main meat producing animals in India whose meat is one of the choicest meats and has huge domestic demand. Goats are important part of rural economy particularly in the arid semi-arid and mountainous regions of the country. Goats account for more than 25 per cent of the total livestock in the country and contribute Rs. 1,06,335/- million annually to the national economy. However the productivity of goats under the prevailing traditional production systems is very low. Therefore rearing of goats under intensive and semi-intensive systems using improved technologies for commercial production has become imperative not only for realizing their full potential but also to meet the increasing demand of chevon in the domestic as well an international markets. Responding to the market signals, the goat production system in India has been slowly moving from extensive to intensive system of management for commercial production.

Status of people entering in to goat farming

- High demand for goat and its products with potential of good returns have been deriving many progressive and educated youths to take up the goat enterprise on a commercial scale
- The trend of commercialization of goat production was especially prominent in the states of Mahasastra, Madhya Pradesh, Bihar, Uttar Pradesh and West Bengal
- Seventy five per cent of these farmers have started operating in the post six years
- All these commercial farmers are well educated and has a good access to technical and market information
- People having major income from business and salaried jobs (33% of the total farmers) has taken up commercial goat farming as their subsidiary occupation
- 46 per cent of the commercial goat farmers successfully reared goats under intensive system
- All the commercial goat farmers were educated, with 50 per cent of then as post graduate

Flock size, breed and investment pattern

Distribution of selected goats farm in to flock size categories.

Category	Flock size group	No of breeding goats	Flock size	No. of farms
I	< 100 goat	33	63	10
II	100-500 goat	144	273	6
III	> 500 goat	610	1169	2

The new entrepreneurs, who started with a large flock of over 100 goats without gaining experience of managing small flock, mostly failed and suffered losses and some of them even left the business. The exceptions are those who started with a very big goat unit (>500 goats) and managed to hire experienced veterinarian to look after and supervise the farm. The minimum no of breeding goats, in a commercial unit should be 50 to make it a self sustaining unit that can provide livelihood to at least one household.

The Sirohli, Barbari, Osmanabadi and Black Bengal were the important breeds of goats reared by the commercial goat farmers. Sirohli and Barbari breeds were spread most widely. Osmanabadi was mostly raised in Maharastra. Sirohli remained the most sought after breed. A considerable number of commercial farms in Madhya Pradesh (78%) Chhattisgarh (40%) and Uttar Pradesh (30%) were non-descript. Some commercial farms in Maharastra, Madhya Pradesh, Rajasthen and Tamilnadu reared south African Boer-cross goats which was crossed with Osmanabadi, siroli and non-descript goats.

The major initial investment was on purchase of breeding stock and construction shed and other infrastructure which accounted for 47 and 48 per cent of total capital investment respectively. The total investment per breeding goat in categories I, II and II were Rs.5083, Rs.3419 and Rs.6015 respectively.

Un like traditional flocks the expenditure on feed on fodder was the major component accounting for 59 per cent of the total variable cost.

Production of kids

Kids born from the goats, were the major output of the commercial goat farms. There were mainly two breeding seasons Feb-April and October-November. Kid mortality varied between 5.64 per cent in category III to 12.28% in category I. The mortality rate in general was well under the permissible limits in most of the commercial farms.

Awareness and adaptation of improved technologies

Commercial goat farmers has very high level of awareness about improved technologies. There was high level of adoption of recommended package of practices and technologies related to direction and type of shed, feeding and watering devices and mineral mixture. But the adoption of daily management practices and prophylaxis was less than 100 per cent. The use of vaccines such as PPR, HS and FMD and medication for internal and external parasites need to be used as recommended for effective prevention of diseases. Thought most of the farmers were eager to adopt the improved technologies the absence of any support system to provide quick access to the latest information and technologies and weak input delivery system resulted in poor adoption.

Mortality and morbidity losses due to diseases

The major diseases that affected goats on commercial farms were PPR, Enterotoxaemia. Pox, FMD, diarrhea and pneumonia. On overall forms the estimated losses due to diseases in goats were 23.22 per cent of net returns and 5.21 per cent of gross returns.

Economics of commercial goat farming

The estimated costs and returns from goat farming revealed fixed cost and variable cost in commercial goat farming contributed 35.36 per cent and 64.64% of the total cost whereas in traditional flocks the fixed cost was 10-15 per cent of total cost. The feed was the major component (59%) of cost on goat rearing. The total cost per doe per annum in categories I, II and II were Rs. 2354, Rs.2137 and Rs.2527 respectively, on the third of the commercial goat farms the total annual cost of rearing goat was between Rs.1124 to Rs.1753 and in another one third it ranged from Rs.2628 to Rs.4311. The latter farms must reduce their cost of rearing to remain in business.

Returns

The gross returns from goat farming were maximum from sale of animals (90%) followed by manure and milk. The annual net returns per goat in categories. I, II and II were Rs.371, Rs.652 and Rs.494 respectively. Most of the commercial goat farms were operating with positive net returns with 39 per cent of them earning profit. However the technological intervention. Particularly prophylaxis, superior and innovative marketing of the produce would be the pre-condition for successful commercial goat production.

Dairy farming

Introduction

Livestock production is undertaken in a multitude of ways across the planet, providing a large variety of goods and services, and using different animal species and different set of resources in a wide spectrum of agro-ecological and socio-economic conditions. Livestock production is undergoing rapid change and this change manifests itself in the growing contribution that livestock make, to satisfying increasing global demands for high/value food products and in continuous adjustments at the level of resource us intensity, size of operation, product orientation and marketing channels. With growing incomes people typically increase their consumption of meat, milk and eggs until these products become fully integrated in to the daily diet. Rapidly increasing demand for animal source food products exerts pressures on the livestock sector, which needs to adapt fast in order to cope with such demand. The lack of available new land prohibits a horizontal expansion of existing models of production, and forces the sector in to rapid technological change and search for alternative resources.

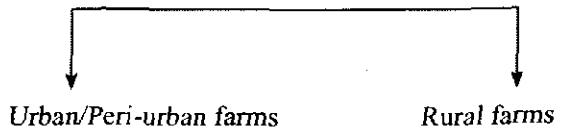
More than 40% Indian farming households, about two thirds of which own less than one ha land are engaged in dairy and other livestock enterprises. Rapid structural changes are occurring globally in the livestock industry with a real danger that the poorer livestock producers will be crowded out and left behind. As more than 40 million households, in India at least partially depend on milk production, development in the dairy sector will have important repressions on their livelihoods, and on rural poverty levels.

Milk production in India, opportunities and risks for small scale producers.

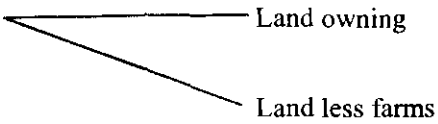
The state of Harayana one of the major milk producing states in India, was chosen to assess possible development in the Indian dairy sector and to broadly identify areas of interventions that favour small scale producers. Impact of changes in milk prices, farm management and other market factors that affect small scale production systems, the whole farm and related household income, were examined using a methodology developed by the International Farm comparison Network (IFCN).

Four types of Dairy farmers were identified defined by

a. Location of the farm in relation to urban centre,



b. Land owner ships



Household and farm comparison

- All four types of farms have more or less diverse income structure - income sources being sale of milk, cash crops in case of land ownership and - off farm employment
- Annual household income ranged from $700 for rural landless farm to $8200 for a large peri-urban farm
- The annual income from Dairy farming ranged from $200 to $8200 per year
- For rural landless farm the net cash farm income just covered the farm cash costs and contributes less than 10 percent to households income. However the noncash benefits from dairy in the form of milk for house consumption and manure as fuel are significant and have a market value equivalent to around ¼ of the total household income.

Costs of milk production

- Land owning farms-that have the possibility to grow crops and forages are able to produce milk at $15 /100 kg
- These have the potential to compete with non-subsidized imports of dairy products and also to produce milk for export, provided international quality standards can be achieved and the dairy chain being internationally competitive.
- The cost of milk production of landless farm near urban areas is 50 per cent higher than that of the land owning farms-since all the feed materials have to be outsourced. However high milk price obtained in urban areas compensates for the additional cost. Landless farms near urban centres typically fully cover their production costs and should be economically viable in the long run.
- The cost of milk production of rural landless farms amounts to $25/100 kg if family labour is priced at the minimum wage rate and is thus significantly higher than the production cost incurred by land owning farms. This high cost results from the low annual milk yields, the very high labour input per litre produced and poor breeding performance.
- Without major improvement rural landless Dairy farms will in the long run, have difficulties competing with the larger farm types.
- However, the main purpose of landless rural farms is to produce milk for home consumption by converting free feedstuffs in to milk, surplus livestock and feed and to provide the female member of the family with an income generating activity.

Prospects for landless dairy farmers:

- Simulation of increased productivity better farm financing and improved milk marketing as they could result from proper dairy development policies, show that landless rural dairy farmers do have the potential to reduce the cost of milk production to the level of large farms.
- Thereby they could achieve an income from dairying that provides higher returns to labour than the prevailing minimum wage rate in the area and fully cover their production costs.
- Thus landless people in rural areas, have the potential to run a profitable dairy enterprises, which generates employment for family members, especially women, and significantly improves their living conditions.
- The main risks of dairying identified by the farmers are not having an animal in milk in any one year, the death of a lactating animal, and having to pay for straw which is the main feed source.
- Occurrence of any of the events can lead to a reduction of the already low household income by 50 per cents and would force the family to abandon the dairy enterprise.

The characteristics of small scale dairy production system include.

- Diffuse marketing structure, consisting of many small scale market agents.
- Low lost products, mostly liquid and limited in diversity
- *Great diversity in market behaviour and roles*
- No voice or role in dairy policy making

Whereas the characteristics of commercial large scale dairy include.

- Concentrated market structure consisting of relatively few large scale vertically integrated market agents.
- Industrial processiug based on capital intensive technologies at all market levels.
- Value added products, mostly non liquid and diverse
- Little diverse in market enterprise type
- Loud voice and large role in dairy policy making

Recommendations

- In order to manage the production risks faced by rural landless dairy farmers, and to realize the potential of small scale dairy production as a means to reduce poverty farm productivity has to be raised.
- Raising productivity of dairy farms and mitigation of their production risks requires the availability of improved breeding services targeted preventive animal health care, especially addressing foot and mouth disease and hemorrhagic septicemia and better feeding strategies.
- Access to formal credit at market interest rates would provide farmers with an alternative to having to accept loans from the milk man and thus increase their bargaining power in the market place.
- As long as small dairy produces are not an organized and active interest group dairy and related sector polices will be driven by other actors who may be have conflicting interest.
- Building the capacity of producers to act on their own behalf is therefore essential for improving poor produce welfare.

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PRINCIPLES OF MANAGEMENT

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Management History

Historical Background of Management

- Ancient Management
  - Egypt (pyramids) and China (Great Wall)
  - Venetians (floating warship assembly lines)
- Adam Smith
  - Published The Wealth of Nations in 1776
- Advocated the division of labor (job specialization) to increase the productivity of workers
- Industrial Revolution
  - Substituted machine power for human labor
  - Created large organizations in need of management

Exhibit 2–1 Development of Major Management Theories Major Approaches to Management

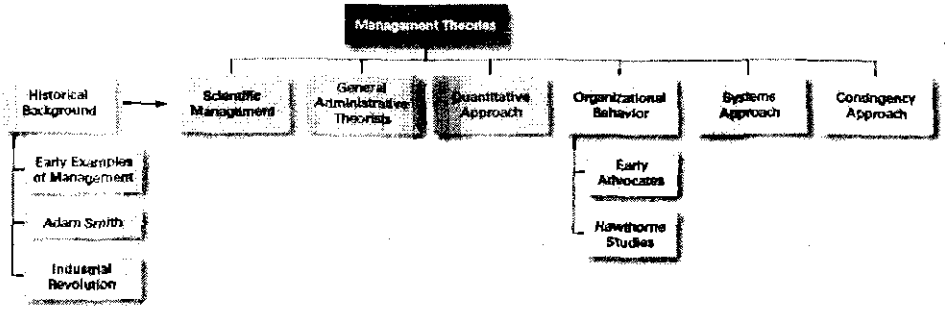


Exhibit 2–1 Development of Major Management Theories Major Approaches to Management

- Scientific Management
- General Administrative Theory
- Quantitative Management
- Organizational Behavior
- Systems Approach
- Contingency Approach

Scientific Management

- Fredrick Winslow Taylor
  - The "father" of scientific management
    Published Principles of Scientific Management (1911)
- The theory of scientific management
  - Using scientific methods to define the "one best way" for a job to be done:
    - » Putting the right person on the job with the correct tools and equipment.

» Having a standardized method of doing the job.
» Providing an economic incentive to the worker.

Exhibit 2–2 Taylor's Scientific Management Principles General Administrative Theory

- Henri Fayol
  - Believed that the practice of management was distinct from other organizational functions
  - Developed principles of management that applied to all organizational situations
- Max Weber
  - Developed a theory of authority based on an ideal type of organization (bureaucracy)
- Emphasized rationality, predictability, impersonality, technical competence, and authoritarianism

Scientific Management (cont'd)

- Frank and Lillian Gilbreth
  - Focused on increasing worker productivity through the reduction of wasted motion
  - Developed the microchronometer to time worker motions and optimize work performance
- How Do Today's Managers Use Scientific Management?
  - Use time and motion studies to increase productivity
  - Hire the best qualified employees
  - Design incentive systems based on output

Division of work	**Remuneration**
Authority	**Centralization**
Discipline	**Scalar chain**
Unity of command	**Order**
Unity of direction	**Equity**
Subordination of individual interests to the general interest	**Stability of tenure of personnel**
	Initiative
	Esprit de corps

Exhibit 2–4 Weber's Bureaucracy

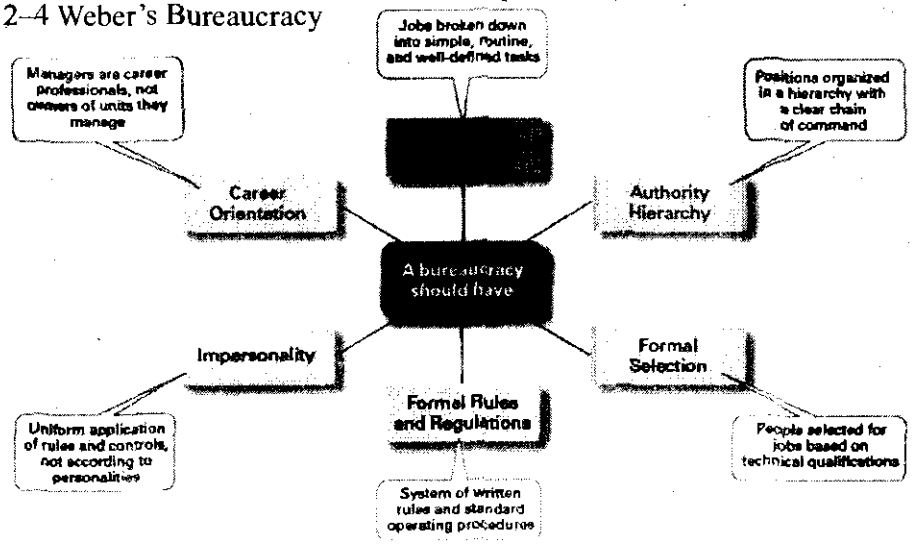


Exhibit 2–4 Weber's Bureaucracy Quantitative Approach to Management

- Quantitative Approach
  - Also called operations research or management science
  - Evolved from mathematical and statistical methods developed to solve WWII military logistics and quality control problems
  - Focuses on improving managerial decision making by applying:
- Statistics, optimization models, information models, and computer simulations

Understanding Organizational Behavior

- Organizational Behavior (OB)
  - The study of the actions of people at work; people are the most important asset of an organization
- Early OB Advocates
  - Robert Owen
  - Hugo Munsterberg
  - Mary Parker Follett
  - Chester Barnard

Exhibit 2–5 What Is Quality Management?

The Hawthorne Studies The Systems Approach

- System Defined
  - A set of interrelated and interdependent parts arranged in a manner that produces a unified whole.
- Basic Types of Systems
  - Closed systems
- Are not influenced by and do not interact with their environment (all system input and output is internal).
  - Open systems
- Dynamically interact to their environments by taking in inputs and transforming them into outputs that are distributed into their environments.

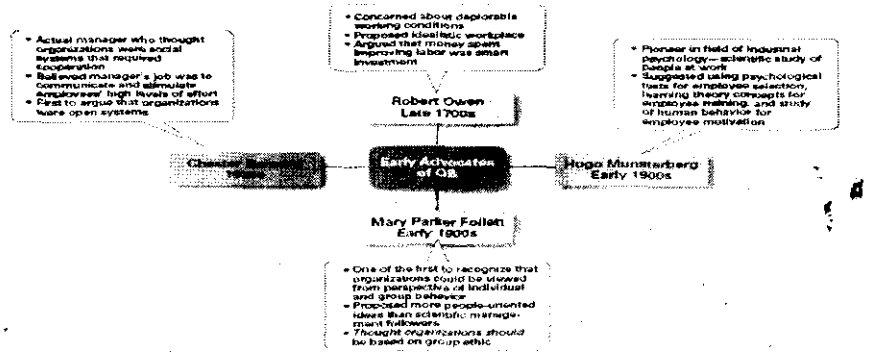
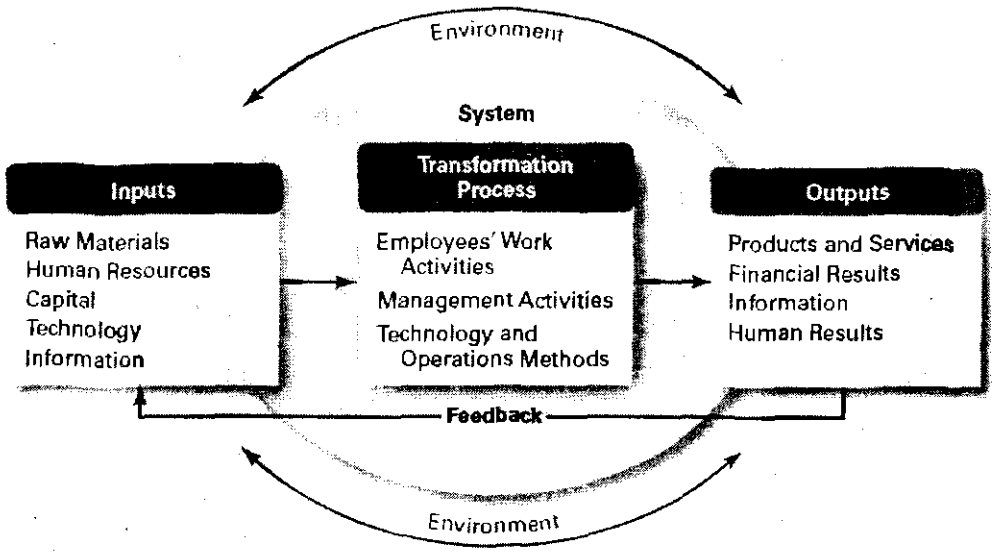


Exhibit 2–6 Early Advocates of OB

Exhibit 2–7 The Organization as an Open System



Implications of the Systems Approach

- Coordination of the organization's parts is essential for proper functioning of the entire organization.
- Decisions and actions taken in one area of the organization will have an effect in other areas of the organization.
- Organizations are not self-contained and, therefore, must adapt to changes in their external environment.

The Contingency Approach

- Contingency Approach Defined
  - Also sometimes called the situational approach.
  - There is no one universally applicable set of management principles (rules) by which to manage organizations.
  - Organizations are individually different, face different situations (contingency variables), and require different ways of managing.

Exhibit 2–8 Popular Contingency Variables Current Trends and Issues

- Globalization
- Ethics
- Workforce Diversity
- Entrepreneurship
- E-Business
- Knowledge Management
- Learning Organizations

- Quality Management
- Globalization
  - Management in international organizations
  - Political and cultural challenges of operating in a global market
- Working with people from different cultures
- Coping with anticapitalist backlash
- Movement of jobs to countries with low-cost labor
- Ethics
  - Increased emphasis on ethics education in college curriculums
  - Increased creation and use of codes of ethics by businesses
- Workforce Diversity
  - Increasing heterogeneity in the workforce
- More gender, minority, ethnic, and other forms of diversity in employees
  - Aging workforce
- Older employees who work longer and do not retire
- An increasing demand for products and services related to aging.
- Entrepreneurship Defined
  - The process of starting new businesses, generally in response to opportunities.
- Entreprencurship process
  - Pursuit of opportunities
  - Innovation in products, services, or business methods
  - Desire for continual growth of the organization
- E-Business (Electronic Business)
  - The work preformed by an organization using electronic linkages to its key constituencies
  - E-commerce: the sales and marketing aspect of a business-to-business (b-b)
- Categories of E-Businesses
  - E-business enhanced organization
  - E-business enabled organization
  - Total e-business organization
- Learning Organization
  - An organization that has developed the capacity to continuously learn, adapt, and change.
- Knowledge Management
  - The cultivation of a learning culture where organizational members systematically gather and share knowledge with others in order to achieve better performance.
- Quality Management
  - A philosophy of management driven by continual improvement in the quality of work processes and responding to customer needs and expectations
  - Inspired by the total quality management (TQM) ideas of Deming and Juran

- Quality is not directly related to cost
- Poor quality results in lower productivity

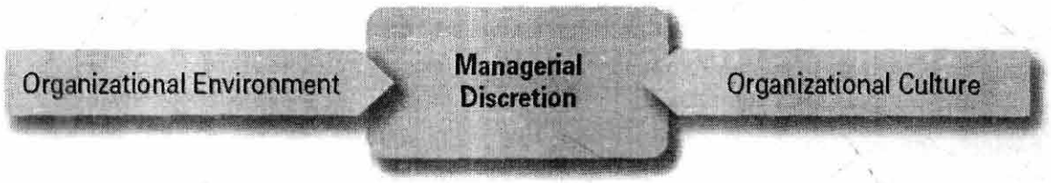
Organizational Culture and Environment
The Manager: Omnipotent or Symbolic?

- Omnipotent View of Management
  - ❖ Managers are directly responsible for an organization's success or failure.
  - ❖ The quality of the organization is determined by the quality of its managers.
  - ❖ Managers are held accountable for an organization's performance, yet it is difficult to attribute good or poor performance directly to their influence on the organization.

The Manager: Omnipotent or Symbolic?

- Symbolic View of Management
  - ❖ Much of an organization's success or failure is due to external forces outside of managers' control.
  - ❖ The ability of managers to affect outcomes is influenced and constrained by external factors.
  - ❖ The economy, customers, governmental policies, competitors, industry conditions, technology, and the actions of previous managers
  - ❖ Managers symbolize control and influence through their action.

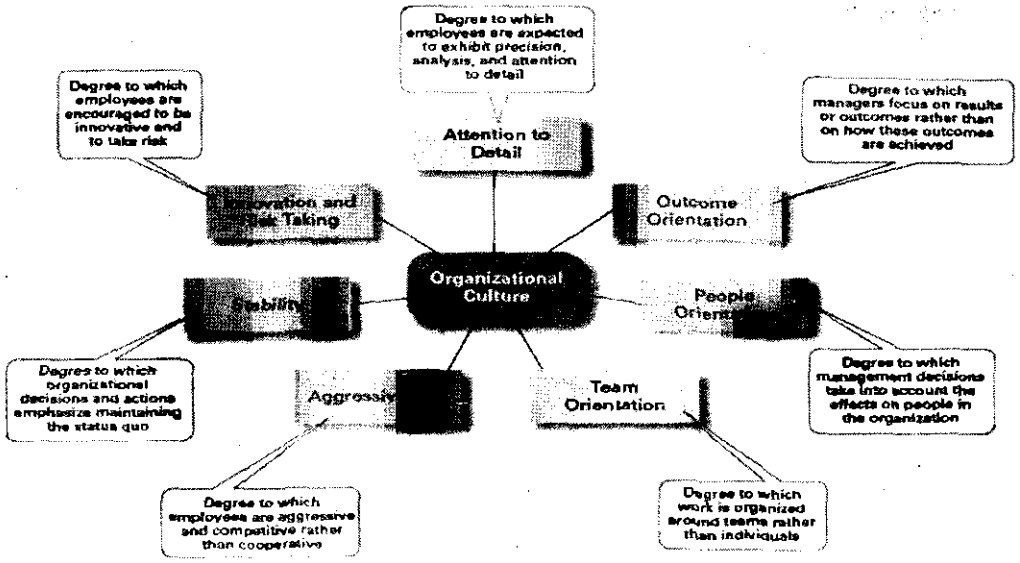
Exhibit 3–1 Parameters of Managerial Discretion



The Organization's Culture

- Organizational Culture
  - ❖ A system of shared meanings and common beliefs held by organizational members that determines, in a large degree, how they act towards each other.
  - ❖ "The way we do things around here."
  - ❖ Values, symbols, rituals, myths, and practices
  - ❖ Implications:
  - ❖ Culture is a perception.
  - ❖ Culture is shared.
  - ❖ Culture is descriptive.

Exhibit 3–2 Dimensions of Organizational Culture



Strong Versus Weak Cultures

- Strong Cultures
  - ❖ Are cultures in which key values are deeply and widely held.
  - ❖ Have a strong influence on organizational members.
- Factors Influencing the Strength of Culture
  - ❖ Size of the organization
  - ❖ Age of the organization
  - ❖ Rate of employee turnover
  - ❖ Strength of the original culture
  - ❖ Clarity of cultural values and beliefs

Exhibit 3–3 Contrasting Organizational Cultures

Dimension	Organization A	Organization B
Attention to Detail	High	Low
Outcome Orientation	Low	High
People Orientation	Low	High
Team Orientation	Low	High
Aggressiveness	Low	High
Stability	High	Low
Innovation and Risk Taking	Low	High

Benefits of a Strong Culture

- Creates a stronger employee commitment to the organization.
- Aids in the recruitment and socialization of new employees.
- Fosters higher organizational performance by instilling and promoting employee initiative.

Organizational Culture

- Sources of Organizational Culture
  - ❖ The organization's founder
  - ❖ Vision and mission
  - ❖ Past practices of the organization
  - ❖ The way things have been done
  - ❖ The behavior of top management
- Continuation of the Organizational Culture
  - ❖ Recruitment of like-minded employees who "fit"
  - ❖ Socialization of new employees to help them adapt to the culture

Exhibit 3–4 Strong Versus Weak Organizational Cultures

Strong Cultures	Weak Cultures
Values widely shared	Values limited to a few people—usually top management
Culture conveys consistent messages about what's important	Culture sends contradictory messages about what's important
Most employees can tell stories about company history/heroes	Employees have little knowledge of company history or heroes
Employees strongly identify with culture	Employees have little identification with culture
Strong connection between shared values and behaviors	Little connection between shared values and behaviors

How Employees Learn Culture

- Stories
  - ❖ Narratives of significant events or actions of people that convey the spirit of the organization
- Rituals
  - ❖ Repetitive sequences of activities that express and reinforce the values of the organization
- Material Symbols
  - ❖ Physical assets distinguishing the organization
- Language
  - ❖ Acronyms and jargon of terms, phrases, and word meanings specific to an organization

How Culture Affects Managers

- Cultural Constraints on Managers
  - ❖ Whatever managerial actions the organization recognizes as proper or improper on its behalf
  - ❖ Whatever organizational activities the organization values and encourages
  - ❖ The overall strength or weakness of the organizational culture

Simple rule for getting ahead in an organization:
Find out what the organization rewards and act accordingly.
Exhibit 3–5 How an Organization's Culture Is Established and Maintained

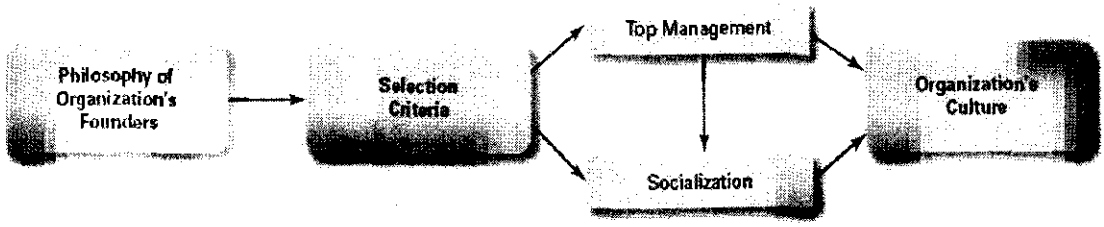


Exhibit 3–6 Managerial Decisions Affected by Culture

Organization Culture Issues

Creating an Ethical Culture
- High in risk tolerance
- Low to moderate aggressiveness
- Focus on means as well as outcomes

Creating an Innovative Culture
- Challenge and involvement
- Freedom
- Trust and openness
- Idea time
- Playfulness/humor
- Conflict resolution
- Debates
- Risk-taking

Exhibit 3–7 Creating a More Ethical Culture

- Creating a Customer-Responsive Culture
  - ❖ Hiring the right type of employees (those with a strong interest in serving customers)
  - ❖ Having few rigid rules, procedures, and regulations
  - ❖ Using widespread empowerment of employees
  - ❖ Having good listening skills in relating to customers' messages
  - ❖ Providing role clarity to employees to reduce ambiguity and conflict and increase job satisfaction
  - ❖ Having conscientious, caring employees willing to take initiative

Exhibit 3–8 Creating a More Customer-Responsive Culture

Spirituality and Organizational Culture

- Workplace Spirituality
  - ❖ The recognition that people have an inner life that nourishes and is nourished by meaningful work that takes place in the context of community.
- Characteristics of a Spiritual Organization

- ❖ Strong sense of purpose
- ❖ Focus on individual development
- ❖ Trust and openness
- ❖ Employee empowerment
- ❖ Toleration of employees' expression

Benefits of Spirituality

- Improved employee productivity
- Reduction of employee turnover
- Stronger organizational performance
- Increased creativity
- Increased employee satisfaction
- Increased team performance
- Increased organizational performance

Defining the External Environment

- External Environment
  - ❖ Those factors and forces outside the organization that affect the organization's performance.
- Components of the External Environment
  - ❖ Specific environment: external forces that have a direct and immediate impact on the organization.
  - ❖ General environment: broad economic, socio-cultural, political/legal, demographic, technological, and global conditions that may affect the organization.

Exhibit 3–9 The External Environment

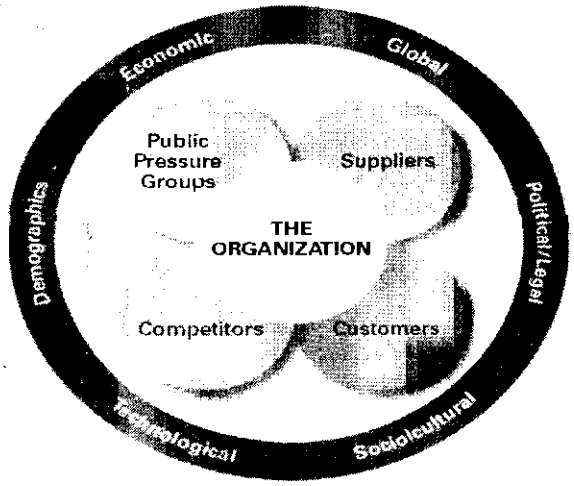
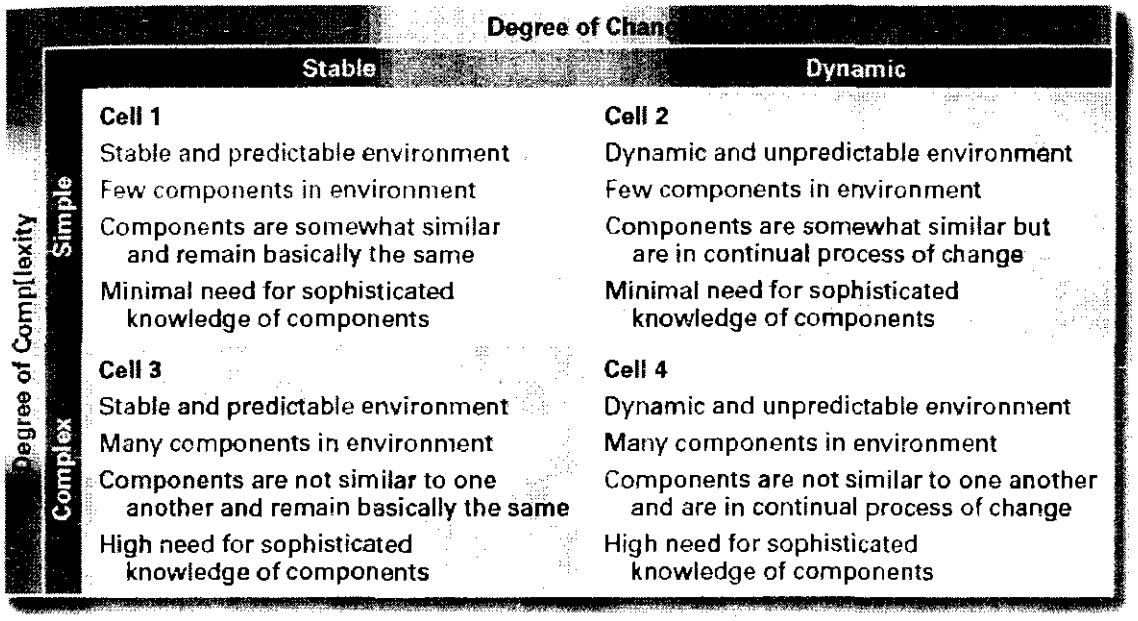


Exhibit 3–10 Important Legislation

How the Environment Affects Managers

- Environmental Uncertainty
  - ❖ The extent to which managers have knowledge of and are able to predict change their organization's external environment is affected by:
  - ❖ Complexity of the environment: the number of components in an organization's external environment.
  - ❖ Degree of change in environmental components: how dynamic or stable the external environment is.

Exhibit 3–11 Environmental Uncertainty Matrix



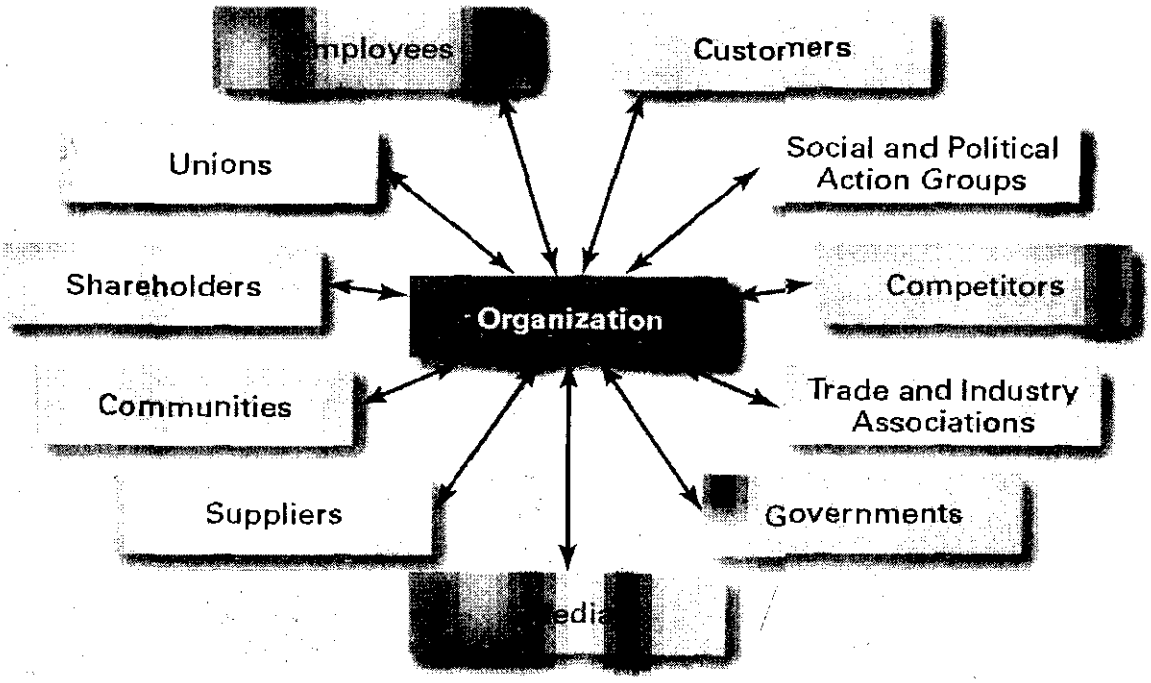
Stakeholder Relationships

- Stakeholders
  - ❖ Any constituencies in the organization's environment that are affected by the organization's decisions and actions
- Why Manage Stakeholder Relationships?
  - ❖ It can lead to improved organizational performance.
  - ❖ It's the "right" thing to do, given the interdependence of the organization and its external stakeholders.

Managing Stakeholder Relationships

- Identify the organization's external stakeholders.
- Determine the particular interests and concerns of the external stakeholders.
- Decide how critical each external stakeholder is to the organization.
- Determine how to manage each individual external stakeholder relationship.

Exhibit 3–12 Organizational Stakeholders



LIVESTOCK ENTREPRENEURSHIP - SELF EXPERIENCE

Roop Kumar Mehta
Mehta Farms
Madhavaram Milk Colony, Chennai- 600 051

Introduction

Our dairy farm was started in a small way at our residence Kilapuk, Chennai, way back in the early 1900's with the Blessings of The Acharyas of Kanchi Kamakoti Peetam. We are known as Mehta Family, a joint family and milk being a daily necessity for a large family, the entire production was used for our own purpose.

The shortage of milk and milk powder in the 1970's, the demand for fresh milk increased and the neighbourhood residents collected milk from our residence, thus started the first commercial sale of milk from our farm. Now, the farm is situated at Madhavaram Milk Colony, TANUVAS, Madhavaram, Chennai-600051, with a strength of 150 milch cows.

Objectives

At that point of time my family decided to increase the number of milch cows mainly to provide quality milk to households, especially for their children. As guided by our Acharyas of Kanchi, we decided to steadfastly follow the following objectives:

1. Go Samrakshana is Loka Samrakshana (Cow protection is Universal Protection.)
2. To provide fresh and wholesome milk to the .customers.
3. Cater mainly to small consumers.

Market Intelligence

- With the above objectives, we had to think differently to sustain the farm on a self reliant basis.
- The first step was to have a good herd and not a herd attitude, here what we mean is not to supply milk to bulk consumers and also to introduce Farm Gate to Kitchen Gate that is door delivery system.
- Our main strength was that we never advertised or solicited, and by word of mouth it spread to the major parts of the city from the neighbourhood and the clientele steadily increased.
- We found most of the customers needed fresh milk at their door, for which they were ready to pay premium prices.
- We found that once a customer is created by this method, by word of mouth, he is not only retained, he sustains with us. There are customers for two to three generations with us.
- Rain or shine, lean or flush season, the small consumer always wants his quota of milk, so there was continuous demand for fresh milk.
- Timely supplies to the customers is an important factor and we give special care to retain our customers.

We found that customers give importance to timely delivery; hence we started giving importance to it. The delivery boys were paid salaries and they were tardy. To enhance their interest we introduced a two point strategy of commission per litre and service charge per house, so that he is keeping up both supply of milk and not skipping far off houses.

After introduction of this system, the job became more lucrative and hence more delivery boys were employed at our disposal. To ensure convenience, purity and easy handling introduction of packing the milk in sachets became handy. Packing gave lot of credence to our product, since right quantity and purity were ensured and it was convenient to the customers for storage.

Present Scenario

The growing consumer awareness about cow comfort, clean milk production, usage of antibiotics and harmonal injections to the cows, we started giving importance to the above by introducing milking machine for clean milking to a section of animals, discarding milk from animals which are under treatment. We receive lot of enquiries about organic milk and also Desi Cow milk. So we are working out strategies to introduce the same in the future.

Value Addition

- Due to present health conscious awareness, we receive more inquiries about Value Added Products.
- We started producing Carrot Milk, flavoured milk, butter milk and curd in a smaller way.
- To manage the excess milk, we have opened our own sweet shop, where we produce milk based sweets.

Livestock Business
Challenges and Opportunities

There were lot of enquiries about organic manure, since cow dung is available in plenty, we have created about fifteen vermi-composting pits. In Chennai, they are prepared to pay Rs. 15/- per kg. vermi- compost and we hope that will be a major source of income for our farm in future. We were under the myth that more feed more milk, but, our contact with Nutrition Department of MVC; we came to know about the balanced ration and feeding of more roughage. During summer the feed consumption and milk production falls due to aggressive heat. To tide over this problem, we adopt a policy of aggressive breeding during the months of August and September, so that we get more calvings during summer months. At present, cost of labour has increased manifold. To find one, is difficult and to retain them is become more difficult. None in the younger generation who are willing to come to this job even if they are paid attractive salaries.

To tackle this problem, recently we have brought in milking machine to a section of animals and if found worthy it will be extended to the entire farm. We have identified a few labour who are loyal and we have upgraded them as our Strategic Partners, wherein capital and infrastructure is provided by us and logistics are entrusted to them and milk is procured from them for a price, bringing in a sense of ownership and pride in them, thus, running of the farm on a day to day basis is smooth and hassle free. The exorbitant cost of milch animal at present is also a great cause of concern. So, we are in the process of evolving a plan wherein our customers are given an opportunity to invest for one animal which can be called as cow sharing and milk supplied to them will be at a concessional rate. This way, the capital is found for the farm and at the same time the customer feels happy that he is consuming his own milk and owning a cow and is also satisfied that he is part of cow protection as well as milk production.

TECHNIQUES OF OPERATIONS RESEARCH IN LIVESTOCK BUSINESS

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Introduction

Operations Research came into existence in 1949 in our country with the opening of Operations Research Unit at Regional Research Laboratory, Hyderabad. Later many developments came in and at present, even a full fledged course on operations research (OR) is available in many institutes in the Country. The application of OR was first made useful while formulating the 2nd five year plan in our country by way of forecasting the trends of demand, availability of resources and for scheduling the complex schemes necessary for developing our Country's economy. As of now, there is hardy no single corporate sector do exists in our country that do not use at least any one of the OR techniques.

OR has become useful in engineering, science, technology, management, defence, business etc. Agriculture and allied activities too now a days are getting due attention from the policy makers in view of its major role in shaping the Indian economy both in the past and in the future. Livestock business has registered success in some quarters but failed to reap the extent of benefits which otherwise should have been yielded. Corporate style of farming might have happened in the organized poultry sector, but things are different in cattle farming. Even though India is blessed with the highest number of livestock population in the world, we are unable to excel in productivity in terms of per animal per unit time per unit area and per rupee investment. The techniques of operations research have sufficient tools to address these issues in a major way. In this paper we have discussed the meaning of OR, history of OR, applications of OR along with some of the important techniques that are applicable in livestock business.

A. Operations Research – a multi disciplinary approach

Operational research is an interdisciplinary mathematical science that focuses on the effective use of technology / resources by organizations. Operational research encompasses a wide range of problem-solving techniques and methods applied in the pursuit of improved decision-making and efficiency. Some of the tools used by operational researchers are statistics, optimization, probability theory, queuing theory, game theory, graph theory, decision analysis, mathematical modeling and simulation. Because of the computational nature of these fields, OR also has strong ties to computer science and analytics. Operational researchers faced with a new problem of determining which of these techniques are most appropriate given the nature of the system, the goals for improvement, and constraints on time and computing power.

B. Various techniques of OR

1. critical path analysis or project planning: identifying those processes in a complex project which affect the overall duration of the project
2. floorplanning: designing the layout of equipment in a factory or components on a computer chip to reduce manufacturing time (therefore reducing cost)

3. network optimization: for instance, setup of telecommunications networks to maintain quality of service during outages
4. allocation problems
5. Bayesian search theory : looking for a target
6. optimal search
7. routing, such as determining the routes of buses so that as few buses are needed as possible
8. supply chain management: managing the flow of raw materials and products based on uncertain demand for the finished products
9. efficient messaging and customer response tactics
10. automation: automating or integrating robotic systems in human-driven operations processes
11. globalization: globalizing operations processes in order to take advantage of cheaper materials, labor, land or other productivity inputs
12. transportation: managing freight transportation and delivery systems
13. scheduling:
    a. personnel staffing
    b. manufacturing steps
    c. project tasks
    d. network data traffic: these are known as queueing models or queueing systems.
    e. sports events and their television coverage
14. blending of raw materials in oil refineries
15. determining optimal prices, in many retail and B2B settings, within the disciplines of pricing science

C. Applications of OR in Management science

The management scientist's mandate is to use rational, systematic, science-based techniques to inform and improve decisions of all kinds. Of course, the techniques of management science are not restricted to business applications but may be applied to military, medical, public administration, charitable groups, political groups or community groups

Applications of management science are abundant in industry as airlines, manufacturing companies, service organizations, military branches, and in government. The range of problems and issues to which management science has contributed insights and solutions is vast. It includes:

1. scheduling airlines, including both planes and crew,
2. deciding the appropriate place to site new facilities such as a warehouse, factory or fire station,
3. managing the flow of water from reservoirs,
4. identifying possible future development paths for parts of the telecommunications industry,
5. establishing the information needs and appropriate systems to supply them within the health service, and
6. identifying and understanding the strategies adopted by companies for their information systems

D. Applications of OR in Livestock Business

Management science is concerned with developing and applying models and concepts that may prove useful in helping to illuminate management issues and solve managerial problems, as well as designing and

developing new and better models of organizational excellence. The same yardstick is applicable to livestock business too. The differences are in terms of inputs and outputs only. Like any other business/corporate industry, livestock business too has to have the vision, clients, staffing, production, process, credit, suppliers, warehousing, competition, consumers, ethics, quality etc. These show that the essential basic mangement strategies in the fields of Human Resources, Finance, Marketing, Production etc are applicable to the Livestock business too if one wants to excel and compete with others. The following tools of OR are highly applicable in these management strategies in Livestock business.

D (i) Transportation models

The transportation model is concerned with selecting the routes between supply and demand points in order to minimize costs of transportation subject to constraints of supply at any supply point and demand at any demand point. Assume a dairy entrepreneur has 5 processing plants with different capacity levels, and 5 regional distribution centres. Here 5 x 5 = 25 routes are possible. Given the transportation costs per litre of each of 25 routes between the processing (supply) plants and the regional distribution (demand) centres, and supply and demand constraints, how many loads can be transported through different routes so as to minimize transportation costs? The answer to this question is obtained easily through the transportation algorithm.

Similarly, how are we to assign different jobs to different centres/units/machines, given cost of job completion for each job ? The objective is minimizing total cost. This is best solved through assignment algorithm. Similarly the same model can be used for the transport of eggs and broilers from the supply center to the distribution center at a minimal cost. This model is also very useful in identifying the optimum cost of transport of feed in the poultry sector as many ingredients are brought from different centres.

Broadly speaking, the transportation models can be useful in the following situations.

1. To decide the transportation of new materials from various centres to different manufacturing plants. In the case of multi-plant company this is highly useful. (dairy and poultry industries)
2. To decide the transportation of finished goods from different manufacturing plants to the different distribution centres. For a multi-plant-multi-market company this is useful. (meat, leather, wool, value added milk products etc.)

D. (ii) Assignment Models

Assignment models are also useful in many ways. This is very similar to transportation models, but used to decide the assignment of jobs to persons and machines; to decide the route a marketing executive has to adopt (dealing with the order in which he/she has to visit different places – applicable in a veterinary pharmaceutical company); to decide the order in which different activities are performed in a production unit say a poultry farm.

In the case of transportation model, the supply quantity may be less or more than the demand. Similarly the assignment model, the number of jobs may be equal to, less or more than the number of machines/persons available. In all these cases the simplex method of Linear Programming Problem (LPP) can be adopted, but transportation and assignment models are more effective, less time consuming and easier than the LPP

D. (iii) Decision Trees

A decision tree is a decision support tool that uses a tree-like graph or model of decisions and their possible consequences, including chance event outcomes, resource costs, and utility. It is one way to display an algorithm. Decision trees are commonly used in operations research, specifically in decision analysis, to help identify a strategy most likely to reach a goal. Another use of decision trees is as a descriptive means for

calculating conditional probabilities. This is useful in strategic decisions by the top management in deciding to select new ventures/expansion of existing dairy /poultry / feed/ pet care and pet food /pharma units related to livestock enterprises.

D. (iv) Game theory

Game theory attempts to mathematically capture behavior in strategic situations, or games, in which an individual's success in making choices depends on the choices of others. While initially developed to analyze competitions in which one individual does better at another's expense (zero sum games), it has been expanded to treat a wide class of interactions, which are classified according to several criteria.

In these world of competition in every sphere of business, the strategy of the top management is devised in such a way that the decisions either counteract or offset the decision of the competitor. In the end one wins the game and other looses. There are occasions that both may win but the extent they sustain may differ. In livestock business, game theory may find its usefulness in marketing strategies including advertisement, price wars, quality, taste, shelf life, packing, value addition, offers etc.

E. Conclusion

The various tools in the subject of operations research have been found useful in a larger way in many fields. However its usefulness in livestock business has not been fully exploited. The assignment modes, tranportation models, game theory and decision trees are explaiuned in brief in this paper while there are many more OR tools do exist. It is upto the user to indentify the suitability of the model to be used as per his/her requirement. The interpretation of the results from these tools is an important and critical criteria that will help the decision maker to proceed in the right direction.

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ALTERNATIVE POULTRY FARMING

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Introduction

The poultry sector which was a backyard entity in the early decades it enjoys an industry status today and the industry is well diversified industry. As the poultry industry is grappled with problem of bird flu, is high time for our entrepreneurial farmer to diverse into an unknown and unexploited Alternative poultry(Emu and Ostrich) which is highly resistant to diseases and can adapt to varied environmental conditions.

The emu (Dromaius novaehollandiae), one of the ancient group of birds, belongs to the order of flightless birds called ratites. Other ratites include the Ostrich (South Africa), Rhea (South America), Cassowary (Australia) and Kiwi (New Zealand). Commercial emu farming was first started in Australia in 1987 to produce emu meat, leather and oil. The farming of emu is well established in Australia and is gaining popularity in the United States, Europe and China. The USA has the largest population followed by Europe, Canada, China and New Zealand. Emu Farms are being established in a number of Asian countries and there are about 5 lakh emu breeder birds in India at present.

Emu farming in India is still in a primitive stage. Emu farming was first started in Andhra Pradesh in 1996 followed by Maharashtra, Tamil Nadu, Karnataka, Kerala and Pondicherry. More and more farms are coming up in different parts of India. The Emu is the Australia's tallest native bird. Emu has a long neck and relatively small naked head. The height of Adult bird is about 5-6 feet and weight is around 45-60 kg. Legs are long and are covered with scaly skin. Body is covered with feathers which are useful to resist extreme hot and cold climatic conditions. Adult Emus are covered with shaggy grey brown feathers except for the neck and head, which are largely naked and bluish-black. The wings are greatly reduced, but the legs are long and powerful. Each foot has three forward-facing toes and no hind toe and the bird sits on haunch. Natural food of emu is insects, tender leaves of plants and forages on different grasses. Emu also eats different kinds of vegetables and fruits like carrot, papaya, water melon, mango etc.

Emu chicks are about 10 inches tall at birth, with black and white stripes. Until the age of two months, the chicks have longitudinal stripes, as they grow the stripes wane and brown black feather starts developing on the body. As the bird matures, they develop a peacock blue neck. There are black feathers on the head. Emus are very hardy birds and adapted to varied agro climatic conditions. The anatomical and physiological features of Emu facilitate its adaptation to diverse climatic conditions such as temperate and tropical areas. There are no known common diseases affecting this species, They can thrive in environments ranging from the hot desert (56°C) to very chill climatic regions (0°C). The feather pattern and nostrils make it resistant to extreme climatic conditions.

The digestive system of emu is different from chicken with the absence of crop favouring better utilization of fibrous diets. These birds are temperamentally docile, and hence can be reared under semi - intensive management conditions with well balanced diet. Emu rearing do not require prime farm land. Marginal land not suited for cultivation of crops can be utilized for this purpose. Emu rearing is not as labour intensive as other traditional livestock. Emu can be raised as an additional farm enterprise to what is currently being done and they integrate well with other livestock operations. Emus yield 95% usable products which include meat (a low fat and cholesterol red meat), oil (a highly penetrating, non-toxic moisturizer), leather (a soft, supple, durable hide with a very distinctive quill pattern used for high fashion industry in products such as jackets, boots, belts, gloves and

accessories) and feathers (designer vests, hats and trim, fishing lures and high-tech environments for delicate cleaning). Egg shells and claws can be carved into Jewelry and decorative items.

Ratite (Emu & Ostrich)- An Alternative Livestock

The economic value of the emu is dependent upon the oil, meat and hide. At market age(15 to 18 months),an emu can yield approximately five liters of oil. This oil is an unsaturated fat and is currently being used in skin care products and topical anti-arthritic creams. Emu meat is low in fat and cholesterol. A 100 gram of emu meat contains 23.3g of protein,109 calories of energy, 57.5 mg of cholesterol 1.7g of fat and 0.6 g of saturated fat. Emu leather is a fine-grained hide that is being used by the fashion industry .Once the slaughter and post-slaughter markets are established the farming of emu may become a successful alternative agricultural business in India.

Housing and Facilities

Adult and young birds must have adequate protection from adverse weather conditions. One adult breeder pair of emu can be housed in a shelter at least 8 by 8 feet that is covered on top and on two or three sides. Emus need a pen and paddock. Paddock size can range from 500 sq.ft. - 1000 sq.ft. per pair of birds. Fencing can be chain link fence, 2 - by 4-inch wire. The recommended height is 6 to 7 feet. Great care should be taken to remove all foreign metal objects, such as nails or staples, from the pen and paddock areas, since emu swallow these objects resulting in severe gastrointestinal problem and death. Emu farmers in India use large magnets to remove metal objects after construction of fences and pens.

Handling of adult emu bird

Wing hold method is accepted method of handling adult emu birds. The most common way to handle adult sized birds is to approach the bird quietly (walk, don't run), once when we are close enough, grab it quickly and firmly from the side or behind by both wings. Allow the bird to get over its fright by letting it jump up or down a little while still keeping our hold on it. Then, if the purpose of catching the bird is to move to another location, propel it forward while moving behind or alongside it (still retaining the grip on the wings) so that the bird's energy is used for forward motion rather than jumping in an attempt to escape.

Nutrition

Nutrition-related mortality problems in chicks and young juveniles include malnutrition or starvation, intestinal obstruction, and leg abnormalities. Recommended starter, grower, finisher, breeder and maintenance, breeder diets are summarized in nutritional guidelines for emus. It is absolutely essential that emus have clean water available at all times. They must receive feedstuffs that provide adequate levels of protein and essential amino acids, to meet their vitamin, mineral, and energy requirements.

Waterers should be rinsed daily and scrubbed every 3 days with a mild disinfectant. Inexpensive, water soluble vitamins and electrolytes for poultry should be added (at the recommended level) to the drinking water for the first 1 to 3 weeks. The fat soluble vitamins (A, D3, E, and K) are compounded with a starch or protein emulsifier to enhance dispersion and availability in water. This will ensure an adequate intake of vitamins, particularly A and D3. The following program is practical and has provided excellent results in rearing emu chicks. Start them on a good quality emu starter ration containing at least 20 percent protein. Emu farmer withhold feed up to 72 hours in newly hatched chicks to allow for the complete reabsorption of the yolk sac. The quality and health of the chick should be carefully evaluated before withholding feed beyond 48 hours.

The starter ration is formulated to provide all nutrients necessary for optimum growth and health during the first 2 weeks of life, and it should be offered in the crumbled form. All other feeds should be pelleted. Chicks should receive continuous light and have access to the starter ration at all times during the first 3 weeks. After that, they can be fed all the starter ration they will consume in two short (20-minute) daily feeding periods. Chicks should not be fed excess protein. Too much protein may cause excessive weight gain, which can contribute to

leg weakness, leg abnormalities, and death. While emus do require more fiber than other birds, high-fiber feeds can cause intestinal obstructions in young chicks and result in "starveout', deaths. Never feed any feedstuff that is damp, moldy or suspect in any way. Botulism or mycotoxicosis leading to intestinal problems may occur. Throw away any damp or moldy feed.

The primary feed ingredients of emu feeds should consist of maize, soybean meal, Deoiled Rice bran sunflower meal etc. At 8 weeks of age, chicks can be placed on a good quality emu grower ration and fed what they will eat two daily feeding periods, juveniles can be switched to a maintenance diet at 25 weeks of age until they reach sexual maturity. Breeder rations contain a high calcium level and should not be fed to juveniles. The breeder diet should be fed 2 weeks prior to the expected first egg.

Forage feeds such as Stylo, Desmanthus etc for juveniles and adults will reduce production costs significantly. Some forages may be too tough or high in fiber or too low in protein and energy to provide the nutrient level required for desired growth. If emus are allowed to forage on natural grasses or grain, try to balance this nutrient intake with the amount of commercial feed that is fed. Breeding birds on pasture should receive daily supplements of a good quality, high protein emu breeder ration to ensure optimum egg production, fertility, and hatchability. Breeders in dry-lot confinement also should be fed the emu breeder ration.
Emus should not be allowed to become overweight. Excess fat is detrimental to egg production

Nutritional Guidelines for Emus

Calculated Analysis	Starter 0 to 6 week	Grower 6 to 36 week	Finisher (36 wk to Mkt Wt)	Breeder (3 - 4 wk before egg production)	Maintenance
Metabolizable energy (kcal / kg)	2700	2600	2600	2600	2400
Crude Protein %	20	18	16	20	15
Lysine %	1.0	0.8	0.7	0.9	0.63
Methionine %	0.45	0.4	0.35	0.40	0.25
Meth + Cyst %	0.75	0.7	0.60	0.76	0.47
Tryptophan %	0.17	0.15	0.13	0.18	0.12
Threonine %	0.50	0.48	0.42	0.60	0.38
Calcium % mini	1.5	1.5	1.5	2.50	1.6
Total phosphorus %	0.80	0.7	0.6	0.6	0.6
Available phosphorus %	0.55	0.5	0.40	0.4	0.4
Sodium chloride %	0.40	0.3	0.30	0.4	0.3
Crude fiber (max) %	9	10	10	10	10
Vitamin A (IU / kg)	15-000	8800	8800	15000	8800
Vitamin D_3 (ICU / kg)	4500	3300	3300	4500	3300
Vitamin E (IU / kg)	100	44	44	100	44
Vitamin B_{12} (micro g/kg)	45	22	22	45	22
Choline (mg / kg)	2200	2200	2200	2200	2200
Copper (mg/kg)	30	33	33	30	33
Zinc (mg/kg)	110	110	110	110	110
Manganese (mg/kg)	150	154	154	150	154
Iodine (mg/kg)	1.1	1.1	1.1	1.1	1.1

Breeder Flock Management

Well-nourished emu hens begin laying at approximately 2 years of age and are reported to have a productive life of approximately 16 years. Egg production is variable but can exceed 50 eggs per year. After 2 years of age, the average egg production is 25 to 30 eggs per year. Production begins in October and continues into March. Juvenile hens and cocks should be reared separately from 1 year of age to sexual maturity. Mature hens and cocks should be separated after the breeding season. This will allow the birds to be more rested, and they will begin egg production more readily when placed together for the breeding season in September. When pairing hens and cocks, always present the cock to the hen in her pen. Sometimes pairs are incompatible and do not mate. If this occurs, present the cock to a different hen.

If eggs are infertile during the early part of the breeding season, this is usually caused by infertility in the cock. The hen will generally lay an egg every 3 days during the breeding season. The breeding pen for each cock and his hens should be 500-1000 sq.ft. area and well drained. Birds in larger enclosures are more difficult to manage. Eggs also will be more difficult to find and collect. A few trees or shrubs in the pens will provide privacy and help induce mating. Eggs are normally laid in a shallow scrape, which is a small hole in the ground. They should be collected twice daily. Reproductively active cocks can be extremely protective and aggressive. Caution should be taken when entering their breeding areas. Aggressive cocks can be fed and penned in a catch or holding pen while eggs are collected.

Hatchery Management

Proper management is critical for successful hatchability. Hatchability problems can be caused by inadequate breeder nutrition, mating problems, improper egg handling, incubator or hatcher malfunctions, and humidity or temperature problems. Successful management of a moderate size hatchery requires a high degree of expertise and attention to detail. Cleanliness is very important. The environmentally controlled hatchery building should be designed for durability and ease of cleaning. It should be of sufficient size, to handle anticipated egg volume and must include areas for egg cleaning and culling, egg trays, cooling and storage, incubation and hatching, chick holding, equipment washing, and storage, as well as office and sanitary facilities.

Equipment requirements for the hatchery include a standby generator, forced draft incubators and hatchers, service tables, a vacuum pumb for cleaning, pressure washer, tray washers, and carts. Incubators and hatchers that can be used for emu eggs are manufactured and sold by several commercial companies in India. A good ventilation system is a must for successful incubation and hatching. In addition, when building a hatchery, keep in mind that emu eggs require a low relative humidity (24 to 35 percent). Thus, in areas of the state with high relative humidities during the emu's breeding season, a dehumidifier system should be installed.

Incubation and Hatching Requirement

Emu eggs should be stored with the large end up at a room temperature of 65 to 70 degrees F. During holding time, the egg should be rotated twice a day. Better hatchability may occur if eggs are set (placed in the incubator) within 2 to 4 days after lay, longer storage may reduce hatchability.

Never set an excessively dirty egg. Manure or dirt should be gently scraped off or lightly sanded with fine grit sandpaper. It is generally not advisable to wash eggs unless absolutely necessary. Only in extreme situations should eggs become wet during the cleaning process. Dirty eggs can be flushed with commercially available Virkon-S powder. If eggs are to be wet, the wash water and rinse water must be at least 10 degrees F. warmer than the eggs. An individual towel should be used for each egg and towels should not be reused. Disinfectants should not be used. The use of disinfectants in the cleaning solution can alter the egg shell cuticle and affect the

rate of water loss during incubation, thus possibly adversely affecting chick quality and hatch time. Incubation time to hatch for emu chicks is between 48 and 52 days with about 50 days being the average. The optimum weight loss for the emu is believed to be between 13 and 17 percent from the time the egg is laid until internal pipping occurs.

After hatching, the chicks should be allowed to remain in the hatcher only for the time sufficient to provide for drying without dehydration. A chick that is up and moving about is ready to be removed from the machine. On an average, the holding time after hatch should be about 12 hours.

Management of Emu Chicks

Emu producers often experience high mortality in chicks and young juveniles as the result of improper brooding and poor early management practices. The following recommendations, when effectively implemented and carefully followed, will significantly improve livability and quality of both chicks and juveniles. Caretakers must be trained and properly supervised to maintain desired conditions and to recognize and correct problems. The brooding facility must be designed to protect chicks from predators (dogs, foxes, etc.) as well as from inclement weather. Chicks should never be allowed to get soaking wet. The brooding area must be kept dry and sanitary at all times and should be designed for effective ventilation and ease in cleaning. Concrete floors in brooding units make them easy to clean.

Emu chicks weigh about 370 to 450 g (about 67% of egg weight) depending on the size of egg. First 48-72 hours emu chicks are restricted to incubator for quick absorption of the yolk proper drying. Place the hobbles for each chicks to prevent leg deformity. Like chicken Emu needs brooding during their early life. Clean and disinfect brooding shed thoroughly well in advance of receiving chicks, spread litter (paddy husk) cover new gunny bags or burlap over the litter. Arrange a set of brooder for about 25-40 chicks giving 4 sft per chick for first 3 weeks. Provide brooding temperature of 90°F at first 10 days and 85°F till 3-4 weeks. Proper temperature makes the brooding successful. Provide sufficient water-mugs of a liter capacity and equal number of feed troughs under the brooder. A chick guard must be 2.5 feet height to avoid jumping and straying of chicks. Provide 24 hours of one foot candle light i.e 40 watt bulb for every 100 sft area. Offer small pieces of carrot to the emu chicks since the birds readily eat and also gets attracted. After 3 weeks of age, slowly extend the brooder area by widening the chick guard circle and later remove it by the time chicks attain 6 weeks. Feed starter mash for the first 6 weeks. Ensure proper floor space for the birds housed as these birds require run space for their healthy life. 30 ft run space is required; hence floor space of 40ft x 30ft is required for about 40 chicks if out door space is provided. Floor must be easily drained and free from dampness. Periodical body weights on 10% of birds will give a scope for correction of management defects.

Health Care and Management

Ratite birds are generally sturdy and live long (100% livability). Mortality and health problems are mainly in chicks and juveniles. These include starvation, malnutrition, intestinal obstruction, leg abnormalities, coliform infections and clostridial infections. The main causes were improper brooding or nutrition, stress, improper handling and genetic disorders. Other diseases reported were rhinitis, candidiasis, salmonella, aspergillosis, coccidiosis, lice and ascarid infestations. Ivermectin can be given to prevent external and internal worms at 1 month interval beginning at 1 month age.

In emu enteritis and viral eastern equine encephalomyelitis (EEE) were reported. In India so far few outbreaks of Ranikhet disease were recorded based on gross lesions but were not confirmed. However, the birds vaccinaled for R.D at the age of 1 (lasota), 4 (lasota booster) weeks; 8, 15 and 40 weeks by mukteswar strain gave better immunity.

Emu Products

Emu Oil

Emu oil is rendered from the fat of the emu bird mainly collected from the back and rump region. The emu oil is an unsaturated fat and is currently being used in skin care products and topical arthritis cream and oil. The most intriguing property of emu oil is its ability to penetrate human skin. Skin penetration is an important feature in cosmetic, pharmaceutical and medicinal products. As a result, emu oil may possibly be an alternative to liposomes as a drug delivery system. The fatty acid composition of emu oil is very similar to the oil secreted by human skin glands. This possibly explains the penetrating, moisturizing and conditioning ability of emu oil on the skin. Other commonly repeated claims include the ability of emu oil to heal burns, wounds and arthritis. Of these, only the anti-inflammatory properties of emu oil have been supported by scientific evidence.

Properties of Emu Oil

- Highly Penetrating
- Anti- inflammatory
- Good emulsifier
- Bacteriostatic
- Non- comedogenic
- Good moisturizer
- Anti-aging and wound healing ability
- Low potential for irritation of human skin

Uses of Emu Oil

- Emu oil is a natural emollient suitable for skin care and cosmetics
- Emu oil can help to reduce the appearance of ageing since it can thicken the skin.
- Due to its penetrating and anti inflammatory property it is an ideal choice for arthritis and rheumatism
- It can fill up the scars caused by pimples
- It is highly suited for curing the sprains, pulled muscle and sore joints the sportsmen frequently met with

How the Emu Oil works?

Emu oil is rich in poly unsaturated fatty acids (PUFA) especially Alpha Linolenic (Omega 3) and Linoleic acid (Omega 6). It is a proven fact that the Omega fatty acids are heart friendly since by reducing the blood cholesterol level they help in preventing cardiovascular diseases.

Emu Meat

The Gourmet, as the emu meat is scientifically known is a lean (98% fat free) red meat similar to beef both in taste and appearance, it is low in fat than chicken, mutton, beef and pork. Gourmet is free from chemical additives or preservatives since emu birds are raised in a natural atmosphere. Gourmet is an excellent alternative for health conscious consumers who loves the traditional taste of red meat. Gourmet owes its heart friendly nature to its low cholesterol level. Hence gourmet is rightly called as the "Super food of the New millennium.

Emu Leather

- Emu leather is thin, very durable, supple and breathable.
- Perfectly fit for designer apparels, handbags, boots and other accessories.
- Has a shimmering surface due to the raised imprints left from the feather follicles structure
- Has a unique and very attractive full quelled pattern.
- Has the ability to accept and enhance any color dye.
- The thickness and softness make it suitable for lightweight clothing and accessories.

- The leg skin is highly suitable for making watch bands, belts and features of wallets due to its attractive scale pattern similar to reptilian leather.
- Emu leather products cannot be duplicated due to unique quelling pattern.
- About 6-8 sq. ft. of hide may be obtained from an adult bird.

Emu Feather

Feathers are soft non allergic/ anti static, beautiful double quilled and are used in hats, dresses, computer and car cleaning brushes and household decorative items.

Emu Shells and Nails

The egg shells are used for painting and as decorative items due to its deep blue color. Nails are strong and decorable used in artificial ornaments and craft goods. The polished emu, nails used as jewelry accessories which is an unique and ultimate favour for fashion designers.

Ratite Industry

Producers all over the country, especially in the south and south west, have turned to raising emu, rhea and ostrich as an alternative to crops and traditional livestock. The raising of the ratites is becoming an alternative livestock at a time when product diversification is considered imperative to the success of the small family farm. The strong current market process for all ages of birds is a powerful incentive to these new producers. In today's market the ratite can produce a far greater return than any other agricultural pursuit on a per acre basis. As this developmental industry progresses in a logical fashion. There will be tremendous opportunities for both the small and large producers alike, as well as for those engaged in the service and support structure. The market prices for these birds will remain high for the next several years and a positive return on investment will probably be the norm.

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DOMESTIC FOOD LAWS - FOOD SAFETY AND STANDARDS ACT 2006

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Introduction

Food safety is about ensuring that all food is safe and acceptable at national/ international level. Rapid industrialization has interrupted the human life mainly through environmental degradation at micro level. Health and life expectancy are at stake. Physical, Chemical, Microbiological contamination of food and food related articles have started threatening human beings, animal and plant life. The forum for multilateral trade agreement is now being used as a platform to find a solution to the human health and environment by majority of nations who are the signatories of WTO. This SPS agreement of WTO is addressing these challenges. This agreement is in vogue from 1995. Sanitary (Human And Animal Health) and Phyto-Sanitary (Plant Health) regulations sets out basic rules for food safety, animal and plant health standards/measures and applies to the domestically produced food or local animal or plant diseases, as well as products coming from other countries. SPS allows countries to set their own standards, which should be based on science. India with its one billion plus population must be proactive in food safety issues especially in wake of trade liberalization. Major concerns on food safety in India are physical, chemical and microbial contaminants.

Genesis of FSS Act 2006

Government of India appointed a Task Force under the chairmanship of Justice (Retd.) E.S. Venketaramaiah to review the existing Food Laws including Prevention of Food Adulteration Act (PFA Act) and to suggest a simplified and harmonized Food Law in 1955. This Task Force suggested that there should be a paradigm shift in the legal framework to promote 'good manufacturing practices'(GMP) which has been universally found to be a better instrument to protect public health, minimize commercial fraud and to promote the development of industry and trade on scientific lines. The Prime Minister's Council on Trade and Industry appointed a Subject Group on Food and Agro Industries headed by Nusli Wadia. This group recommended that there is an urgent need to not only avoid existing multiplicity of laws and multifarious agencies administering them but also suggested that the harmonization of these laws under a single umbrella so that a single authority can supervise the effective implementation of the law. Various central Acts like Prevention of Food Adulteration Act, 1954 , Fruit Products Order , 1955, Meat Food Products Order , 1973,Vegetable Oil Products (Control) Order, 1947,Edible Oils Packaging (Regulation) Order 1988, Solvent Extracted Oil, De- Oiled Meal and Edible Flour (Control) Order, 1967, Milk and Milk Products Order, 1992 etc will be repealed after commencement of FSS Act,2006. This Act was passed by the Parliament and notified in the Gazette vide No.34 of 2006 dated 23rd August 2006.

Salient Features of the Food Safety and Standards Act, 2006

The Act also aims to establish a single reference point for all matters relating to food safety and standards, by moving from multi- level, multi- departmental control to a single line of command. To this effect, the Act establishes an independent statutory Authority – the Food Safety and Standards Authority of India with head office at Delhi. Food Safety and Standards Authority of India (FSSAI) and the State Food Safety Authorities shall enforce various provisions of the Act.A pressing need for having a modern Integrated Food Law (IFL) had been articulated by various stakeholders viz. the State Governments, Industry, R&D Institutions, etc. from time to time, due to following reasons:

- Multiplicity of food laws and standards setting and enforcement agencies create confusion in the minds of consumers, traders, investors and manufacturers.

- Varied quality / safety standards regarding admissibility and levels of food additives and contaminants, food colours, preservatives etc. lead to harassment of manufacturers of food products and other stakeholders and restrict innovation in food products.
- Thin spread of manpower, food laboratories and other resources under various authorities administrating these laws, is not conductive to effective fixation of food standards and their enforcement.

Such a situation is detrimental to the growth of the nascent food processing industry, which is so vital for generating employment and enhancing income of farmers in our country. The main objectives of the Food Safety and Standards Act, 2006 are to:

- consolidate the laws relating to food, establish the Food Safety and Standards Authority of India for laying down science based standards for articles of food,
- regulate manufacture, storage, distribution and sale and import of articles of food to ensure availability of safe and wholesome food for human consumption and
- Augumenting infrastructure, manpower, testing facilities for better standard fixation and enforcement.
- . The Food Authority will be assisted by Scientific Committees and Panels in fixing standards and by a Central Advisory Committee in prioritization of the work.
- Adequate representation of government, industry organizations, consumers, farmers, technical experts, retailers etc. This consultation is not only provided at the highest level of the Food Authority, but also at various levels like Central Advisory Committee, Scientific Committee and Scientific Panels.
- Financial penalties for misuse of powers by Food Safety Officers.
- graded penalties depending upon the gravity of offence,
- adjudication and compounding of offences
- an effective, transparent and accountable regulatory framework within which the industry can work efficiently, putting in place an investor friendly rather than an adversarial regulatory mechanism, which emphasizes self regulation and capacity building; decentralization of licensing for manufacture of food products and establishing a single reference point for all matters relating to food safety and standards.
- the enforcement of the legislation will be by the State Governments/ UTs through the state Commissioner for Food Safety, his officers and Panchayati Raj/Municipal bodies.

The Act, inter alia, incorporates the salient provisions of the Prevention of Food Adulteration Act, 1954 and is based on international legislations and instrumentalities. In a nutshell, the Act takes care of international practices and envisages a overreaching policy framework and provision of single window to guide and regulate persons engaged in manufacture, marketing, processing, handling, transportation, import and sale of food. The Act is contemporary, comprehensive and intends to ensure better consumer safety through Food Safety Management Systems and setting standards based on science Systems and setting standards based on science and transparency as also to meet the dynamic requirements of Indian Food Trade and Industry and International trade.

The Food Safety and Standards Authority of India (FSSAI)

Established under Food Safety and Standards Act, 2006 which consolidates various acts & orders that have hitherto handled food related issues in various Ministries and Departments. FSSAI has been created for laying down science based standards for articles of food and to regulate their manufacture, storage, distribution, sale and import to ensure availability of safe and wholesome food for human consumption

Establishment of the Authority

Ministry of Health & Family Welfare, Government of India is the Administrative Ministry for the implementation of FSSAI. The Chairperson and Chief Executive Officer of Food Safety and Standards Authority of India (FSSAI)

have already been appointed by Government of India. The Chairperson is in the rank of Secretary to Government of India.Framing of Regulations to lay down the Standards and guidelines in relation to articles of food and specifying appropriate system of enforcing various standards thus notified.

- Laying down mechanisms and guidelines for accreditation of certification bodies engaged in certification of food safety management system for food businesses.
- Laying down procedure and guidelines for accreditation of laboratories and notification of the accredited laboratories.
- To provide scientific advice and technical support to Central Government and State Governments in the matters of framing the policy and rules in areas which have a direct or indirect bearing of food safety and nutrition.
- Collect and collate data regarding food consumption, incidence and prevalence of biological risk, contaminants in food, residues of various, and contaminants in foods products, identification of emerging risks and introduction of rapid alert system.
- Creating an information network across the country so that the public, consumers, Panchayats etc receive rapid, reliable and objective information about food safety and issues of concern.
- Provide training programmes for persons who are involved or intend to get involved in food businesses.
- Contribute to the development of international technical standards for food, sanitary and phyto-sanitary standards.
- Promote general awareness about food safety and food standards

Definitions (Section 3):

"Food": Food means any substance, whether processed, partially processed or unprocessed, which is intended for human consumption and includes primary food, genetically modified or engineered food or food containing such ingredients, infant food, packaged drinking water, alcoholic drink, chewing gum and any substance, including water used into the food during its manufacture, preparation or treatment but does not include any animal feed, live animals unless they are prepared or processed for placing on the market for human consumption, plants prior to harvesting, drugs and medicinal products, cosmetics, narcotic or psychotropic substances further, the Central Government is empowered to declare, by way of notification in the Official Gazette, any other article as food for the purposes of the Act having regards to its use, nature, substance or quality

"Primary food": Primary Food means or refers to an article of food, being a produce of agriculture or horticulture or animal husbandry and dairying or aquaculture in its natural form, resulting from the growing, raising, cultivation, picking, harvesting, collection or catching in the hands of a person other than a farmer or fisherman.

"Food safety": Food safety means the assurance that food is acceptable for human consumption according to its intended use;

"Standard": The Standard in relation to any article of food, means the standard notified by the Food Authority. The chapter II covering section 4 to 17 deals with the establishment, composition and functions of Food Safety and Standards Authority of India.

Sections 18 seeks to provide for the general principles to be followed in administration of the Act by the Central Government, the Food Authority, the State Governments and other agencies, while framing regulations and specifying food safety standards or while enforcing or implementing the provisions of the Act. The general principles are:

- Protection of Human Life and Health
- Protection of consumer interests including fair practices in all kinds of Food Trade
- To carryout provisional risk management measures necessary to ensure appropriate level health

- Protection of farmers interests
- Risk Analysis
- Transparent Public consultation & information
- Fair practices in food trade
- Due consideration of international standards

The Food Authority should, while discharging its functions, take into account the prevailing practices and conditions in the country including agricultural practices, handling, storage and transport conditions including international standards and practices, etc. The said authorities shall be guided by the general principles of Food Safety such as risk analysis, risk assessment, risk management, risk communication, transparent public consultation, protection of consumer interests, etc. It empowers the Food Authority to notify other general principles from time to time as per the requirements.

General Provisions as to Articles of Food (Chapter iv section 19 to 25) that is not based on an adequate or scientific justification thereof.

Provisions relating to Import (CHAPTER V)

Section 25 makes all imports of articles of food to be subject to the provisions of the Act. It provides that no person shall import into India any article of food or any unsafe or misbranded or sub-standard food or food containing extraneous matter in contravention of the Act or any rules and regulations made there under. It also provides that the Central Government shall, while prohibiting, restricting or otherwise regulating import of articles of food under the Foreign Trade (Development and Regulation) Act, 1992 (22 of 1992), follow the standards laid down by the Food Authority under the provisions of this Act and the rules and regulations made there under.

Implementation and Enforcement of Act

The enforcement of the law would be through the state commissioner of Food Safety (CFS) and his officers (viz Designated Officer, Food Safety Officer) and Panchayati Raj / Municipal bodies.

Commissioner of Food Safety of the State: The state government shall appoint the CFS for the State for efficient implementation of food safety and standards and other requirements. He shall perform all or any of the following functions, namely:

(a) prohibit the manufacture, storage, distribution or sale of any article of food in the interest of public health,

(b) carry out survey of the industrial units engaged in the manufacture of food,

(c) conduct or organise training programmes for the personnel, generating awareness on food safety,

(d) ensure an efficient and uniform implementation of the standards,

(e) sanction and prosecution for offences and

(f) such other functions as the state government may, in consultation with the Food Authority entrust.

Designated Officer: The CFS shall, by order appoint the Designated Officer to be in- charge of food safety administration in such area as may be specified. The functions of the Designated Officer, includes:

(a) to issue or cancel license of food business operators as the Licensing Authority,

(b) to prohibit the sale of any article of food which are not as per prescribed standards,

(c) to receive report and samples of article of foods from Food Safety Officer ,

(d) to make recommendations to Commissioner of Food Safety for sanction and launch prosecutions in case of contraventions punishable with imprisonment ,

(e) to sanction and launch prosecutions in case of contraventions punishable with fine,

(f) to maintain record of all inspection made by Food Safety Officer ,

(g) to get investigated any complaint which may be made in writing in respect of any contravention of the provisions of this Act.

(h) to investigate any complaint which may be made in writing against the Food Safety Officer and

(i) to perform such other duties as may be entrusted by the Commissioner of Food Safety .

Food Safety Officer: The CFS may appoint Food Safety Officers for such local areas as it may assign to them for the purpose of performing its functions under this Act. He would take sample for analysis, inspect/search business premises, seize foods, and launch prosecution as sanctioned by CFS.

THE METHOD OF ORDINARY LEAST SQUARES ANALYSIS AND INFERENCE

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Statistics is about estimation and inferences. It helps the researcher to estimate the unknown population/ universe parameters from the sample characteristics. Any research design proceeds as follows: (1) specification of theory or hypothesis, (2) specification of the structural relations of the theory, (3) specification of the empirical model of the theory, (4) obtaining data, (5) framing hypotheses, (5) estimation of the parameters of the model, (6) hypothesis testing, (7) inferences, (8) forecasting or prediction, and (9) using the results for control or policy purposes. Statistical data consists of (1) time series data, (2) cross-sectional data, (3) panel or pooled data, a combination of 1 and 2, and (4) special data like event, cohort, duration, spatial and ethnographic data. The Census is the complete enumeration of the population or universe, while the sample is a selection of some representations of the universe. Sampling methods may be random, stratified, cluster or purposive.

In the regression analysis, the aim is to find out the relationship between variables – whether two variables are correlated and whether there is a causal effect, i.e. whether we can find/estimate the effect of one variable on the other. Correlation implies that there is an association between the paired values of two variables, where association means that the fluctuation in the values for each variable is sufficiently regular to make it unlikely that the association has arisen by chance. Correlation measures the strength or degree of linear association between two variables (-1 to +1). A key thing to remember when working with correlations is never to assume a correlation means that a change in one variable causes a change in another. No causal link can be deduced from a correlation alone. The formula to measure of correlation is:

$$r = \frac{n\sum XY - (\sum X)(\sum Y)}{\sqrt{[n\sum X^2 - (\sum X)^2][n\sum Y^2 - (\sum Y)^2]}}$$

Regression analysis helps to find causal effect one variable on the other. Let the theory be X (income) influences Y (consumption), i.e. $Y = \alpha + \beta X$. We know the relationship is not exact; so, add an error term to the model. Then the model becomes stochastic:

$$Y = \alpha + \beta X + u$$

where u is a random variable. This implies that we are modelling Y as a random variable. Without including the random term, estimation will produce biased estimates of the coefficients. The disturbance term u captures:

Omitted explanatory variables: what has been left out that might cause variations in Y? The β will be biased; including additional relevant variables to minimise bias.

Structural stability: what if the sample contained observations from two populations? Coefficient could reflect differences between populations rather than within populations.

Measurement error: *concept error* - differences between theoretical concept and empirical counterpart, and *empirical error* – variables incorrectly measured.

Functional form: chose the correct functional relationship between Y and X (linear or nonlinear); estimating a straight line through a clearly non-linear relationship will result in a higher residual variance than necessary.

Heteroscedasticity, multicollineary and autcorrelation are other types of problem.

The general regression model may be stated in matrix notation as:

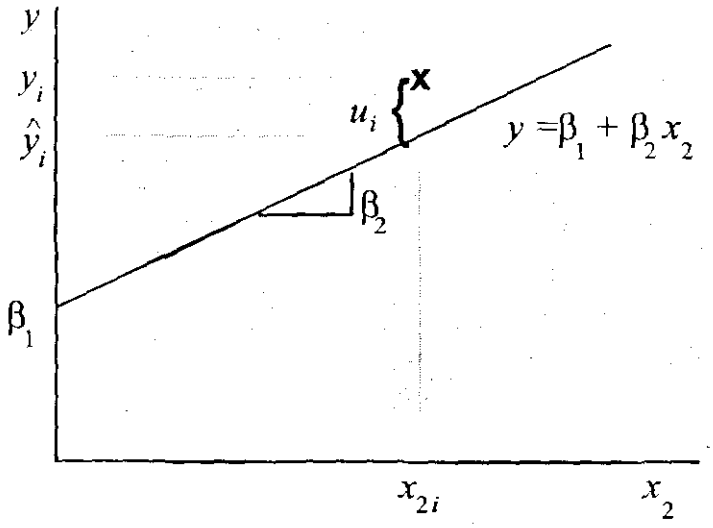
$$\mathbf{y = Xb + u}$$

where y is an n x 1 vector the dependent variable, X is an n x k matrix of the independent variables, βb is a k x 1 vector of coefficients to be estimated and u is an n x 1 vector of random disturbances.

Estimation of the parameters of the regression model by ordinary least squares (OLS) is common.

The assumptions of OLS are that (1)the regression model is linear in parameter, (2) X values are fixed in repeated sampling (non stochastic), (3) $E(u_i)=0$ (zero mean of u), (4) homoscedasticity (var $u_i=E\ u_i^2 = \sigma_u^2$) for all t, (5) no auto or serial correlation [cov $(u_i\ u_j) =E\ u_i\ u_j = 0]$ if $i \neq j$, (6) zero covariance between ut and X_t ($E\ (u_t\ X_t) = 0$), (7) $t > K$, t is time and K in the number of explanatory variables, (8) variability in X values, (9) normality (i.e. $u \sim N\ (0, \sigma_u^2)$), (10) the regression model is correctly specified, and (11) there is no perfect multicollinearity.

To (slightly) simplify notation, re-write the equation as $Y_i = a + b\ X_i + u_i$. The estimates of a and b come from the sample regression line $Y_i = a + bX_i + e_i$ by choosing the values of a and b to minimise the sum of squared errors Σe^2. This gives the ordinary least squares (OLS) estimates.



Note that $e_i = Y_i - (a + bX_i)$. Hence we minimise Σe^2 by choice of a and b. Why? Finding the sum of e that is close to zero is problematic. As some point lie above the line and some below the line, distances will in large part cancel out each other out.

Hence minimise: $\Sigma e^2 = \Sigma(Y-a-bX)^2 = \Sigma(Y^2 - 2aY + a^2 + 2abX - 2bXY + b^2X^2)$.

For a minimum, the 1st order condition for b is:

$$\frac{d \sum e^2}{db} = \frac{d\left(\sum (Y - a - bX)^2\right)}{db} = 2 \sum (Y - a - bX)(-X) = 0$$

and hence $-2 \Sigma XY + 2a \Sigma X + 2b \Sigma X^2 = 0$ which is $-\Sigma XY + b \Sigma X^2 + a \Sigma X = 0 \Rightarrow \Sigma XY = b \Sigma X^2 + a \Sigma X$.

And the 1st order condition for a is :

And hence $-\Sigma Y + na + b\Sigma X = 0 \Rightarrow \Sigma Y = na + b \Sigma X$.

The equations: $\Sigma XY = b \Sigma X^2 + a \Sigma X$ and $\Sigma Y = na + b \Sigma X$ are called the normal equations (2 equations, 2 unknowns in this case).

Solving them gives the estimates of a and b. For b: $\Sigma XY = b \Sigma X^2 + (\Sigma Y/n - b \Sigma X/n) \Sigma X$ and substituting for a in the first equation) $a = b(\Sigma X^2 - (\Sigma X)^2/n) + \Sigma Y \Sigma X/n$. Thus,

$$b = \frac{\sum XY - \sum X \sum Y / n}{\sum X^2 - (\sum X)^2 / n} = \frac{n \sum XY - \sum X \sum Y}{n \sum X^2 - (\sum X)^2}$$

$$a = \overline{Y} - b \overline{X}$$

Alternatively, in deviations form the parameter estimates are

$$\hat{\beta} = \frac{\sum xy}{\sum x^2} \text{ where } x = X - \overline{X} \text{ and } y = Y - \overline{Y}$$

In matrix notation, the OLS estimate of the coefficient vector b is given **by:**

$$b = (X'X)^{-1} X'Y$$

In the inference from OLS, the theory will suggest that certain coefficients should take on particular values or values within a range, and the estimates of α and β are obtained from the sample. Then, inferences can be made concerning the likely population parameters that have been estimated from sample data. While interpreting the OLS results,

- 1st – look at the sign
- 2nd –look at the size
- 3rd – look at the sig.
- 4th – look at the R square
- 5th – look at the F

We are interested to see that "Given the estimate, the true population parameter is 1 or any value". Then, the Null hypothesis is $H_0 : \beta = 1$ (or) 0, and the Alternate hypothesis is $H_1 : \beta \neq 1$ (or) 0 (a Two-sided Test). Hypothesis testing implies: Having obtained a parameter value from the sample, test for its trueness to the true population value recognizing that accepting a false relationship is more serious than rejecting a true one. Both estimators a and b are linear functions of u; u follows a normal distribution. Therefore,

$$\hat{\alpha} \sim N(\alpha, v_\alpha) \text{ and } \hat{\beta} \sim N(\beta, v_\beta)$$

convert them into a **standard** normal variable, but variance **contains** $\sigma^2 u$ **(unknown).** The **relationship between the** population **parameter** and the sample estimate of b can be **tested as** , using the t-test:

$$\{(\hat{\beta} - \beta)/SE(\hat{\beta})\} = t_{t-2}$$

$$\{(\hat{\alpha} - \alpha)/SE(\hat{\alpha})\} = t_{t-2}$$

$$\hat{\beta} \pm t_{crit.,n-2} SE(\hat{\beta})\}$$

$$\hat{\alpha} \pm t_{crit.,n-2} SE(\hat{\alpha})\}$$

Here, the SE contains S_e^2 term instead σ_u^2. Then, the F-test is given by the hypothesis: no relation between Y and X

$$F = \sum Y^2 / (\sum e^2 / t-2)$$

Addition of X variables will never decrease R Square, but likely to increase it. Therefore, it can be adjusted for degrees of freedom:

$R^2 = 1 - (RSS/TSS)$ RSS (residual sum of squares; TSS – total sum of squares)

$R^2(bar) = 1 - [RSS/(n-k)] / [TSS/(n-1)]$

$= 1 - (n-1)/n-k) (1- R^2)$

It allows for the tradeoff between increased R^2 and d.f. It will never be higher than R^2; and can be negative.

Some variations and extensions of the regression model are:

- Spherical and non-spherical distributions
- heteroscedasticity
- autocorrelation models
- non-linear regression models
- multivariate regression

While dealing with them, matrix computations (linear algebra) is almost indispensable tool. The following types of data may require some special treatment and estimation methods:

- Time series approach (ARCH, GARCH, Unit root, cointegration, causality)
- Simultaneous equations models (reduced form &Vector autoregression)
- Limited dependent variables (Probit &Logit)
- Qualitative response models (Censored &Truncated)
- Panel data (Cross-section+time series)
- Semi-parametric and Non-parametric Models
- Bayesian Techniques
- Non-linear estimations.

SUPPLY CHAIN MANAGEMENT IN LIVESTOCK BUSINESS

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Introduction

Globalization is a process of interaction and integration among the people, companies, and governments of different nations, a process driven by international trade and investment and aided by information technology. This process has effects on the environment, on culture, on political systems, on economic development and prosperity, and on human physical well-being in societies around the world. The current wave of globalization has been driven by policies that have opened economies domestically and internationally. Business today is in a global environment. This environment forces companies, regardless of location or primary market base, to consider the rest of the world in their competitive strategy analysis. Firms cannot isolate themselves from or ignore external factors such as economic trends, competitive situations or technology innovation in other countries, if some of their competitors are competing or are located in those countries.

Parameters for success in globalized markets

Cost

Cost factors could be considered as the cost drivers that are responsible for success in globalized markets. There are several costs involved in going global which are the major critical factors for success. Some important areas where costs play and lead to success are due to continuing push for economies of scale. Accelerating technological innovation advances in transportation, emergence of newly industrialised countries with productive capability and low labour costs and increasing cost of product development relative to market life are pointed as the major areas where costs are involved. When these are handled with proper strategies there is no doubt in succeeding the global markets. Sourcing efficiency and costs vary from country to country and global firms can take advantage of this fact (Ferrier, 2004).

Quality

A global and a domestic company may each spend 5 percent of sales on research and development, but the global company may have many times the total revenue of the domestic because it serves the world market. Global marketing strategies can generate greater revenue and greater operating margins, which, in turn, support design and manufacturing quality. Global companies "raise the bar" for all competitors in an industry. When a global company establishes a benchmark in quality, competitors must quickly make their own improvements and come up to par. Global competition has forced all companies to improve quality. For truly global products, uniformity can drive down research, engineering, design, and production costs across business functions (Geetha, 2009).

Customer satisfaction

Over the past three decades, customer expectations have risen by leaps and bounds (Nebel et. al., 2000). Customers continue to become more sophisticated and interested in innovative products and customized services. They are becoming more unpredictable in their wants and needs. At the same time, they continue to expect and demand more 'value' from brands. In their bid to satisfy the customer's fancy, businesses are vying with one another to service the customers with their product and service offerings. Heightened competition has given customers tremendous freedom of choice - a freedom they have been increasingly willing to exercise.

Thus, to achieve sustainable advantage in this competitive scenario, it is imperative for businesses to service the needs of their customers excellently across any and all loci points.

Traceability

Traceability is a very important element in food supply chain in order to ensure product and process integrity, improve consumer trust and maintain quality standards. The new age consumers are highly conscious of the origin of food products to ensure verified or disease-free food products. Since the quality of food products will affect consumer health directly, the food products should be traced on both upstream and downstream of the supply chain. In case any contaminated or disease affected products are in supply chain, the food supplier can recall them immediately. The traceability also facilitates identifying and removing the cause of the problem in the entire supply chain from supplier to customer. Traceability creates consumer trust and delivers quality and safety food to the consumer.

Production and distribution

It is not unreasonable to wonder why all products are not sold directly from producer to final consumer. In general, it starts from the consumer. Identifying the actual needs and wants of the consumers is a major factor for any business enterprise to be successful. The preferences of the customers are changing with time posing a greater challenge for the producers. The demand created by the customers and the demand created by the firms should be mutually benefiting. The firms or the producers consider the time as the critical factor for success as the customers need their need met in time. The modern customer base is varied with the different preferences they show for a particular product in terms of variety and quality. The customers of today are not ready to compromise quality for price or the vice versa. The organizations that fail in servicing their customers properly are in a danger of losing their business.

Traditional systems

In the past, supply, production and distribution systems were organized into separate functions that reported to different departments of a company. Often policies and practices of the different departments maximized departmental objectives without considering the effect they would have on other parts of the system. These three systems are interrelated, conflicts often occurred. While each system made decisions that were best for it, overall company objectives suffered. For example, the transportation department would ship in the largest quantities possible so it could minimize shipping costs. However, the increased inventory and resulted in higher inventory-carrying costs.

The major objectives of a company should be to

- Provide best customer service
- Provide lowest production costs
- Provide lowest inventory investment
- Provide lowest distribution costs

The traditional / past systems also had different department but the major differentiating factor is that they were independent in their operations. The profit/ loss was separate for the different departments. These objectives create conflict among the marketing, production, and finance departments because each has different responsibilities in these areas. Marketing's objective is to maintain and increase revenue; therefore, it must provide the best customer service possible. There are several ways of doing this:

- Maintain high inventories so goods are always available for the customer
- Interrupt production runs so that a non-invoiced item can be manufactured quickly.

- Create an extensive and costly distribution system so goods can be shipped to the customer **rapidly.**

Finance must keep investment and costs low. This can be done in the following ways:

- Reduce inventory so inventory investment is at a minimum
- Decrease the number of plants and warehouses
- Produce large quantities using long production runs
- Manufacture only to customer order

Production must keep in operating costs as low as possible. This can be done in following ways:

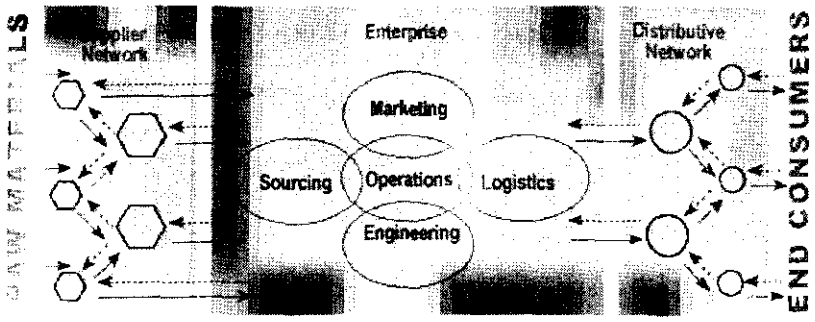
- Make long production runs of relatively few products. Fewer changeovers will be needed and specialized equipment can be used, thus reducing the cost of making the product.
- Maintain high inventories of raw materials and work in process so production is not disrupted by shortages.

These conflicts among marketing, finance and production center on customer service, disruption of production flow, and inventory levels. One important way to resolve these conflicting objectives is to provide close coordination of the supply, production and distribution functions. The problem is to balance conflicting objectives to minimize the total of all the costs involved and maximize customer service consistent with the goals of the organization. This requires some type of integrated materials management or logistics organization that is responsible for supply, production, and distribution. Rather than having the planning and control of these functions spread among marketing, production and distribution, they should occur in a single area of *responsibility.*

Supply chain management

A supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers. Supply chains exist in both service and manufacturing organizations, although the complexity of the chain may vary greatly from industry to industry and firm to firm.

Supply Chain Activities



Need for supply chain management

Traditionally, marketing, distribution, planning, manufacturing, and the purchasing organizations along the supply chain operated independently. These organizations have their own objectives and these are often conflicting. Marketing's objective of high customer service and maximum sales conflict with manufacturing and distribution goals. Many manufacturing operations are designed to maximize throughput and lower costs with little consideration for the impact on inventory levels and distribution capabilities. Purchasing contracts

are often negotiated with very little information beyond historical buying patterns. The result of these factors is that there is not a single, integrated plan for the organization---there were as many plans as businesses. Clearly, there is a need for a mechanism through which these different functions can be integrated together. Supply chain management is a strategy through which such integration can be achieved.

Supply chain management is typically viewed to lie between fully vertically integrated firms, where the entire material flow is owned by a single firm and those where each channel member operates independently. Therefore coordination between the various players in the chain is key in its effective management. Cooper and Ellram [1993] compare supply chain management to a well-balanced and well-practiced relay team. Such a team is more competitive when each player knows how to be positioned for the hand-off. The relationships are the strongest between players who directly pass the baton, but the entire team needs to make a coordinated effort to win the race (Ganeshan and Harrison, 1995).

Requirements of supply chain management

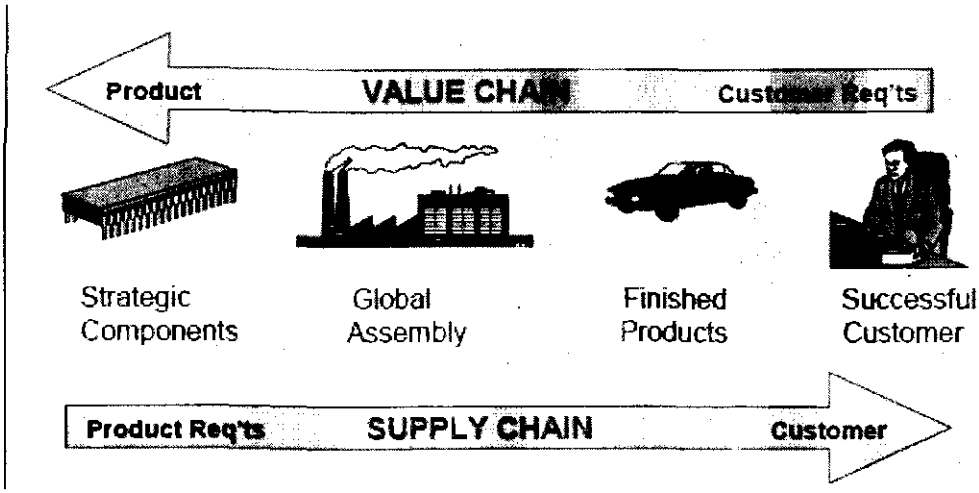
The major requirements of supply chain are the different intermediaries involved in the chain. Although these are important the following are the major requirements for a supply chain.

1. Segment customers based on service needs. Companies traditionally have grouped customers by industry, product (or service), or trade channels and then provided the same level of service to everyone within a segment. Effective supply chain management, instead, groups customer by distinct service needs regardless of industry and then tailors services to those particular segments.
2. Customize the logistics network. Companies need to design their logistics network based on the service requirements and profitability of the customer segments identified. The conventional approach of creating a "monolithic" logistics network runs counter to successful supply chain management.
3. Listen to signals of market demand and plan accordingly. Sales and operations planning must span the entire chain to detect early warning signals of changing demand in ordering patterns, customer promotions and so forth. This demand-intensive approach leads to more consistent forecasts and optimal resource allocation.
4. Differentiate product (or service) closer to the customer. Companies today no longer can afford to stockpile inventory to compensate for, possible forecasting errors. Instead, they need to postpone product (or service) differentiation in the manufacturing process closer to actual consumer demand.
5. Strategically manage the sources of supply. By working closely with their key suppliers to reduce the overall costs of owning materials and services, supply chain leaders enhance margins both for themselves and their suppliers.
6. Develop a supply chain wide technology strategy. Information technology must support multiple levels of decision making across the supply chain. The IT system also should afford a clear view of the flow of products, services, and information.
7. Adopt channel-spanning performance measures. Excellent supply chain measurement systems do more than just monitor internal functions. They adopt measures that apply to every link in the supply chain, incorporating both service and financial metrics (Goel, 2005).

Value chain Vs Supply chain

The Value Chain concept was developed and popularized in 1985 by Michael Porter, in Competitive Advantage," (1) a seminal work on the implementation of competitive strategy to achieve superior business performance. Porter defined value as the amount buyers are willing to pay for what a firm provides, and he

conceived the "value chain" as the combination of nine generic value added activities operating within a firm – activities that work together to provide value to customers. Porter linked up the value chains between firms to form what he called a Value System; however, in the present era of greater outsourcing and collaboration the linkage between multiple firms' value creating processes has more commonly become called the "value chain." As this name implies, the primary focus in value chains is on the benefits that accrue to customers, the interdependent processes that generate value, and the resulting demand and funds flows that are created. Effective value chains generate profits.



A comparison of a value chain with a supply chain

Supply Chain Management (SCM) emerged in the 1980s as a new, integrative philosophy to manage the total flow of goods from suppliers to the ultimate user and evolved to consider a broad integration of business processes along the chain of supply. Keith Oliver coined the term "supply chain management" in 1982. The primary focus in supply chains is on the costs and efficiencies of supply, and the flow of materials from their various sources to their final destinations. Efficient supply chains reduce costs. a supply chain and a value chain are complementary views of an extended enterprise with integrated business processes enabling the flows of products and services in one direction, and of value as represented by demand and cash flow in the other. Both chains overlay the same network of companies. The customer is the source of value, and value flows from the customer, in the form of demand, to the supplier.

The primary difference between a supply chain and a value chain is a fundamental shift in focus from the supply base to the customer. Supply chains focus upstream on integrating supplier and producer processes, improving efficiency and reducing waste, while value chains focus downstream, on creating value in the eyes of the customer. This distinction is often lost in the language used in the business and research literature. Creating a profitable value chain therefore requires alignment between what the customer wants, i.e., the demand chain, and what is produced via the supply chain. And while supply chains focus primarily on reducing costs and attaining operational excellence, value chains focus more on innovation in product development and marketing.

Value is highly conditioned by the larger social and economic environment through which complex and numerous interactions affect the human perception of value-based transactions. Advertising, social trends, and economic conditions all influence consumer and business valuations of products, services, and resources flowing through the value systems in our economy. One of the most watched figures in the marketplace is the consumer confidence index based on a survey of households. This index is an aggregate measure of confidence in the economy and a leading indicator of how consumers will value, and therefore how they will spend money on goods and services. When perceptions of value in a marketplace become exaggerated, market bubbles

occur such as the internet technology bubble several years ago. When significant trends take hold in this larg environment it is difficult, if not impossible, for individual companies or households to avoid being swept alor in the sudden creation and destruction of value that may result.

Supply Chain management must address the following problems

1. Distribution Network Configuration: Number and location of suppliers, production facilities, distributior centers, warehouses and customers
2. Distribution strategy: Centralized Vs decentralized, cross docking, direct shipment, pull or push strategies third party logistics
3. Information: Integrate systems and processes through the supply chain to share valuable information including demand signals, forecasts, inventory and transportation
4. Inventory management: Quantity and location of inventory including raw material, work-in-process anc finished goods service providers and customers.

Benefits

- Lower costs
- Better customer service
- Efficient manufacturing
- Better trust among the partners leading to win-win

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LINEAR PROGRAMMING

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Overview of Operations Research

Operations research is a scientific approach to problem solving for executive decision making which requires the formulation of mathematical, economic and statistical models for decision and control problems to deal with situations arising out of risk and uncertainty. In fact, decision and control problems in any organizations are more often related to certain daily operations such as inventory control, production scheduling, manpower planning and distribution, and maintenance.

The origin and development of operations research can be studied under the following classification.

1. Pre-World War II developments
2. Developments during World War II
3. Post-World war II developments
4. Computer era
5. Inclusion of uncertainty models.

Pre-World War II developments

Many of the techniques of today's operations research have been actually developed and used even before the term 'operations research' was coined. Some of the techniques are: inventory control, queueing theory, and statistical quality control.

In 1915, Ford Harris developed a simple EOQ (economic order quantity) model to optimize the total cost of inventory system, which was eventually analyzed in 1934 by R.H.Wilson. Around the same time (1916), A.K.Erlang, a Danish telephone engincer, was responsible for many of the early theoretical developments in the area of queueing theory.

Developments during World War II

During the World War II, the effective utilization of scarce resources was the top-most concern of the military in Britain. So, in Britain, scientists from different fields were jointly directed to do research on military operations for improving its effectiveness with the limited resources. Later on, this scientific and interdisciplinary approach became an important problem-solving aspect of operations research methodologies.

Post-World War II developments

After the World War II, the industries in America and Britain concentrated in applying the operations research methodologies to industrial problems for maximiziug the profitability with limited resources. In 1947, Dantzig, developed simplex inethod to solve linear programining problem. Thereafter the Operations Research Society of America, and the Institute of Management Science were founded in 1952 and 1953, respectively.

Computer era

Many of the operations research techniques involve complex computations and hence they take longer time for providing solutions to real life problems. The development of high speed digital computers made it possible to successfully apply some to the operations research techniques to large size problems. The developments of recent interactive computers make the job of solving large size problems even more simple because of human intervention towards sensitivity analysis.

Inclusion of uncertainty models

The use of probability theory and statistics to tackle undeterministic situations made the operations research techniques more realistic.

LINEAR PROGRAMMING

Linear programming is a mathematical programming technique to optimize performance (e.g. profit or cost) under a set of resource constraints (e.g. machine-hours, man-hours, money, materials, etc) as specified by an organization. With the advent of highly efficient computer codes, the usefulness of this technique is maximized even though the computations in a linear programming modes are too elaborate.

A sample list of applications of the linear programming problem is presented below:

- **A product mix problem:** Decide the combination of various product quantities to maximise profit or to minimise production cost.
- **Allocation of bank funds:** To achieve highest possible returns. This should be achieved within liquidity limits set by RBI and maintaining flexibility to meet the customers demand for loans.
- **Manufacturing problem:** To manufacture goods (say furniture) so as to give maximum profits bearing in mind the time constrain and the market demand for the goods.
- **Advertising application:** To achieve the best possible exposure to the client's product at the lowest possible advertising cost.
- **Portfolio selection:** Select specific investments among available alternatives so as to maximise return or to minimise risk.
- **Staffing problem:** Develop a work schedule that allows say, a large restaurant or a hospital

Concept of Linear Programming Model

The model of any linear programming problem will contain: objective function set of constraints and non-negativity restrictions. Each of the components may consist of one of more of the following:

- Decision variables
- Objective function coefficients
- Technological coefficients
- Availability of resources

The components and other terminologies of the linear programming model are explained with the help of a product-mix problem as described here.

Formulation of a Linear Programming Problem involves constructing a mathematical model from the given data. This can be done only if the following requirements are met:

- There should be a clearly identifiable objective and it should be measurable in quantitative terms. E.g. In a manufacturing problem the objective can be maximisation of profit or minimisation of cost.
- The resources to be allocated in the problem should be identifiable and quantitatively measurable. E.g. The use of labour time, or raw material in the manufacturing process should be clearly stated.
- The relationships representing the objective function and the constraints equations must be linear.
- There should be a series of feasible alternative courses of action available to the decision maker. These are determined by the resource constraints.

When all the above mentioned conditions are satisfied the problem can be expressed as L.P. problem. Then solve it for an optimal solution.

Formulation of LPP therefore implies translating the given descriptive problem into these three sets of linear relationships between the decision variables.

Methods of Solution

Solving a Linear Program problem involves:

- Selection of appropriate method of solution and
- Then obtain a solution to the problem with the help of selected method
- Test whether this solution is optimal.

The problem can be solved by using:

- **Graphical method:** This method can be used if there are only two decision variables in the LPP.
- **Simplex method:** This method is useful in solving LP problems with two or more than two decision variables.

The Graphical method of solution: This method can be used in case where LPP has only two decision variables. But there is no restriction on the number of constraints. The method uses the familiar graphical presentation with two axes. The method becomes unwieldy when there are three variables since we then need a three dimensional graph. The method cannot be used if the number of decision variables is more than three. In such a case we have to use a non graphical method to obtain a solution. The graphical method of solution to L.P. problem uses all the equations in a given problem, namely the equation expressing objective unction the constraints imposed in achieving the objective. These constraints can be of (i) greater than (ii) less than or (iii) strict equality type. There is also a non-negativity restriction on the values of the decision variables. It implies that the solution of the problem lies in the first quadrant of the graph. All these relations are linear.

The Simplex method of solution: The simplex method uses a simplex algorithm; which is an iterative, procedure for finding, in a systematic manner the optimal solution to a linear programming problem. The procedure is based on the observation that if a feasible solution to a linear programming exists; it is located at a corner point of the feasible region determined by the constraints of the problem. The simplex method, selects the optimal solution from among the set of feasible solution to the problem. The algorithm is very efficient as it considers only those feasible solutions, which are provided by the corner points. Thus, we need to consider a minimum number of feasible solutions to obtain an optimal one. The method is quite simple and the first step requires the determination of basic feasible solution. Then, with the help of a limited number of steps the optimum solution can be determined.

Example for Solving LP problem by Simplex Method

Simplex method is the basic building block for all other methods. This method is devised based on the concept of solving simultaneous equations. It is demonstrated using a suitable numerical problem.

Consider the linear programming model as reproduced below and solve it using the simplex method.

Maximize $Z=6X_1 + 8X_2$

Subject to

$$5X_1 + 10X_2 \leq 60$$

$$4X_1 + 4X_2 \leq 40$$

$$X_1 \text{ and } X_2 \geq 0$$

Solution: The standard form of the above LP problem is shown below:

$$\text{Maximize } Z = 6X_1 + 8X_2 + 0S_1 + 0S_2$$

Subject to

$$5X_1 + 10X_2 + S_1 = 60$$

$$4X_1 + 4X_2 + S_1 = 40$$

$$X_1, X_2, S_1 \text{ and } S_2 \geq 0$$

Where S_1 and S_2 are slack variables, which are introduced to balance the constraints. Canonical form is the form in which each constraint has a basic variable.

Definition of basic variable. A variable is said to be a basic variable if it has unit coefficient in one of the constraints and zero coefficient in the remaining constraints. If all the constraints are '$\leq$' type, then the standard form is to be treated as the canonical form. The canonical form is generally used to prepare the initial simplex table. The initial simplex table of the above problem is shown in Table 1.

Table 1. Initial Simplex Tableau

CB_i	C_j	6	8	0	0	Solution	Ratio
	Basic variable	X_1	X_2	S_1	S_2		
0	S_1	5	10	1	0	60	60/10=6 **
0	S_2	4	4	0	1	40	40/4=10
Z_j		0	0	0	0	0	
$C_j - Z_j$		6	8*	0	0		

* Key column. **Key row.

Here, C_j is the coefficient of the 'j'th term of the objective function and CB_i is the coefficient of the 'i'th basic variable. The value at the intersection of the key row and the key column is called the key element. The value of Z_j is computed using the following formula.

$$Z_j = \Sigma (CB_i)(a_{ij})$$

Where a_{ij} is the technological coefficient for the ith row and jth column of the table. $C_j - Z_j$ is the relative contribution. In this term, C_j is the objective function coefficient for the jth variable. The value of Z_j against the solution column is the value of the objective function and in this iteration, it is zero.

Optimality condition. For maximization problem, if all $C_j - Z_j$ are less than or equal to zero, then optimality is reached; otherwise select the variable with the maximum $C_j - Zj$ value as the entering variable. (For minimization problem, if all $C_j - Z_j$ are greater than or equal to zero, the optimality is reached; otherwise select the variable with the most negative value as the entering variable.)

In Table 1, all the values for $C_j - Z_j$ are either equal to or greater than zero. Hence, the solution can be improved further. $C_j - Z_j$ is the maximum for the variable X_2. So, X_2 enters the basis. This is known as entering variable, and the corresponding column is called key column.

Feasibility condition. To maintain the feasibility of the solution in each iteration, the following steps need to be followed:

1. In each row, find the ratio between the solution column value and the value in the key column.
2. Then, select the variable from the present set of basic variables with respect to the minimum ratio. Such variable is the leaving variable and the corresponding row is called the key row. The value at the intersection of the key row and key column is called key element or pivot element.

In Table 1. the leaving variable is S_1 and the row 1 is the key row. Key element is 10. The next iteration is shown in Table 2. In this table, the basic variable S_1 of the previous table is replaced by X_2. The formula to compute the new values of Table 2.is as shown below:

$$\text{New value} = \text{Old value} - \frac{\text{Key column value X Key row value}}{\text{Key value}}$$

Table 2. Iteration 1

CB_i	C_j	6	8	0	0	Solution	Ratio
	Basic variable	X_1	X_2	S_1	S_2		
8	X_2	1/2	1	1/10	0	6	6/(1/2)=12
0	S_2	2	0	-2/5	1	16	16/2=8 **
Z_j		4	8	4/5	0	48	
$C_j - Z_j$		2 *	0	-4/5	0		

As a sample calculation, the computation of the new value of row 2 and column X1 is shown below:

$$\text{New value} = 4 - \frac{4X5}{10} = 4 - \frac{20}{10} = 4-2=2$$

Computation of the cell values of different tables using this formula is a cumbersome process. So, a different procedure can be used as explained below.

Let the first and second rows in Table 1. be L_1 and L_2 , respectively; and the first and second rows in Table 2. be L_3 and L_4, respectively. The coefficient of the first row of Table 2. can now be obtained by using the

following formula.

$$L_3 = \frac{L_1}{\text{Pivot element}} = \frac{L_1}{10}$$

This operation makes the value of the cell with respect to the first row and the second column in Table 2. as unit. Since the new basic variable is becoming X_2, the cell value with respect to the second row and the second column in table 2.should be made equal to 0.

This can be achieved by multiplying /dividing the value of the first row and the second column in Table 2. by a suitable constant and then by adding/subtracting the resultant value to/from the value of the second row and second column in Table 1 such that the net value is zero. The necessary formula to achieve this result is shown below.

$$L_4 = L_2 - 4L_3$$

The entries of the second row in Table 2. is not optimal. The criterion row value for the variable X_1 is selected as the entering variable and after computing the ratios; S_2 is selected as the leaving variable. The next iteration is shown in Table 3.

Table 3. Iteration 2

CB_i	C_j	6	8	0	0	Solution
	Basic variable	X_1	X_2	S_1	S_2	
8	X_2	0	1	1/5	-1/4	2
6	X_1	1	0	-1/5	1/2	8
Z_j		6	8	2/5	1	64
$C_j - Z_j$		0	0	-2/5	-1	

In Table 3. all the values for $C_j - Z_j$ are either 0 or negative. Hence, the optimality is reached. The corresponding optimal solution is as follows:

X_1 (production volume of P_1) = 8 units

X_2 (production volume of P_2) = 2 units

And the optimal objective function value, Z (total profit) is Rs.64.

HUMAN RESOURCE MANAGEMENT

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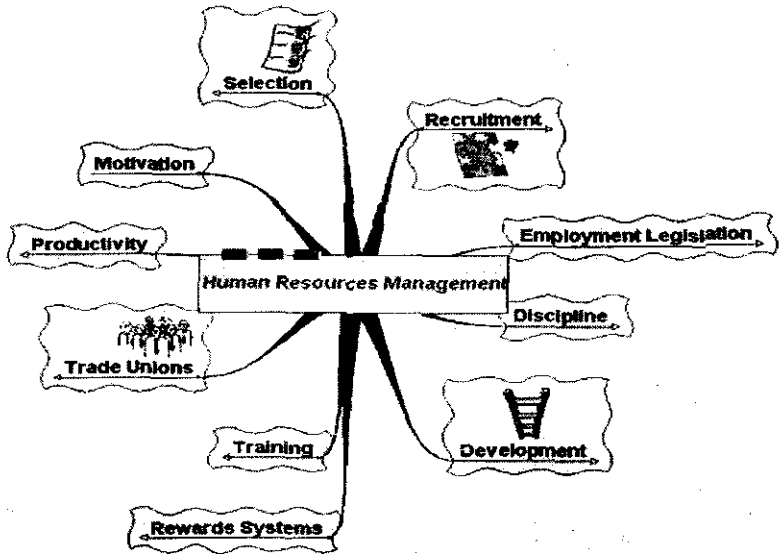
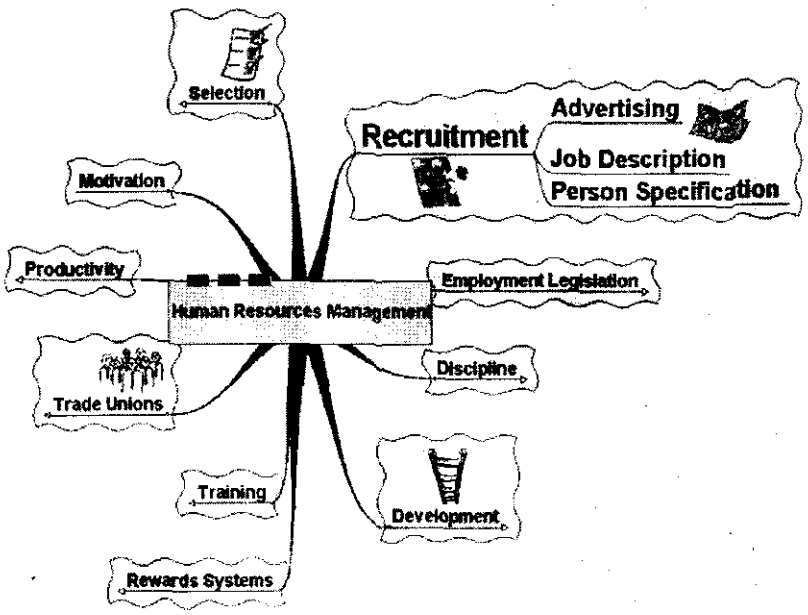


Recruitment



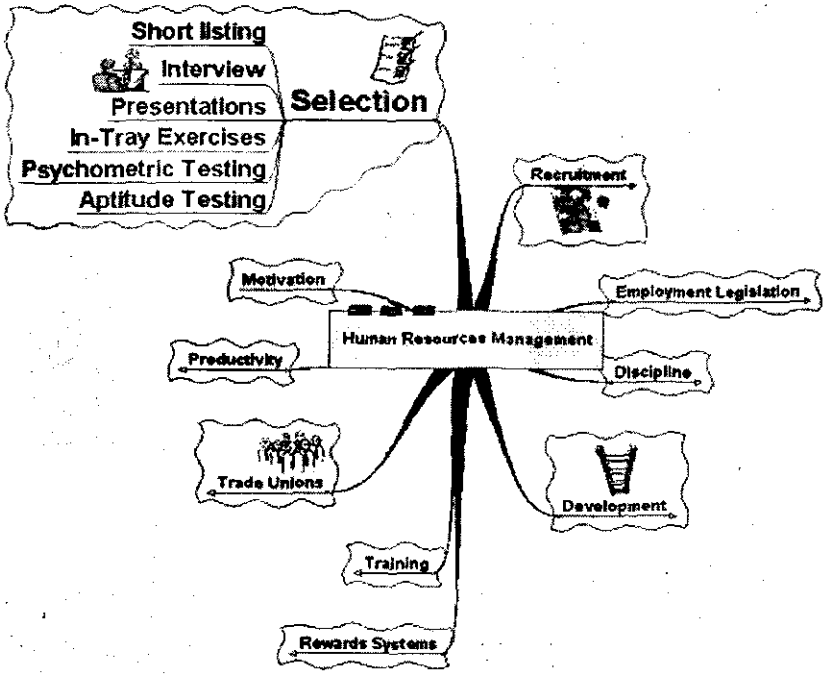
Recruitment

- The process by which a job vacancy is identified and potential employees are notified.
- The nature of the recruitment process is regulated and subject to employment law.
- Main forms of recruitment through advertising in newspapers, magazines, trade papers and internal vacancy lists.

Recruitment

- Job description – outline of the role of the job holder
- Person specification – outline of the skills and qualities required of the post holder
- Applicants may demonstrate their suitability through application form, letter or curriculum vitae (CV)

Selection



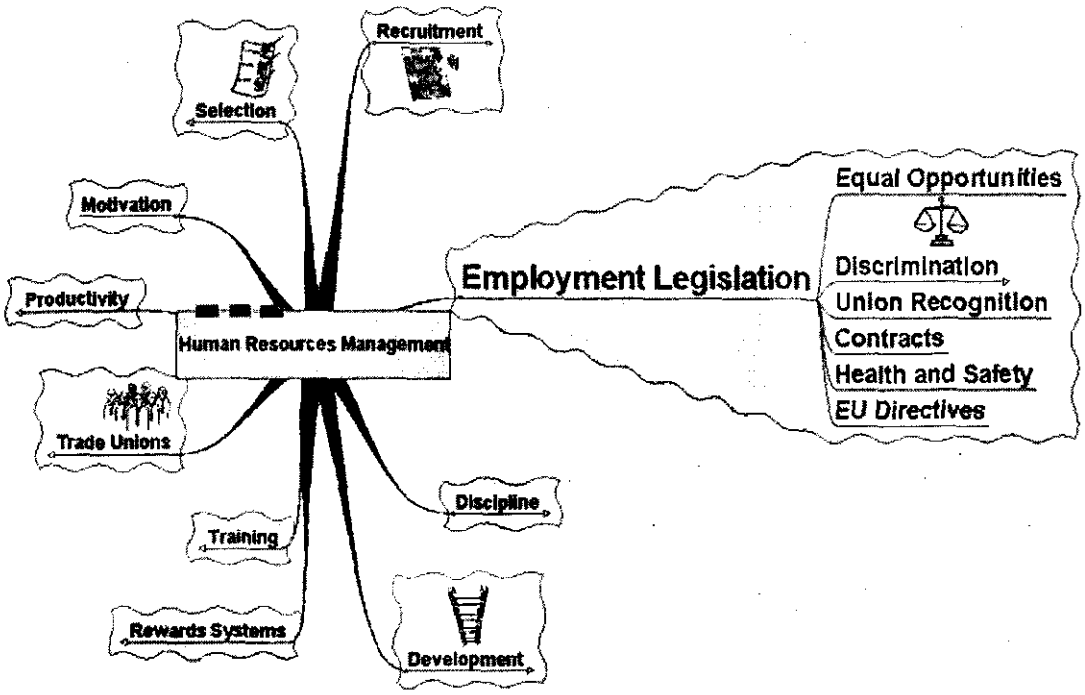
Selection

- The process of assessing candidates and appointing a post holder
- Applicants short listed – most suitable candidates selected
- Selection process – varies according to organisation:

Selection

- Interview – most common method
- Psychometric testing – assessing the personality of the applicants – will they fit in?
- Aptitude testing – assessing the skills of applicants
- In-tray exercise – activity based around what the applicant will be doing, e.g. writing a letter to a disgruntled customer
- Presentation – looking for different skills as well as the ideas of the candidate

Employment Legislation



Employment Legislation

- Increasingly important aspect of the HRM role
- Wide range of areas for attention
- Adds to the cost of the business

Discrimination

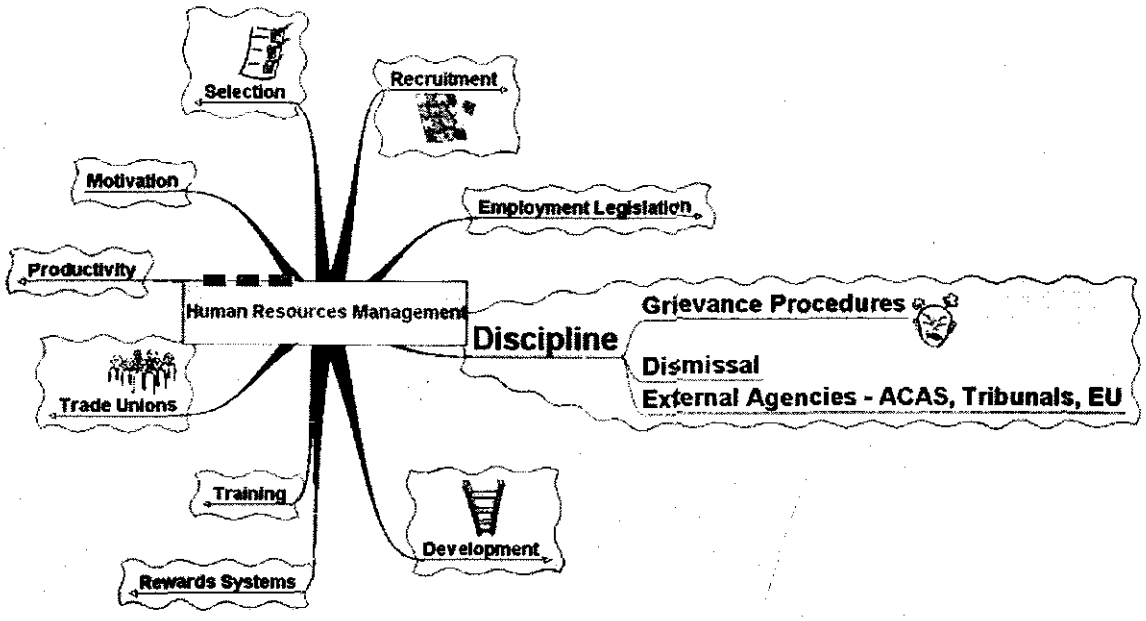
- Crucial aspects of employment legislation:
- Race
- Gender
- Disability

Discipline

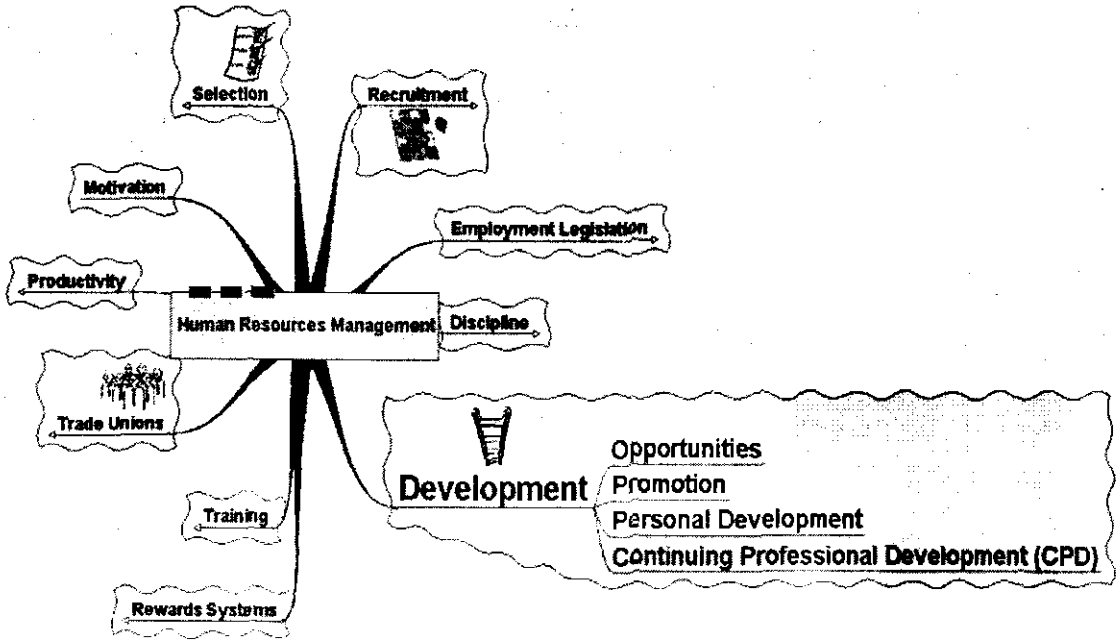
- Firms cannot just 'sack' workers
- Wide range of procedures and steps in dealing with workplace conflict
- Informal meetings
- Formal meetings
- Verbal warnings

- ❖ Written warnings
- ❖ Grievance procedures
- ❖ Working with external agencies

Discipline



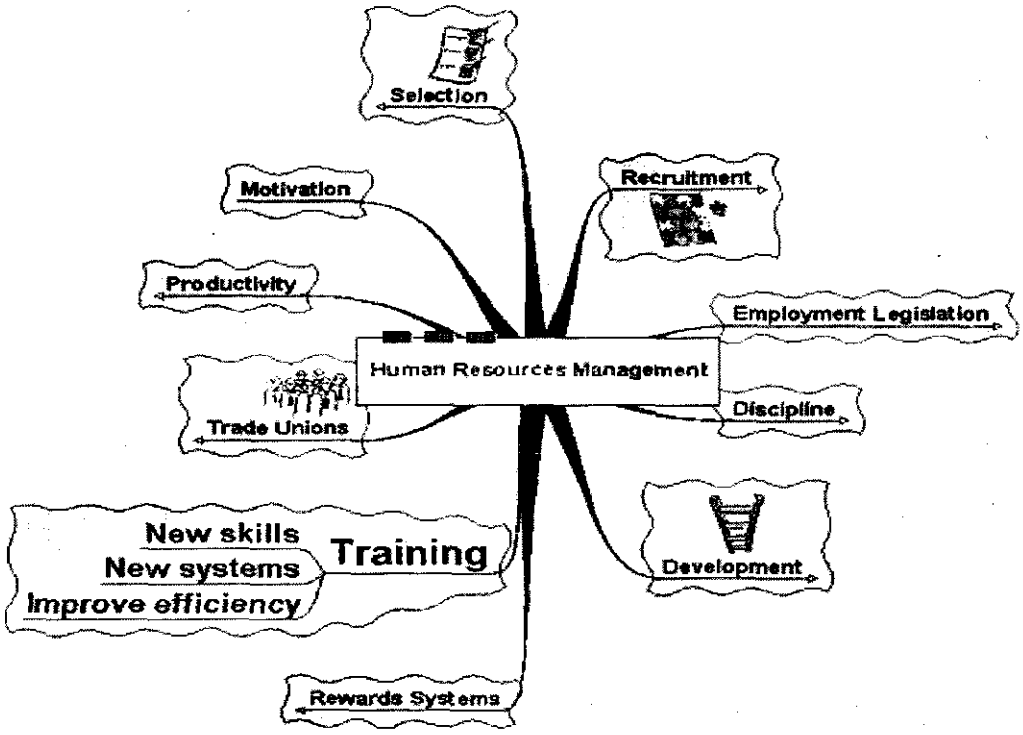
Development



Development

- Developing the employee can be regarded as investing in a valuable asset
- A source of motivation
- A source of helping the employee fulfil potential

Training



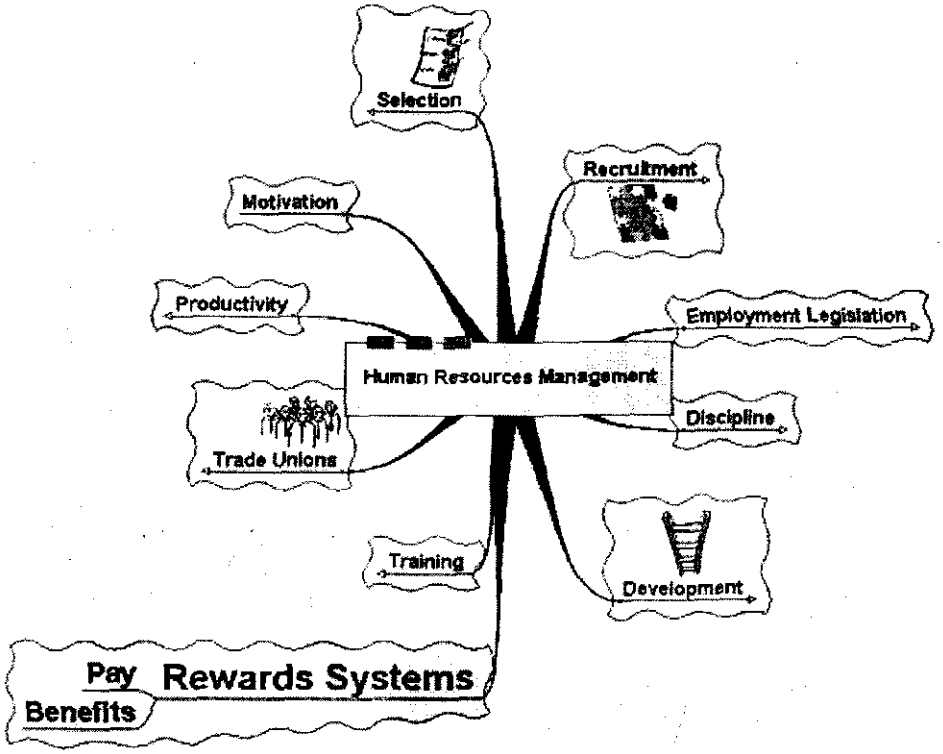
Training

- Similar to development:
- Provides new skills for the employee
- Keeps the employee up to date with changes in the field
- Aims to improve efficiency
- Can be external or 'in-house'

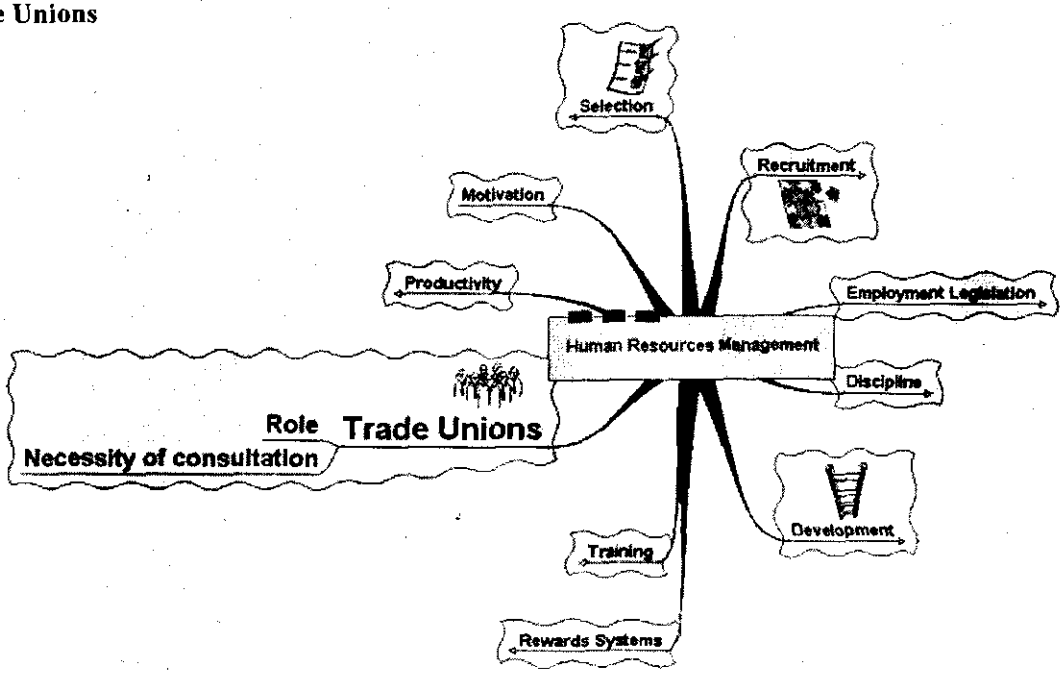
Rewards Systems

- The system of pay and benefits used by the firm to reward workers
- Money not the only method
- Fringe benefits
- Flexibility at work
- Holidays, etc.

Rewards Systems



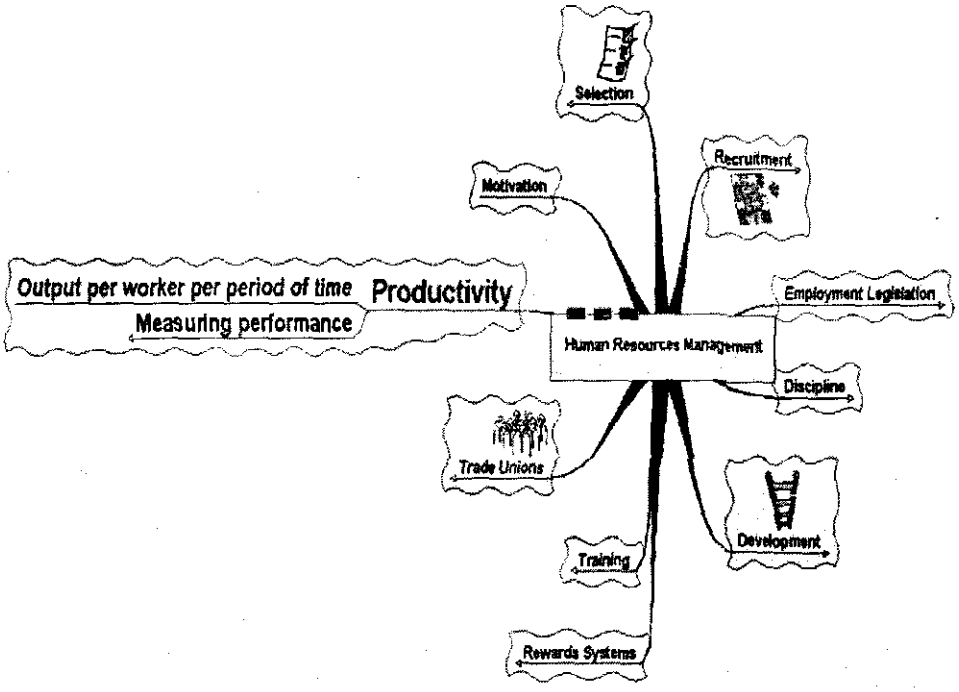
Trade Unions



Trade Unions

- Importance of building relationships with employee representatives
- Role of Trade Unions has changed
- Importance of consultation and negotiation and working with trade unions
- Contributes to smooth change management and leadership

Productivity



Productivity

- Measuring performance:
- How to value the workers contribution
- Difficulty in measuring some types of output – especially in the service industry
- Appraisal
- Meant to be non-judgmental
- Involves the worker and a nominated appraiser
- Agreeing strengths, weaknesses and ways forward to help both employee and organisation

INDIAN DAIRY INDUSTRY

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Introduction

Dairying in India is an integral part of total farming system. In terms of value of output, milk is now the single largest agricultural commodity; higher than paddy or wheat. Dairying contributes close to the third of gross income of rural household and in case of landless farmers nearly half of their gross income. An estimated 70 million rural households are engaged in milk production. India is now the largest milk producing country in the world with estimated production of 116 million tonnes. India has already entered in the international market in milk products. Indian Dairy Scenario : Globally, India – with its 114.4 million metric ton milk production – enjoys numero uno position in terms of production. However, it lags behind when it comes to processing milk for tradable products. At the same time, the world is eyeing India as their future market. Indian dairying, historically, has proved to be a strong instrument of growth and socio-economical changes. The concerted and committed efforts of millions of farmers improvised the business opportunities' resulting into plenty form scanty with respect to milk. The Anand model of dairy development became unique, replicable and exemplary for many developing countries.

- Bovine population – 283 million (185 million cattle, 98 million buffaloes)
- Per – capita availability of 15 state federations, 177 district unions and 1.30 lakh village co-op. societies.
- Contribution of livestock sector to agriculture GDP is around 25-28 percent to livestock sector.
- During 11th Five Year Plan, expecting overall growth of livestock sector to be between 6-7 per cent and the milk production growth is estimated to be 5 per cent per annum.
- The projected demand of milk would be 180 MMT per year by 2021-22 implying continual growth of at least 5 per cent annually during the period in milk production.

Growth in Milk Production & Per Capita Availability

The per capita availability of milk in the Country has increased from 100 gms/person/day to around 250gsm/person/day and is projected to increase further to 300 gms/ person day by the year 2020. Operation Flood was rural development programme started by India's National Dairy Development Board (NDDB) in 1970. One of the largest of its kind, the programme objective was to create a nationwide milk grid. It resulted in making India the largest producer of milk and milk products, and hence is also called the White Revolution of India. It also helped reduce malpractices by milk traders and merchants. This revolution helping in alleviating poverty and famine levels from their dangerous proportions in India during the era. Operation Flood has helped dairy farmers, direct own development, placing control of the resources they create in their own hands. A 'National Milk Grid', links milk producers throughout India, reducing seasonal and regional price variations while ensuring that the producer gets a major share of the price consumers pay. The bedrock of operation flood has been village milk producers' coooperatives, which procure milk and provide inputs and services, making modern management and technology available to members. Operation Flood's objective included :

- Increase milk production ("a flood of milk")
- Augment rural incomes
- Fair prices for consumers

Programme Implementation

Gujarat-based co-operation "Anand Milk Union Limited", often called Amul, was the engine behind the success of the programme, and in turn became a mega company based on the cooperative approach.

Operation Flood was implemented in three phases.

Phase I : (1970-1980) was financed by the sale of skimmed milk powder and butter oil donated by the European Union (ten the European Economic Community) through the World Food Programme. NDDB planned the programme and negotiated the details of EEC assistance.

During its first phase, Operation Flood linked 18 of India's premier milksheds with consumers in India's major metropolitan cities : Delhi, Mumbai, Kolkata and Chennai. Thus establishing mother dairies in four metros.

Operation flood, also referred to as "White Revolution" is a gigantic project propounded by Government of India for developing dairy industry in the country. The Operation Flood – 1 originally meant to be completed in 1975, actually spanned the period of about nine years from 1970-79, at a total cost of Rs.116 crores.

Phase II : Operation Flood Phase II (1981-1985) increased the milksheds from 18 to 136;260 urban markets expanded the outlets for milk. By the end of 1985, a self-sustaining system of 43,000 village cooperatives with 4,250,000 milk producers were covered. Domestic milk powder production increased from 22,000 tons in the pre-project year to 140,000 tons by 1989, all of the increase coming from dairies set up under Operation Flood. Direct marketing of milk by producers' cooperatives increased by several million litres a day

Phase III : (1985-1996) enabled dairy cooperatives to expand and strengthen the infrastructure required to procure and market increasing volumes of milk. Veterinary first-aid health care services, feed and artificial insemination services for cooperative members were extended, along with intensified member education. Operation Flood's Phase III consolidated India's dairy cooperative movement, adding 30,000 new dairy cooperatives to the 42,000 existing societies organized during Phase II. Milksheds peaked to 173 in 1988-89 with the numbers of women members and Women's Dairy Cooperative Societies increasing significantly.

Dairy Farming in India

The dairy sector offers a good opportunity for those who are looking for new and expanding markets. While the farming sector is more or less stagnant, the dairy sector has seen much activity. In the past 15 years, milk production in India has doubled and is now over 100 million tons a year thus becoming India's No.1 farm commodity. India's milk production is expected to grow at about 3 per cent per anum. However, due to increasing population, per capita availability of milk is expected to increase by only about 1.5 per cent per annum. For an economy growing at about 8 per cent per annum, this increase in availability will be grossly inadequate. Production growing at only 3 per cent and consumption growing at more than double the rate leads to a mismatch between demand and supply. This creates opportunities for new entrants to this industry.

Role of co-operatives : The presence of milk cooperatives all over the country helps to organize the industry and give this sector a distinct advantage. Cooperatives allow for much easier marketing of the end product as compared to other businesses. Cooperatives assure the farmer of not only a market for their product but also take care of logistical issues like transportation and containers. The farmer is spared these costs as well as the cost of putting up a retail outlet. Cooperatives allow for stable selling rate which does not change even when they yield is surplus. Payments are guaranteed to milk producers and ensured within a minimum of 30 days.

Role of State and Central Government

There are several financial incentives provided by the governments for setting up infrastructural facilities for milk production. The tenth plan outlay for animal husbandry and dairying was Rs.2500 crores. The National

bank for Agricultural and Rural Development (NABARD) assists farmers with loans and refinancing facilities for dairy farming. The interest charged ranges between 12% to 13% depending on the amount of loan taken. Loans are to be repaid in monthly installments usually within a period of 5 years.

There are several other factors that make dairy a safe sector to venture into. They are:

- The demand for milk and its products is active year round. Demand for Milk is increasing day by day.
- Dairy farming does not need skilled labor, thus reducing costs and making availability of labor easy.
- Unlike other agricultural sectors, Dairy is not dependant on rains and production goes on year round. Returns on this business are available within a month. Today, virtually no other business offers such a short gestation period.
- Use of by products provides additional income and increases returns. For example dung can be used to produce biogas for cooking and even as manure and compost.
- Veterinary Aid is available at most of the villages in India.
- There is no direct competition from the foreign counterparts.

Incentivizing Dairy Industry

Indian Dairy Association has submitted to the Government of India a pre budget Memorandum for the financial year 2011-2012. The Memorandum seeks a number of concessions in order to enhance milk production and milch animal productivity, clean and quality milk, processing and packaging and to boost export of milk products. In case of dairy cooperative society as per the existing income tax provision, the income of the village level society is exempt under section 80 B (*ii*) (b) but the district level cooperative dairy federation are not exempt from the payment of income tax. IDA has recommended that district unions and state federations should also be given exemption under income tax act since these constitute the integral part of the three tier system of dairy development followed in India. At present VAT is charged at five per cent on skim milk powder and chakka (raw material for shrikhand) but at 12.5 per cent on milk products like butter, cream etc. It has been suggested that all milk products should be charged at a uniform rate of five per cent. It is expected that GST will replace VAT with effect from April 1, 2011.

The Memorandum also deals with custom and excise duty. It has been brought out that despite being largest milk producer in the world, India has a share of only two per cent in the world dairy expert due to relatively low quality and hygienic standard of milk and milk products. Cold chain has become integral part of supply chain of perishable food items to provide consumer with safe and wholesome products. Milk and milk products being most perishable commodity need to be handled hygienically, processed properly and transported maintaining the cold chain. Therefore, it is very essential to boost clean milk production by adopting milking machines, use of aluminum or stainless steel milk cans, use of bulk milk cooler etc. However, due to excise, sale tax, octroi etc., the prices of these equipment has become exorbitant. IDA has therefore, recommended for total exemption of central excise duty on dairy equipment and machinery required essentially in clean milk production, processing and packaging of milk and milk products.

Conclusion

Milk is the largest crop in India with its in value terms exceeding Rs.2.25 lakh crores and the milk group contributes highest to the total output of the agricultural sector surpassing the output value of other major agri-commodities like wbeat, rice and oilseeds. Milk directly affects livelihood of almost all farmers in the country, including landless and marginal farmers. Further, most of the dairy business in organized sector is in the hands of cooperatives which are owned by farmers themselves. Today at the time of unprecedented drought-like situation prevailing in country, it is necessary that Government pays immediate attention to the country's dairy

co-operative industry and ensure that it does not cripple. It is important to note that Milk also forms the largest share of expenditure on food item in a consumer basket and hence the rise in milk price affect each common man of India the most. Thus, in today's critical situation affecting every citizen of the country, the Government urgently needs to act and protect dairy farmers of India by supporting them with the following actions which will help in keeping control over input prices to milk farmer and ultimately to check milk prices in the country also.

- Restore custom duty on milk powder to 15 per cent on 10,000 MT TRQ and to 40 per cent on butter oil
- Impose export duty on export of oil meals, de-oiled cake, cattle feed etc which helps in price reduction of cattle feed
- Reduce Income Tax on co-operatives which will help in improving returns to farmer members
- Removal of VAT & Excise duty on use of molasses used in cattle feed
- VAT on all value-added dairy products to be fixed to 4 per cent.

The Indian dairy industry has the following tasks ahead

- Consistent efforts to improve productivity of milch animals, feeding , health care and farm management .
- Need to expand their coverage of milk procurement and grow their current share of marketable surplus from 30 per cent to 65 per cent by 2021-22.
- Growth in milk procurement would necessitate a substantial increase in milk handling capacity including logistics, infrastructure and processing.
- Adopt suitable measures and technologies to ensure that procurement; processing operations are efficient and cost effective.
- Ensure food safety to consumers through effective quality assurance systems.
- Create cost effective cooperative marketing and distribution network including modern retailing.

To meet the above challenges, we have to adopt the holistic approach to improve quality of human resource and make initiatives through academic innovations.

STATUS OF INDIAN MEAT INDUSTRY

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Introduction

Livestock sector is one of the most important components of agriculture in India. The value of the output from livestock and fisheries sectors together stood at about Rs. 2,82,779 crore during 2007- 08 which is about 31.6 per cent of the value of the output of Rs. 8,94,420 crores from total Agriculture and the allied fields. (Central Statistical Organisation).Meat production is 6.5 million tones during 2007- 08 and the per capita consumption increased from 870 grams in 2000 and reached 2 kg during 2007- 08. India is standing eighth in rank in the world's meat production. Buffalo meat in India contributes about 30% of total meat production. The contribution by beef, mutton, chevon, pork and chicken is 30%, 5%, 10%, 10.2% and 11.5%, respectively. The compound average growth rate during the last two decades works out to 4.6% as against 21% which shows it, is now the fastest growing segment of livestock sector.

Trends in Livestock Population and Meat Production during 1975-2000

Livestock Species	Population in millions		Slaughter rate(%)		Carcass weight (Kg.)		Meat production in 000 Tonnes		Share in Total meat production (%)	
	1975	2000	1975	2000	1975	2000	1975	2000	1975	2000
Cattle	180.1	209.0	4.9	6.4	82.0	110.3	724	1378.0	35.3	30.0
Buffaloes	60.5	92.0	9.3	11.0	139.0	138.0	780	1403.0	38.1	30.5
Sheep	40.1	56.4	31.9	32.8	9.0	12.0	117	222.0	5.7	4.8
Goat	69.7	120.5	42.50	38.0	9.0	10.0	269	458.0	13.2	10.0
Pigs	7.0	16.0	25.7	83.6	31.0	35.0	56	46.9	2.8	10.2
Poultry	141.0	637.0	0	0	0.8	1.0	101	527.0	4.9	11.5

There are many reasons for the slow growth of the meat industry, including the negative attitude of public towards meat on account of misinformation campaign, and socio-political considerations. Most meats are sold in the domestic market without proper sanitary inspection by the veterinarians. Mostly small animals, sheep, goats and pigs are slaughtered in unregistered slaughter houses in small numbers ranging from 2 – 10 by the individual butchers and meat is sold fresh on the same day. However, large numbers are slaughtered in the modern state-of-the-art abattoirs following world class sanitary and phytosanitary measures.

Challenges and opportunities for Indian meat industry

The Green Revolution had led to self-sufficiency in food grains, the White Revolution saw India occupy the number one position in milk production in the world, and the Blue Revolution brought about increase in fish production. This proves that the Indian farmer is progressive. What he needs is the lead in the right direction. Contribution of buffalo in bringing about the White Revolution in India is well known. India is now poised to achieve the Pink Revolution through buffalo. If this could be done, India can also achieve the number one position in meat production. This could be achieved by reducing the mortality rate in male Buffalo calves (80%), and rearing the animals scientifically for quality meat production. Meat production has been neglected, and has not been given adequate attention by the scientists, policy makers, and entrepreneurs, coupled with lack of political will. If all these are combined, the meat production can be greatly enhanced. Meat production

is intimately linked to quality leather production in which India has acquired number two position in the world after Italy. If substantive support is given by the Government, both meat and leather can also achieve number one position in the world, like milk. In order to achieve the Pink Revolution, the following steps have been taken by the Government and the entrepreneurs in India. The Government and the Private Sector have already initiated many of the steps.

1. Setting up of the State of Art-Abattoir-cum-Meat Processing Plants
2. Packaging of technologies to raise male buffalo calves for meat production
3. Buffalo rearing under contractual farming as backward integration to the modern abattoirs for meat production
4. Establishing disease- free zones for rearing animals

Components of Meat Industry

There are several distinct components of meat and meat by-product related industries, namely:

1. Trade in live animals: Weekly/daily Cattle markets dealing in Buffaloes, Sheep, Goats, Pigs and Bullocks.
2. Slaughtering the animals by individual butchers for retail in domestic markets;
3. Slaughtering the animals in the mechanized abattoirs in export oriented units(EOU) for export;
4. Transportation of fresh frozen meat in refrigerated containers from the point of production to the port for export to various countries;
5. Marketing and processing of raw hides and skins;
6. Marketing and processing of bones for further processing into gelatin, ossein and Dicalcium Phosphate (DCP);
7. Production of casings from the intestines;
8. Marketing and Processing of hooves and horns in the Cottage Industry;
9. Marketing and processing of blood for production of pharmaceuticals;
10. Rendering plants for production of meat-cum-bone meal and bone chips

Production of Meat

The meat meant for export has to pass through ante-mortem and post-mortem examination after 24-hour resting period of the animals, like the meat meant for local market and is chilled for 24 hours to bring down the pH below 6. Thereafter, it is deboned and deglanded. The meat is then packed into different cuts, and frozen at –40 ° C for 12 hours to bring down the deep bone temperature to -18 ° C. The frozen meat is stored in cold storage for export. There is very little processing of the meat. The meat produced for the domestic market is sold as hot meat. Goat/ sheep meat is marketed in villages by slaughtering one or two animals once in a week or as special occasions by a group of people joining together and sharing the cost of the meat so obtained. There is not much over head cost on meat in villages and realization on the cost of skin, blood etc., is poor.

Meat production ('000 MT per annum)							Requirement
	2001	2002	2003	2004	2005	2008	2020
Beef	1452.3	1462.6	1472.9	1483.2	1493.5	1462.0	1460.0
Buffalo meat	1432.7	1449.6	1466.6	1483.1	1487.6	1443 0	3250.0
Mutton	230.4	232.8	235.8	238.8	238.8	232.0	600.0
Chevon	469.0	470.0	473.0	475.0	475.0	470.0	850.0
Pork	483.0	486.5	490.0	497.0	497.0	612.0	770.0
Chicken	1250.0	1400.0	1600.0	1,650.0	1900.0	1401.0	2930.0

From the table it is clear that future demand for meat must be met by a minimum of doubling the meat production level. In the small towns sheep/goat meat is directly marketed to the consumers from meat shops. Since the time gap between slaughter and the sale is very short, the deterioration of the quality of the meat is less. In the big towns and cities most of the meat is consumed on the same day or kept in a refrigerator in the households. Large ruminants (buffalo and cattle) are slaughtered in big towns and meat is sold directly to the consumers. Poultry meat is mostly sold by slaughtering the live birds in the presence of the consumers. However, there are a few modern processing plants where poultry is slaughtered; chilled and frozen birds are sold in big cities. The export of poultry meat is insignificant. The reasons are that mortality of birds is high, overhead inventories are abnormal. The greatest disincentive is that exporters find the prices quoted in importing countries are not favorable.

Meat Quality and Safety Measures

Most of the export-oriented meat processing plants in India follow world class sanitary and phytosanitary measures given by the OIE, a referral institution of WTO. The plants are certified with HACCP (Hazard Analysis Critical Control Points), ISO-9002 and SGS meeting the OIE norms. These measures are for meat safety which starts right at the Primary production level either with the farmers raising 5 – 20 animals or in the feedlot. The identification and traceability of the animals from production source to the abattoir is completely maintained. It is ensured that animals have been raised under disease free conditions of the diseases related to List 'A' of OIE. Except for Foot and Mouth Disease, which is endemic in a few pockets in India and has an insignificant incidence (0.001%), India is free from Rinderpest, Contagious Bovine Pleuropneumonia etc. India has now launched a massive FMD control programme with Central Government assistance to make the three zones free of FMD comprising of 56 districts. In the HACCP, the Critical Control Points (CCP) are closely monitored at the reception of the animals (procured from disease free areas), ante-mortem examination, post mortem examination, chilling of carcasses at 0 - 4 ° C for 24 hours to bring pH level below 7, freezing of deboned meat at –35 to –40 ° C for 10 – 12 hours and storage at –18 ° C. All these measures exclude the possibility of transferring any contagious/infectious/zoonotic disease to the importing countries. The in-house quality laboratories in the plants ensure the absence of Salmonella, Listeria and permissible limits of E-Coli, Coliform bacteria. Almost all the export oriented plants follow the safety specifications given by the Meat and Meat Product Order of 1993 issued by the Directorate of Marketing and Inspection, Government of India. In addition, the measures recommended in Codex Alimentarius are also implemented.

Processing of Meat

There is very little processing. Hardly 1% of the total meat produced in the country is used for processing. Pork and Poultry meat are used for production of ham, sausages, patties etc., for the elite market. The meat processors like Venky, Government Bacon Factories etc, produce these products. Meat from small ruminants, namely, sheep and goat is also used for production of traditional Kebabs (Seekh and Shami Kebab).

Export of Meat

India's international trade in livestock and livestock products is mainly in live animals (17%), meat and meat products (82%), dairy products and eggs (1%). At the global level, India's exports and imports account for only 0.17% of each. Meat and meat products have dominated the exports from livestock. At present, more than 60 countries are importing meat from India. India exports more than 500,000 million tonnes of meat of which major share are buffalo meat. About 21% of buffalo meat produced is exported. Indian buffalo meat is witnessing strong demand in international markets due to its lean character and it's near organic nature. India is the 6th largest exporter of bovine meat in the world.

According to APEDA, the export of buffalo meat was increased from 343817.08 tonnes (valur Rs. 1536.77 crore) in 2003- 04 to 483478 tonnes (Rs. 3549.70 crore) in 2007- 08. The export of sheep/ goat meat is increased

from 16820.53 tonnes (Rs.110.39 crore) in 2003- 04 to 8908 tonnes (Rs.134.09 crore) in 2007- 08. the processed meat export was 986.13 tonnes (Rs.7.63 crore) in 2003 -04 to 1245 tonnes (Value Rs. 12.96 crore). The export of poultry products was 415228.17 tonnes (Rs. 202.40 crore) in 2003- 04 to 1355246 tonnes (Rs. 401.08 crore) in 2007- 08.

Meat Processing Plants

There are 10 fully integrated meat processing plants conforming to international standards set out by Office International Des Epizooties (OIE), Paris. There are other processing plants also which are partially integrated. Most of the above plants are fully integrated where healthy animals are slaughtered and carcasses are deboned. The deboned meat is frozen and exported. These plants have rendering plants and effluent treatment plants attached to them. Some of the processing plants in Sahibabad, UP, Kirti Nagar Industrial Area in Delhi and Mumbai in Maharashtra, do not have their own slaughter houses, but receive the carcasses of the slaughtered animals from the Government approved Municipal slaughter houses. These plants do small business.

Integrated Processing Plants

S.No	Company	Processing Plant	Location	Annual Capacity (tonnes)
1.	Allanasons	Fully integrated	Aurangabad	90,000
			Unnao	90,000
			Kolkatta	100,000
		Partially integrated	Hyderabad	90,000
			Sahibabad	50,000
2.	Hind Agro Industries Ltd	Fully integrated	Aligarh	120,000
			Sahibabad	50,000
		Partially integrated	Meerut	25,000
			Khurja	20,000
			Delhi	20,000
3.	Al-Kabeer	Fully Integrated	Hyderabad, AP	60,000
4.	Arabian Exports	Fully Integrated	Koregaon	50,000
5.	Fair Exports	Fully Integrated	Barabanki, UP	50,000
6.	MKR	Fully Integrated	Nanded	40,000
7.	Punjab Agro	Fully Integrated	Bassi, Punjab	50,000
8.	Venkay	Fully Integrated Poultry	Pune	1 Million Birds
9.	Government	Fully Integrated	Deonar	50,000
10.	Government	Fully Integrated	Goa	10,000

Utilization of Slaughter House By-products

The mechanized slaughter houses produce huge quantities of offal and ingesta from the slaughtered animals which could be profitably utilized for production of value added products, like Meat-cum-Bone Meal (MBM), Tallow, Bone Chips, Pet Foods and methane as a source of energy for value addition in most of the modern plants. MBM contains about 50% of good quality protein and is a cheaper source of protein for poultry feeding. It is a good source of lysine and other sulphur containing amino acids. Similarly, tallow is a cheap source of energy for broiler production vis-à-vis the vegetable sources which are expensive. Tallow is also used for soap manufacturing. The rendering plant cooks the byproduct at 133°C at Bar 3, which completely sterilizes the MBM and destroys the prion causing BSE in the animals.

Employment Generation

About 40 million people are engaged in meat sector, namely, trade of live animals, hides, bones, casings, horns and hooves etc. This sector when organized on scientific lines will generate more employment in rearing of animals on scientific lines and processing of slaughter-house by-products for allied industries.

Meat Industry in future

Government of India is particularly working hard to improve the export of agricultural products either raw or processed, so they are setting up export zones through out the country.

As many as 48 Agri Export Zones (AEZs) for different products have been set up in 19 States. The state-wise break-up of approved AEZs include West Bengal (5), Karnataka (3), Uttaranchal (4), Punjab (3), Uttar Pradesh (4), Maharashtra (6), Andhra Pradesh (4), Jammu & Kashmir (2), Tripura (1), Madhya Pradesh (3), Tamil Nadu (3), Bihar (1), Gujarat (2), Sikkim (2), Himachal Pradesh (1), Orissa (1), Jharkand (1), Kerala (1) and Assam (1).

Approvals have been given for setting up of 23 Special Economic Zones (SEZs) in the country and a number of measures were taken during the year for promoting SEZs. The above mentioned export zones will promote the meat and meat products export in the near future.

Conclusion

People spent 40 to 45 per cent of their income on food and about 60 per cent of the global retail chains business is based on agri- business. The buying power of our middle class consumers is increasing. Despite the global financial sector, the food processing sector in India grew to 14 per cent. There is no income tax, central excise in this sector. So there is a growing need for setting up a chain of laboratories and training institutes to boost India' s meat and poultry processing sector. The meat and poultry processing sector needs to invest, modernize and raise standards or face growing competition from higher quality imported products. If our entrepreneurs failed to exploit the potential in the meat and poultry processing sector, products from other countries would enter the Indian market.

PET BUSINESS IN INDIA: PERSPECTIVE AND PROSPECTIVE

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Pets have always been a craze in western countries. In India, though dogs have been domesticated for a long time the craze has started with Indians trying to follow the western culture. According to a research conducted by Research and Consultancy Enterprise (RACE) of Institute of Management Technology (IMT), Ghaziabad there are about 2.2 million dogs in the Indian household with the population increasing by 26% every year. Not only in Gaziabad, has each and every city had an increase in pet population. Most of the people had them for security. Consumer perceptions are changing rapidly and the pets are increasingly being treated as companions Pets seem like perfect companions providing unconditional love and not expecting anything in return. Pets are also considered as fashion in celebrity culture. A leading newspaper daily reported that 70% of the film personality is known to own at least one dog.

The pet industry in India has an estimated revenue earning potential of Rs. 450 crore. Out of this around 300 crore is contributed by pet foods and the remaining 150 crore comes from grooming and healthcare sector. The industry is growing rapidly in India" says Mr. O.P Singh, CEO of a pet food supplier company called Venky's India. There are innumerable options for business in the pet industry. The options just keep growing day by day as people come up with new ideas. With Rs 210 crore (US$44.7 mn) in its kitty and a 25 percent annual growth, the Indian pet industry holds tremendous potential for its stakeholders—domestic, as well as, international. (IIPTF). Recent research has demonstrated that the human/animal interaction benefits human physical, emotional and psychological well-being. Keeping the companion animals healthy and treating them with dignity is a contribution to society.

Some facts

- In the EU alone, more than 13,000 assistance dogs help blind and deaf people as well as other handicapped persons in their daily life;
- Therapy horses are used to help treat people with mental and physical disabilities.
- Studies shows that pet owners are healthier than those who do not own a pet;
- Pet owners tend to be less susceptible to conditions such as depression, hypertension and heart attacks. They also recover more quickly from illness;
- Dog owners take regular exercise by walking their pets;
- For people living alone, ownership of a dependent animal offers a focus of interest and commitment, which is quite separate from personal preoccupations. Companion animals demand care and attention - and respond with affection.
- Positive self-esteem of children is enhanced by owning a pet.

(Source: IFAH-Europe and PAWSitive InterAction)

- ❖ Pet Sales
- ❖ Pet Health Care
- ❖ Pet Saloon and spa
- ❖ Pet Magazines
- ❖ Pet Transport
- ❖ Pet Food Industry
- ❖ Pet Shows
- ❖ Pet Holiday Homes and day care
- ❖ Pet Training
- ❖ Pet Accessories
- ❖ Pet Pharmaceuticals
- ❖ Pet Counselors
- ❖ Pet Insurance

Pet Sales

The sale of pet increased with demand for pets in India started increasing. More frequent visits to western countries and adopting western lifestyles people also started looking in for breeds beyond borders. Hence there has been huge number of increase in import of pet from various countries spending huge money in the process. At present the market prices are based on registry of pets at various kennel clubs, show winners lines etc. People nearly spend Rs. 500/- to more than a lakh of rupee in the purchase of pet.

Pet Food

The Pet Food market in India has been growing steadily. Currently it stands at around 200 Crore which will grow upto 700 Crore a year by 2014 that is around 25%.Though the market is dominated by certain foreign brands (Pedigree & Royal Canin are market leader with 120 & 30 crore turnover respectively). our domestic companies are looking to venture into various segments and provide a variety of products to attract the pet owners. The market is worth INR 876 mn and shows huge potential for growth with increasing number of pets especially in the urban towns and cities in India. An analysis of the drivers explain the factors for growth of the industry including low penetration of branded pet food, increasing pet ownership, increasing consumer awareness, and increasing organized retail chains. The key challenge identified encompasses high import duties and frequent bans on imports. Key trends have also been analyzed including dominance of non-vegetarian dog food, players providing customized products and services, and increasing promotional activities.

"Dog Dabbawala" service in Mumbai that supplies nutritious home cooked food at the cost of Rs 120/meal with door to door supply. The Milestone Resort of Delhi has even launched a unique restaurant for dogs called Bow Wow club.

The fastest growing segment of the pet foods industry is gourmet dog treats. There's a lot of money to be made in this business because the profit margin is very high and people are willing to pay for the best dog treats money can buy. As people become more health conscious of their own diets, they begin to scrutinize their pet's diets as well, and many are turning to naturally made food and biscuits for their dogs, even though all-natural handmade biscuits cost as much as ten times more than commercially produced biscuits.Baking and selling specialty dog treats is a fantastic opportunity for pet-loving entrepreneurs who want to work from home and have lot of fun. Selling options are plentiful as done for other products.

Pet Accessories

Having owned a pet for a huge price the accessories also increase in the process. Americans spend more than $30 billion annually on their pets and big bucks can be earned by designing, making and selling designer duds for dogs. Sweaters and rain jackets are sure bets to become top sellers, but dog lovers around the globe are also buying designer doggie hats, goggles, shirts, booties, scarves and even Halloween costumes for their beloved furry friends. Hemchandra's younger daughter Radhiya, a designer, has launched a range of pet clothing and pet accessories under the brand name Rad Petz. The family is certainly ramping up. Fuzzy Wuzzy's revenues are worth Rs 10 lakh a year.

The requirement is simple design skills, sewing skills and equipment, patterns, and a bit of creativity to get out especially if ambitious. Apart from this designing, manufacturing and wholesaling pet toys could put you on the path to financial freedom, and this opportunity can be started part time from home on a minimal initial investment. There are literally thousands of different pet toys on the market. They can be sold in a doggie clothing boutique at home or in a retail storefront location or through pet shops are going as wholesale. If not, there are still many ways to sell direct to dog owners. These include exhibiting and selling at pet fairs, online sales via dog-related websites, mail order sales supported by newspaper, catalog, online and magazine advertising. As dog owuers know, word travels fast amongst dog owners, and when a great product for a pet is found, he or she is quick to spread the word to other dog owners. Pets are like children to most people and generally people will spare no expense when it comes to the happiness of their pets.

The other products include chains, leash body belts etc.The domestic product market is expected to grow at an annual rate of 10-15% according to Euro monitor, a global market research firm. "India is predicted to supply the world with the bulk of pet-related products in the coming years" says Binoy Sahee, the Director of India International Pet Trade Fair (IIPTF) that organizes pet fairs regularly.

Pet Health Care

Apart from this veterinarians are employed in various veterinary clinics, hospitals and also become entrepreneurs in providing health care for pets in providing vaccination, deworming, medical and surgical treatments etc. The quality service you provide the more the profit you make.

Pet Shows

The pet shows are organized with lot of funds involved internationally. It serves as a platform for buyers and sellers to showcase their pets and market them. Apart from this increases the visitors from all over the world increasing the foreign money in India. It is a place where the manufacturers of various products to make an attraction to the clients through exhibits and stalls. They also sponsor events and make a mark in the industry.

Pet pharmaceuticals

With increasing animal population, the key persons for growth of veterinary pharmaceutical industry is the willingness of the owners to spend more on the health of their animals and the ability of veterinarians to meet that need. The human-pet bond has a high economic ceiling, and both veterinarians and the animal health industry have recognized the potential of this market segment.

One of the silent contributors to the balance sheets of some Indian pharmaceutical companies is the animal healthcare market. Off late, for a variety of reasons, there has been a paradigm shift from being a silent player to a more aggressive positioning. Zydus Cadila, Alembic, Vetnex, Virbac Animal Health India, Intas Pharmaceuticals, Intervet India, Concept Pharmaceuticals and Wockhardt are some of the major players in India who have stakes in the animal healthcare market. Their global counterparts include Pfizer, Merial, Schering Plough, DSM Nutritional Products, BASF Animal Nutrition, Bayer Animal Health, Elanco, Novartis and Ceva Sante. Animal health products market is growing at an annual rate of eight to ten percent with a major chunk of growth coming from small and medium sized local companies"(Indian Express Newspapers).

Thiru. Sushil Mehta, Managing Director and Chief Executive Officer Ranbaxy Fine Chemicals Limited reported to Indian Express future trends include product development for certain segments like parasiticides for companion animals, increased shopping at retail outlets and through internet and over-the-counter (OTC) products posing stiff competition to prescription. So, households will also see major growth as the number of companion animal's increase and product development will focus on the needs of ageing pets, especially in Western countries. Increased spending, better pet monitoring services, pet insurance, and owner lifestyles will also shape the growth of the animal healthcare market.

Pet Holiday Homes and day care

Lots of people have pets that can't be boarded or left with friends and family when the need arises--pets with chronic health conditions or exotic pets that are difficult to take care of. Likewise, many people prefer to have their dogs, cats and other pets in the safety and familiar surroundings of home, rather than an unfamiliar boarding environment. When these pet owners want or need to be away from their home, there is only one solution available: hire a pet-sitting service to come to their homes and take care of their beloved pets while they're away. So on a small scale, pet sitter can make huge money. Good candidates for the job include pet-loving retirees and students. This can he done as marketing advertisement done for the pet products.

A doggie day care is strictly a drop off in the morning and pick up in the evening or anytime during the day type of operation. Day-care facilities for dogs are becoming increasingly popular, especially as more and more caring dog

owners are realizing the benefits of leaving their beloved dogs at day care with other dogs instead of at home alone while they are at work. This prevents neighbour complaints. A better alternative is to rent commercial warehouse space and covert it into a dog day care spa, complete with water features, fenced outdoor space, and indoor couches to ensure your clients have all the creature comforts they're used to at home. It can be added with an innovative web cams throughout their facility so people at work could log onto their website and see live footage of their dogs playing with other dogs. (Entrepreneur Media, Inc. 2011)

Pet Salons and Spa

A research conducted by Dare magazine says that the total market size of the pet grooming industry was 132 crore in 2007 and is expected to grow to 299 crore by 2010 and the total market size of the pet grooming industry was 132 crore in 2007 and is expected to grow to 299 crore by 2010. At present there are four major pet salons in India – Scooby scrub in Delhi, Tailwaggers and TopDog in Mumbai and Fuzzy Wuzzy in Bangalore. Pet salons can be started with a low investment of 1-5 lakhs that includes the cost of training, shop rent, equipments and products. The entrepreneurs who have started pet salons feel that one doesn't even have to be from a business background. "A formal training is not as important as love for animals "says Yashodhara Hemachandra of Fuzzy Wuzzy Salon. Petsalons provide services like hair cuts, nail trimming, tick and flea treatments, oil massages and some fancy services like party dressing and hair coloring.Medicated and non medicated pet spas are also an attraction.

Pet Counselors

For those whose pets are extremely notorious and nervous, we have canine behavior therapists. Shirin Merchant, a canine behavior therapist based in Mumbai counsels around 100 dog owners per month at Rs. 1000 per session. We also have some 'Dog Yoga' called 'Doga' service centers available these days. (The Booming Pet Industry in India, The Viewspaper- www. http://theviewspaper.net/the-booming-pet-industry-in-india/)

Pet Magazines

Pet owners are always on a lookout for good quality information on pet care and pet health. These needs are fulfilled by pet magazines. Eg. "Woof" and "Dogs and pups". People try to invest on magazines to know about breeds in particular, health care related issues, pet shows, pet sales etc.)

Pet Training

Dog obedience training is a multimillion-dollar industry, and continues to grow by double digits as more and more dog owners realize the benefits of professional obedience training. Training classes can be held at home in a one-on-one or group format or can travel to your customers' homes and train one-on-one. Likewise, deals can be made with schools and community center to hold dog obedience classes on weekends and nights. Current rates for in-home training are in the range of $30 to $50 per hour and many trainers create dog-training packages for their customers, which include a set amount of training classes and course materials in print and video formats. (http:// www.entrepreneur.com)There are associations like the Association of Pet Dog Trainers (APDT) where in becoming a member can be helpful in increasing the fee. Get a formal certificate will also increase the demand of the trainer.

Pet Insurance

It is slowly but surely catching up in India. Pet Insurance schemes essentially pay for the veterinary costs in case one's pet falls sick or suffers an accident or injury. Some pet plan insurance products also make payments for loss or death of the insured pet. Claes Virgin wrote the world's first policy on pet insurance in 1890. Pet insurance policies worldwide are also available for livestock and animals like horses. Pet care insurance in India is still at a emerging stage. Most of the clients come from the super rich sections of society. However, the insurers foresee a huge untapped potential in this sector, in the coming years. Pet insurers put the number of pets at over 4 million, counted across 27 main Indian metros. The value of the Indian pet industry is estimated at above Rs 400 crore. Industry insiders in India expect pet insurance business to boom with the increased public awareness about the concerned schemes.Oriental

Insurance, a premier Indian insurance company, provides insurance for dogs, horses and elephants. Currently the other key players in the Indian pet insurance market are United India Insurance Co, National Insurance Co, Bajaj Allianz General Insurance and New India Assurance Co. Usually the premium for pet insurance varies between three to five percent of the amount insured in India. Pet medical insurance plans in India normally provide coverage for death from disease, disability and sickness. Insurance coverage is also extended for public liability and accidental death of pets (www.Mapsofindia.com).

Pet Transport

Pet transportation facilities within country and abroad has started to attract the new area in pet industry and open for newer industrial growth. Rishya, a budding entrepreneur, came up with the idea of transportation services for pets to ensure they travel from one end of the globe to another, safely. Top it up with a pet valet service. Fuzzy Wuzzy Pet Transportation is officially registered with the Independent Pet and Animal Transportation Association International (IPATA) in the US. (Abhijeet Mukherjee,ET Bureau - Pet Business For Startups, Times Internet Limited, 2010).

The Indian pet industry has just started coming out of the box and given that changing lifestyles are expected to grow at a significant rate in future. Hence, indigenous firms can gain a lot by marketing their products effectively and building brand loyalty(Neha Agarwal, Pet Industry In India, Youth on Pets 2010)

MITIGATION OF RISK AND UNCERTAINTY – LIVESTOCK INSURANCE

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Meaning of insurance

Insurance is related to protection of the economic value of assets. Every asset has a value. The asset would have been created through the efforts of the owner, in the expectation that, either through the income generated there from or some other output, some of his needs would be met. However if the asset gets lost earlier to its life span, being destroyed or made non-functional, through an accident or other unfortunate event the owner and those deriving benefits there from suffer. Insurance is a mechanism that helps to reduce such adverse consequences.

Why insurance?

There is normally expected life cycle for every asset during which time it is expected to perform its assigned role. So, a prudent individual can manage his affairs so that by the end of that life cycle, a substitute is in place to ensure continued benefit/comfort. However, if due to an accident or other unfortunate event, the asset gets destroyed or made non-functional earlier, the person deriving benefits there-from suffer. Insurance is the mechanism that helps to soften the impact of such adverse consequences by providing for some monetary substitution to face such unforeseen circumstance. However it has to be remembered that what is being talked about is only a probability of a loss. The protection of insurance is against a contingency that may or may not happen.

What is peril?

The need of insurance arises from the chances of an accidental occurrence destroying or making an asset non-functional. Such loss producing eventualities are called perils. E.g. fire, floods, lightning, earthquakes, etc.

The concept of Risk

The term risk may be defined as the possibility of adverse results flowing from any occurrence. Risk arises, therefore, out of uncertainty. It can also represent the possibility of an outcome being different from the expected. Risk is a condition where there is a possibility of an adverse deviation from a desired outcome that is expected or hoped for, there is no requirement that the possibility be measurable, only requirement is that it must exist. For those who define risk as uncertainty, the greater the uncertainty, the greater is the risk. For the individual, the higher the probability or loss, the greater is the probability of an adverse deviation from what is hoped for and, therefore, greater is the risk.

Spreading of risk

In order to be amenable to statistical predictions, insurance risks must be handled on a large scale as in the case of tossing a coin 10 times or a million times. i.e. "law of large numbers." People facing common risks come together and make their small contributions to a common fund. The contribution to be made by each person is determined on the assumption that while it may not be possible to tell beforehand, which person will suffer, it is possible to tell, on the basis of past experiences, how many persons, on an average, may suffer losses.

Insurance business

The business of insurance done by insurance companies (called Insurers) is to bring together persons with common insurance interests (sharing the same risks) collecting the share or contribution (called premium) from all of them, and paying out compensations (called claims) to those who suffer. The Insurer acts as a trustee for managing the common fund for and on behalf of the community. He has to ensure that nobody is allowed to take undue advantage of the arrangement.

Role of insurance in economic development

Insurance benefits society by way of

1. Providing relief to the insured from any mishap.
2. Reducing burden of Government in providing relief to the old citizens: and
3. Providing funds to Govt. For nation building activities.

Insurable interest

A person should have insurable interest before insuring any asset. Insurable interest exists on person/ persons, who by virtue of destruction or damage to the asset suffer economic loss arising out the asset.

Livestock & Poultry insurance

Our country is based on rural activities and hence developments of rural areas lead to development of our country. Rural people are mainly dependent on agriculture and/or livestock & Poultry. Protection to their assets leads to protection to our country as a whole.

How to do insurance?

Insurance is proposed by a proposal to the Insurer, who, after examining it accepts by receiving a consideration (premium) with certain terms and conditions and issue a policy for a specified period.

Speciality in Livestock insurance

Cattle owners are mainly poor and do not have assured livelihood and hence they are unable to pay premium in lump sum. They are not aware of scientific management of cattle thereby losing their cattle in large numbers during outbreaks. They are also in remote villages, where insurance business is not generally reaching them. Veterinary health services are also not assured in small villages and remote places causing inconvenience for insurance activities.

Valuation of animals

Cattle are valued for their market value based on Breed, Sex, age, production capacity etc. valuation in poultry depends on type ie.Broiler, Layer, Parent stock etc. value

Premium rate

Animals coming under subsidy scheme are charged with less rate of premium compared to others.

Sum assured Vs Value prior to illness"

Through premium is charged based on the market value of the animals at the time of insurance, value of the animals may vary depending on various factors. Hence the market value may either go up or come down. However the compensation in the event of loss is limited to sum assured only. In other words if the market value of the animal goes down at the time of loss, then claim is restricted to that value (value prior to illness) only. This condition does not apply to animals coming under subsidized loan scheme sponsored by Govt. The theme behind this is to re-create the asset for the livelihood of cattle owner.

Calf insurance scheme

In case of calves especially heifer calves, value is variable depending on its age and hence sum assured is fixed at the maximum expected value of the animal on input cost basis, in specified period of cover, mutually agreed by Insurer and Insured. If loss occurs in any particular age, value as per the input cost up to that age is taken in to account. This is because insurance eliminates the profit margin and it compensates the just financial loss to the insured, which is actually the total input cost only.

Types of cover

Cattle – Death due to disease and or accident / Permanent Total Disability cover due to disease and or accident

Poultry – Death due to disease and or accident or Tailor made cover on specific risks

Risk reduction

As per the available records only a fraction of population of animals are insured. Especially animals under bank loans are generally insured, whereas private owners are not enrolling in large numbers for insurance. Hence the spreading of risk is not as expected. We can note the all India Livestock population from 1951 to 2003 is as follows: (in million numbers)

Species	**1951**	**1956**	**1961**	**1966**	**1972**	**1977**	**1982**	**1987**	**1992**	**1997**	**2003**
Cattle	155.30	158.70	175.60	176.20	178.30	180.00	192.45	199.69	204.58	198.88	185.18
Buffalo	43.40	44.90	51.20	53.00	57.40	62.00	69.78	75.97	84.21	89.92	97.92
Total bovines	198.70	203.60	226.80	229.20	235.70	242.00	262.36	275.82	289.00	288.80	283.10
Sheep	39.10	39.30	40.20	42.40	40.00	41.00	48.76	45.70	50.78	57.49	61.47
Goat	47.20	55.40	60.90	64.60	67.50	75.60	95.25	110.21	115.28	122.72	124.36
Pigs	4.40	4.90	5.20	5.00	6.90	7.60	10.07	10.63	12.79	13.29	13.52
Total livestock	292.80	306.60	335.40	344.10	353.60	369.00	419.59	445.29	470.86	485.39	485.00
Poultry	73.50	94.80	114.20	115.40	138.50	159.20	207.74	275.32	307.07	347.61	489.01

Livestock Population – Tamil Nadu (In Thousands)

Year	Cattle	Bufflalo	Sheep	goat	Pig	Other animals	Total livestock	Total poultry
1951	10216.60	2297.16	8023.84	4040.13	408.56	143.65	25129.61	8377.62
1956	9698.25	2040.94	7041.62	3757.58	506.90	118.91	23164.20	10416.63
1961	10825.90	2594.27	7159.96	3428.85	502.29	127.53	24638.80	11293.24
1966	10859.35	2724.02	6621.18	3770.85	474.89	118.68	24568.96	11225.89
1974	10572.38	2853.25	5392.82	3954.48	562.81	97.68	23433.41	12977.66
1977	10801.12	3077.68	5289.24	4202.09	678.12	97.99	24146.24	14347.20
1982	10365.50	3212.24	5536.51	5246.19	693.74	90.63	26186.09	18283.72
1989	9353.14	3128.26	5880.79	5919.71	660.68	56.70	26366.22	21570.24
1994	9096.12	2931.18	5612.24	5864.44	613.13	53.96	25679.33	23853.68
1997	9046.54	2741.24	5258.88	6416.20	609.18	71.11	25939.00	36511.00
2004	9141.04	1658.42	5593.49	8177.42	320.87	----	24942.00	86591.27

Though official figures are not available about the number of animals insured year wise/State wise, it is assumed that the insurance coverage is very much less based on the premium collected by various Insurance Companies.

Why more animals are not covered

1. Lack of awareness of livestock insurance among rural mass
2. Poor condition of the rural mass leading to unable to pay insurance premium in one instant
3. Non-availability of insurance representation in the vicinity
4. Non-availability of veterinary healthy cover in the vicinity
5. No image building for immediate claim compensation to the insured
6. Insurance offices are located far away from rural areas
7. Non-utilisation of self-help groups in bringing more insurance
8. Failure of some of the societies/self-help groups on transparency of public accounts
9. Lobbying of money lenders in rural areas
10. Scarcity of good and loyal leaders in rural areas
11. No proper education to rural mass on various schemes of Govt.
12. Certain difficulties faced by rural people in insurance procedure
13. Non-availability of bank loan for insurance premium
14. Rural people are unable to pay for escalated health care expenses

Risk involved in healthy livestock insurance

1. Selection of risk thereby only few among available herd of animals are proposed to insurance
2. Not taking proper veterinary care on the assumption that insurance will compensate loss
3. Animals having illness also are proposed for insurance
4. Uninsured animals are being claimed against insured animals
5. Proper identity of animals are not assured always
6. Post-mortem is not conducted in some cases due to poor transport facility
7. Claim intimation is not sent to Insurer on time thus not giving chance to Insurer to verify claims on random
8. Claim intimations are sent on Friday evening or Saturday morning to avoid Insurer to do random check-up
9. Claim forms are sent in some cases belatedly without valid reasons
10. Insurance procedures are not made known to all insured especially un-educated people
11. Communication becomes difficult for insured in remote villages with Insurer
12. Periodical vaccinations are not carried out especially in milch animals with the fear of loss of milk production
13. Balanced diet is not fed to animals because of poor condition of rural people
14. Non-availability of market for the produce for a reasonable cost, leading to improper management of animals
15. Animals are purchased for lesser value as against the loan amount

Role of insurance in economic development

1. Providing relief to the insured from any mishap
2. Reducing burden of Government in providing relief to the old citizens
3. Providing funds to Government for nation building activities
4. Enabling financial institutions to give loan for cattle for the betterment of rural /needy people
5. Livestock insurance enables rural people to avail certain assets and thereby generating income for their livelihood

Suggestions for more insurance coverage

1. Involvement of more NGOs / Self help groups to cater the need of needy people
2. Arranging mobile veterinary assistance for a cluster of villages
3. Arranging ways and means for assured proper marketing of produce for a reasonable rate
4. Organizations to come forward to pay annual premium and collecting back the same on easy installments to enable cattle owner to pay premium
5. Taking insurance for cattle owner also along with animals, so that in case of death of owner, loan can be repaid and the balance amount can be given to legal heir
6. Forming grazing lands in villages thus reducing the maintenance cost
7. Creating district wise livestock centers to distribute young animals/milch animals in a reasonable cost to poor people (i.e. on input cost basis)
8. Creating units locally to utilize animal by-products thus creating a need for more Animal Husbandry activities
9. Education to rural people on Animal Husbandry Economics

INDIAN FISHERIES SECTOR –AN OVERVIEW

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The fisheries sector has been playing a vital role in the economic development of India. When our country become independent, food storage was the most important problem and hence the First Five Year Plan addressed this issue almost exclusively. In order to evolve technologies for increasing fish production, the erstwhile Central Marine Fisheries Institute (CMFRI) at Mandapam and Central Inland Fisheries Research Institute (CIFRI) at Barrackpore were established in 1947. Since then, several fisheries research institutes were formed.

Artisanal fishing was predominant till the early sixties when mechanization of marine fishing using trawlers was introduced through the Indo-Norwegian Fisheries Project (INP) in Kerala and Tamilnadu. Trawl fishing emerged as the major source of marine fish production and this led to an increasing trend in marine fish production till late seventies. The next decade saw leveling off of marine fish landings and overfishing became evident thereafter causing several problems. Conflict in resource exploitation surfaced frequently and often proved to be brutal resulting in casualties among the various sections of fishermen. Even today, we see breakdown of law and order due to this problem. Resource depletion in various kinds leading to threatening and endangerment of marine flora and fauna caused colossal damage to the marine resources and the ecosystem. The significant achievement was enhanced output, national income, employment generation and foreign exchange earnings though export of fish and fishery products. It has rich fisheries resources (Table 2).

Fisheries is a sunrise sector in India. It has been playing a significant role in the economy and in supporting the livelihood of an estimated 14 million people in the country. Its contribution include:

1. National income
2. Food fish production
3. livelihood support and employment
4. Foreign Exchange earnings
5. Eco-tourism
6. Coastal security
7. Protection against climate changes
8. Protection against natural disasters like Tsunami
9. Biodiversity
10. Cultural links

National Income

Fisheries provided an estimated goods and services worth Rs.42,178 crore in 2007-08 from a more Rs.245 crores estimated during 1970-71. It's share in the country's GDP was 1.04% and 4.71 % of that from agriculture and called activities. However, it is claimed that this estimate does not reflect the accurate value of the contributions from fisheries and it is believed it may be more than the reported value.

Food Fish Production

The estimated fish production was a more 0.752 million tonnes (t) consisting of 0.534 million to from marine fisheries and 0.218 million t from inland fisheries in 1990-91. It rose to 7.637 m.t in 2008-09 comprising 2.977

million t of marine fish and 4.660 million t of inland fish (Table 3). While the marine fish production recorded on annual growth rate of 1.33%, the inland fish production annual growth rate of 6.52%. The inland fish production accounted for over 60% of total fish production mainly due to enhanced output from farmed fish production.

Livelihood support and employment

Fisheries remains a major source of livelihood for the rural poor, particularly all aong the 8127 km long coastline of the country. The country has enormous inland and marine waters providing immense livelihood and employment opportunities to the fisherfolk. According to an estimate, about 14 million people derive livelihood and employement from fisheries (www.nfdb.org). The total output of fisheries sector was estimated at Rs.31.672 crores in 2003-04 with net domestic product valued at Rs.27.026 cores (CSO, 2005). With this level of output, over 90 lakh people may be employed at subsistence level of an annual income of Rs.30,000/ fisherman. The share of marine and inland fisheries sectors in providing employment to the fisherfolk is 54% and 46% respectively. (XI plan – Fisheries Report, 2007).

Foreign Exchange Earnings

Foreign exchange earnings through export is a top priority of the Union Government of India for sustaining economic growth of the country. Fisheries exports constitute about 18% of agricultural exports of the country. About 100 products of fish are exported to many countries. The export of marine products has steadily grown over the years, from a more Rs.3.92 crore in 1961-62 to Rs.10,048.53 crores in 2009-10 (Table 4). Marine products account for 1.1% of the total export from India.

Eco-tourism

Several islands, beaches, backwaters and mangrove forests have become hot spots of eco-tourism. Which may be generating several millions of rupees as income. No economic valuation of these services of the marine eco-system, besides others, has been undertaken in India and hence the level of income from marine eco-tourism is not yet fully known.

Coastal security

India is a peninsula and coastal security is of utmost importance to the country. The recent terrorist attacks in Mumbai revealed the slackness in the Indian coastal waters. The patrol boats of the Indian coastguard as well as coastal police of the maritime states are very limited and the role of fisherfolk in identifying foreign vessels or any anti-social activity is significant. The Indian fishing fleet has an estimated 2,41,720 fishing crafts with the following composition.

1. Mechanished boats	:	59,619
2. Motorised craft	:	76,057
3. Non-motorised craft	:	1,06,044
		2,41,720

Source: Marine Fisheries Census, Part – 1, 2005, Report of the working Group on Fisheries for X Plan, Ministry of Agriculture, 2001. These boats keep a constant vigil along the entire coastline and provide adequate coastal security.

Protection Against climate changes

The Marine Ecosystem is a reservoir for absorption of green house gases such as carbon-di-oxide. The marine biota, particularly marine phytoplankton absorb carbon-di-oxide for photosynthesis. Mangroves and coral reefs also absorb the gases while help to provide protection against climate changes.

Protection from Tsunami

Mangroves provided protection to the people living in coastal areas during the recent tsunami. Fisherfolk, NGOs and governments have prioritized protection and restoration of mangrove forests as they provide several other benefits to the coastal communities.

Biodiversity

India is blessed with rich and varied fisheries resources and habitats. India is estimated to have 10% of fish biodiversity on earth. The Gulf of Mannar is a hotspot of marine biodiversity and therefore has been declared a marine bio-sphere park which means all the resources in the region are now protected for conservation and management. The fisheries plays a pirotal role in the Indian economy and in the livelihood development of our fisherfolk.

Table – 1. Indian Fisheries

Indian Fisheries

Global position	3rd in Fisheries 2nd in Aquaculture
Contribution of Fisheries to GDP (%)	1.07
Contribution to Agril. GDP (%)	5.30
Per capita fish availability (Kg.)	9.0
Annual Export earnings (Rs. In Crore)	7,200
Employment in sector (million)	14.0

Resources

Coastline	8129 kms
Exclusive Economic Zone	2.02 million sq. km
Continental Shelf	0.506 million sq. km
Rivers and Canals	1,97,024 km
Reservoirs	3.15 million ha
Ponds and Tanks	2.35 million ha
Oxbow lakes and derelict waters	1.3 million ha
Brackishwaters	1.24 million ha
Estuaries	0.29 million ha

Some Facts

Present fish Production	7.637million tonnes
Inland	4.660 million tonnes
Marine	2.977 million tonnes
Potential fish production	8.4 million tonnes
Fish seed production	21,000 million fry
Hatcheries	1,070
FFDA	422
BFDA	39

Table 2 Fish Production in India (in lakh tonnes)

Year	Marine	Inland	Total
1950-51	5.34	2.18	7.52
1960-61	8.80	2.80	11.60
1970-71	10.86	6.70	17.56
1980-81	15.55	8.87	24.42
1981-82	14.45	9.99	24.44
1982-83	14.27	9.40	23.67
1983-84	15.19	9.87	25.06
1984-85	16.98	11.03	28.01
1985-86	17.16	11.60	28.76
1986-87	17.13	12.29	29.42
1987-88	16.58	13.01	29.59
1988-89	18.17	13.35	31.52
1989-90	22.75	14.02	36.77
1990-91	23.00	15.36	38.36
1991-92	24.47	17.10	41.57
1992-93	25.76	17.89	43.65
1993-94	26.49	19.95	46.44
1994-95	26.92	20.97	47.89
1995-96	27.07	22.42	49.49
1996-97	29.67	23.81	53.48
1997-98	29.50	24.38	53.88
1998-99	26.96	26.02	52.98
1999-2000	28.52	28.23	56.75
2000-01	28.11	28.45	56.56
2001-02	28.30	31.26	59.56
2002-03	29.90	32.10	62.00
2003-04	29.41	34.58	63.99
2004-05	27.79	35.25	63.05
2005-06	28.16	37.56	65.72
2006-07	30.24	38.45	68.69
2007-08	29.19	42.07	71.26
2008-09 (P)	29.77	46.60	76.37

(P): Provisional.

Source : Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, New Delhi

POULTRY INDUSTRY

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Even though domestication of chicken was started more than 5,000 years ago, the modern commercial poultry production was started after the First World War period only, in U.S.A. and some European countries. The Indian poultry industry is barely 40 years old. In between 1955 to 1965, some Christian missionaries have imported White Leghorn, R.I.R. and White Rock breeds, to upgrade the local chicken, having very high disease resistance power; but highly broody. Later, hybrid broiler (Arbor Acres) and layer (Babcock) strains were brought to India in early seventies, to start the modern poultry industry. Among the two, the layer industry took wings early and registered a spectacular growth rate between 1970 and 1985. The broiler industry came to existence five years later and showed 25 -100% annual growth rate initially and 7 -15 % growth rate subsequently. During the last few years, the egg and broiler production in India is showing an annual growth rate of about 5% and 9%, respectively. In spite of late start and more vegetarianism, the poultry industry in India has picked up very fast and reached the top ten spots, in both broiler and egg production. The top ten eggs and broiler producing countries in the world are shown in Tables-1 and 2, respectively. The growth indicators of poultry development in India are presented in Table-3.

Table-1. Top Ten Table Eggs Producing Countries in the World in 2009

Country	Million Metric tonnes	Eggs (billions)	Value (Bill.U.S.$)
China	23.21	414.30	19.69
U.S.A.	5.45	97.28	4.09
India	3.21	57.30	2.61
Japan	2.65	47.30	2.17
Mexico	2.57	45.87	2.00
Russian Federation	2.20	39.27	1.84
Brazil	1.93	34.45	1.37
Indonesia	1.17	20.88	0-91
France	0.96	17.14	0.78
Ukraine	0.90	16.10	0.73

Table-2. Top Ten Broiler Producing Countries in the World in 2009

Country	Million Metric tones	Value (Bill.U.S.$)
U.S.A.	16.61	19.37
China	11.55	13.48
Brazil	10.75	12.55
India	2.97	3.46
Mexico	2.70	3.15
Russian Federation	2.09	2.44
Iran	1.65	1.92
Indonesia	1.60	1.87
Japan	1.39	1.62
United Kingdom	1.31	1.54

Tables1 and 2 have clearly indicated that India ranks 3rd and 4th positions in egg and broiler production; respectively. Moreover the poultry production standards reported in Tables-4 and 5 also proved that our production standards are comparable or better than the standards recorded in many developed countries. Hence India is a developed country, as far as poultry production is concerned.

In addition to the modern hybrid layers and broilers, India is having a huge (300 -500 millions) population of indigenous chicken in the backyard or free range; which provides pin money to the house wives. Nearly, 15% of our eggs and 18% of our poultry meat come from the backyard farms. The Japanese Quail farming is also growing at a rapid rate, as alternative to chicken, by small farmers and entrepreneurs. Native ducks and few Khaki Campbell X native crosses are reared in the north eastern states and in Kerala, mostly by the nomadic tribes in the free range.

The Indian poultry industry is owned by farmers and several private companies; with good technical support from agricultural and veterinary universities and financial support from nationalized banks. The present poultry industry in India is a US$ 17 billion industry; providing direct employment to about two million people and many more indirectly. The layer and broiler sectors are recording an annual growth rate of five and nine percent, respectively. Most (>80%) of the modern poultry industry is concentrated in the southern states of Andhra Pradesh, Karnataka, Maharashtra and Tamil Nadu; besides Punjab and Haryana states in the north.

India is self sufficient in poultry production as well as in all farm inputs; except pure lines, grandparent stock and amino acids. Now India is exporting incubators, cages, feed mills, all other farm equipment, medicines, vaccines, feed supplements, day old chicks, hatching eggs, table eggs, egg powder, dressed chicken, soybean meal, corn and other feedstuffs, mostly to Afro-Asian and few European countries. The contribution of poultry sector to total value of outputs from livestock sector in India has gone up from 2.2 % in 1951 to about 13.1 % in 2009. The poultry industry is contributing about 2% to the national G.D.P.

Table3: Indicators of Poultry Development in India

Year	*Production by hybrid chicken*			*Per capita availability*	
	Eggs (Billions)	Broilers (Millions)	Broiler Meat ('000 T)	Chicken Eggs (No.)	All Poultry Meat (g)
1961	2.88	<1	81	7	188
1971	5.34	4	121	10	220
1980	12.50	30	179	18	266
1985	16.13	75	274	22	365
1990	23.30	190	412	28	498
1991	23.66	215	440	28	521
1992	22.74	210	427	26	493
1993	24.80	235	454	28	517
1994	26.29	275	507	29	566
1995	28.13	330	578	31	633
1996	30.30	400	659	32	707
2000	35.50	800	980	36.6	1020
2003	39.50	1250	1600	40.3	1360
2004	41.90	1400	1900	41.4	1660
2005	43.30	1600	2200	42.5	1900
2006	46.70	1800	2500	43.8	2200
2007	50.71	1900	2680	44.7	2500
2008	54.44	2050	2830	46.1	2600
2009	57.30	2150	2970	48.5	2750

Egg Production

The commercial egg production in India was started in early seventies, with introduction of Babcock chicken. Later, other hybrids like Bovans, Hisex, Hyline, Keystone, Lohmann and Hubbard were introduced into the Indian market. All hybrids are laying white shell eggs only. On the contrary, the native chicken as well as the cross breeds developed by the Ag. / Vet. Universities, produce brown shell eggs; which constitute nearly 15% of the total eggs produced in India. India has developed its own technology in poultry housing suitable for tropics, cages, other farm equipment, incubators, feed mills, farm /feed automation equipment at low cost; which are not only efficient, but also durable. This has not only reduced the cost of production of eggs, but also improved the production standards. The egg production technical standards in India are presented in Table-4.

Besides chicken eggs, duck eggs contribute about 5% and Japanese quail eggs about 2.5% of the total eggs produced in India. The duck eggs are mostly produced in the free range system; whereas the quail eggs are produced in organized farms, mostly in cages. Nearly 12% of the table eggs produced in India is exported to Afro-Asian countries and Europe; either as shell eggs or egg powder. Most of the layers are reared in 3-tier Californian cages erected on elevated platforms in open sided houses of 20,000 to 50,000 layers capacity, with automatic feed trolleys. Eggs are manually collected, due to cheaper labour. Few big farms are having automatic egg collection system; but not popular due to more breakages. The rate of egg production by hens is comparable with the standards recommended by the breeders, due to better management, feed quality and health care. E.coli infection, mycotoxins, coryza and wing rot are some of the health problems faced by layer farmers; but they are over coming these problems within two weeks; with least loss. Prompt veterinary services are available in all poultry pockets, within few hours of any disease outbreak. Farms with >100,000 birds are employing their own poultry veterinarian.

Table-4: Table Egg Production Standards in India-2009

Details	Standards	Remarks
Table egg production-farm eggs	57.3bill.	3rd rank
Free range / backyard egg production	8.6 bill.	15%
Duck egg production- mostly free range	2.4 bill.	5.2%
Japanese quail egg production	1.3 bill.	2.6%
Total egg production (excluding hatching eggs)	61.0 bill.	--
Export of shell eggs	3.0 bill.	Afro-Asian countries
Export of egg powder	32,000 tonnes	From 2.56 billion eggs, 100% export to Japan & Europe
Per capita chicken egg consumption	48.6 eggs	One of the lowest in the world
Per capita eggs consumption of other eggs	3.3 eggs	--
Average commercial layer farm size	30,000 layers	--
Flock depreciation (0-20 wks)	5%	Low mortality rate
Flock depreciation-(21-80wks)	8%	----do---
Age at culling	>80 wks	Some flocks are force moulted & kept >100 wks. Of age
Hen-day egg production	85%	Some flocks produce >80% @ >75 wks.
Peak egg production	95%	Very good production
Hen-housed egg production upto 80 wks.	340eggs	---
Feed /hen /day	108g	Mostly own feed
Feed / egg		133g
Annual growth rate	5%	--
Cost of production /100 eggs	US$ 5.10	One of the lowest
Market price for 100 eggs	US$ 5.55	---do---

Broiler Production

Commercial broiler production in India was started around 1974, with the import of Arbor Acres and Cobb broiler G.P. stocks. Later, Hubbard, Hybro, Marshall and Ross hybrid G.P. stock were introduced. Besides hybrid broilers, few indigenously developed cross bred coloured broilers and local free range birds are having about 18% market share. These birds will fetch premium price, due to strong game flavour, lean and tough meat; which was liked by locals. In addition to these meats, the culled hens, egg-type cockerels, broiler breeders and egg-type breeders are also utilized as low value meat. The per capita poultry meat consumption in India is one of the lowest in the world (2.75kg), due to more vegetarian population.

Unlike the layer industry, the broiler industry is a highly integrated operation. The integrator is the owner of the bird, who owns the breeding stock, hatchery, feed mill, processing plant and the marketing net work. The farmers are the owners of the poultry house and equipment. He will rear six batches of broilers per year on "all in-all out basis" for contract in his / her farm, for a commission. The farmers' expenditure will be on litter material, labour and fuel, for which he will get a commission of Rs. 3 /kg live broiler and sell the manure + empty feed bags. Inspite of integration, the poultry processing industry is still in its infancy; due to preference of hot fresh chicken by the consumers, instead of chilled or frozen chicken. This trend is slowly changing .Hence a big boom in the poultry processing sector will be expected in the next decade.

The broiler integrators' business volume ranges between 100,000 to 5,000,000 broilers per week. Some of the large integrators are having their own processing plants, pharmaceutical unit, poultry house fabrication section, incubator and other equipment manufacturing section and several cost saving devices. Present performance of broilers in India are shown in Table-5

Table-5: Broiler production and standards in India-2009

Details	Standards	Remarks
Total broiler chicken production	2.15 bill.	4th in the world
Broiler meat production	2.97 mill. tons	---do---
Culled hen, breeders & cockrel meat production	0.20mill. tons	Sold at reduced cost
Back yard and free range chicken meat production	0.28 mill. tons	Sold at premium price
Poultry other than chicken meat production	0.14 m.t.	---
Total poultry meat production	3.59 m.t.	--
Poultry meat exports	0.05 m.t.	Negligible
Per capita poultry meat consumption	2.75 kg	One of the lowest in the world
Annual growth rate	9%	Fair growth rate
Housing and Rearing system	Deep litter	Open sided house
Average farm size & batch system	10,000 birds	All in-all out under integration & batch system in own farms
Growing period	40days	--
Average body weight	2kg	---
Mortality	5%	--
Feed convertion ratio (FCR)	<1.7	--
Source of feed & chicks	--	Own or integrators
Marketing	Own	Live or dressed chicken
Cost of production / 2 kg live broiler	US $ 1.95	Low for integrators
Cost / kg dressed chicken in the retail market	US $2.66	Varies with the supply & demand

Breeder farms and hatcheries

India is having four pure line breeding farms and about10 grandparent stock farms; all under private sector. Many Agriculture and Veterinary Universities are having their own pure line breeding farms, to supply dual purpose chicken to small farms. There are more than 800 parent stock farms and > 2,000 hatcheries, to supply necessary commercial broilers and egg –type pullets to the farmers.

Unlike in other countries, most of the layer and broiler breeding stocks are reared in cages in open sided houses and artificial insemination is done twice a week. This will ensure high rate of fertility particularly in the old flock as well as during summer, especially in broiler breeders; resulting in more number of chicks per dam. Slat –cum deep litter system, which is followed throughout the world, has become obsolete, due to high cost and low fertility. Few small breeding stock owners are having their breeders on deep litter, with plans to shift them to cage houses soon. Cage rearing of breeders is having several advantages like:

- Better fertility rate, resulting in more chicks per dam
- Lesser feed / bird, / egg /chick
- Lesser mortality
- Lesser capital cost on housing and
- Lesser cost of production

Rubber or plastic mats are provided on the bottom of the cages, to prevent hair cracks to the hatching eggs; which will affect the hatchability. India is exporting large number of hatching eggs to several Afro-Asian countries. The performances of breeders in India are presented in Table-6.

Table-6: Breeders' performance and standards in India-2009

Details	*Broiler breeder*	*Layer breeder*
Housing & rearing system	Elevated cages in open sided houses	Elevated cages in open sided houses
Average flock size	30,000 hens + cocks + growers	30,000 hens + cocks + growers
Age at culling	72 weeks	80 weeks
Flock depreciation- 0-20 wks.	10%	5%
---do---- = >20 wks.	12%	7%
Source of feed	Own	Own
Source of parent stock	Own or from G.P.. farms	Own or from G.P. farms
Hatching eggs /hen	180	300
Saleable Day old chicks /hen	145 unsexed chicks	122 pullet chicks
Fertility	92%	95%
Hatchability of total eggs set	82%	87%
Feed / hatching egg (includes sires' share)	480g	150g
Feed / chick (including cocks' share)	580g / unsexed chick	370g / pullet chick
Cost of production/100 hatching eggs	US$ 26.66	US$ 11.11
Cost of production / 100 chicks	US$ 33.20	US$ 27.50 (pullet chiks)

Non-Chicken Poultry farming in India

Besides chicken, Japanese quails, guinea fowls, turkeys and emus are reared in India on a commercial scale, following modern scientific methods. Other species of poultry like ducks, geese, turkeys and pigeons are still reared by traditional methods in a small scale to meet the local demand.

Japanese quail

Japanese quails are reared for meat and eggs; both in cage and deep litter systems of rearing. Most of the Japanese quail farms are having their own hatchery and breeding stock. Such farms will have a total stock of 10,000 and above. They obtain an average hatchability of 80%. Large farms are preparing their own feed and others are purchasing quail feed crumbles from feed manufacturers. Three types of feeds are given to J. quails; namely starter feed from 0-2 weeks of age, grower feed from 3-5 weeks of age and layer / breeder feed from 6 weeks of age. They are ready for market at 25-30 days of age, with a body weight of 130 – 180g. They start laying eggs from 6 weeks of age and the hatching eggs are collected from 8 weeks of age. The egg weight is around 10g and sold at US$ 2-80 / 100 eggs for table purpose and US$ 4-50 to 5 /100 hatching eggs.

The mortality rate during 0 -4 weeks of age is around 6 % in cages and 10% in deep litter system. The major causes of mortality during growing period are chilling, drowning, stampeding, huddling and starvation; which can be controlled by using right brooding temperature, right size feeders and waterers, combined with proper management. Egg Peritonitis and egg bound are the major cause of mortality in laying quails and cannibalism in adult males. Under integrated quail operation, with own breeding stock, hatchery, feed mill, farm and direct marketing, the Japanese quail farming is highly economical in India.

Emu farming in India

Prior to 1990, emus are reared in India in zoological parks only. The commercial emu farming was first stared in Andhra Pradesh 1992. By the end of 2009, there were more than 10,000 commercial emu farms in India, out of which nearly 50% are in Andhra Pradesh alone. The number of emus in each farm ranges from four to 5,000 birds; with an average of 60 birds per farm. Now few big corporate entrepreneurs are entering into emu farming business for their valuable oil and skin. During 2010, the emu farms suffered some losses due to lack of marketing and poor development of the proccssing industry. Management, feeding, breeding and hatching procedures for emu rearing are standardized for Indian conditions. Now the emu farms in India are able to achieve the technical standards reported in Table-5. Specialized emu incubators, with capacities ranging from 10 to 1000 eggs are fabricated locally, which are giving hatchability upto 80%. Due to high prices and demand for emu oil, the processing of emu has started as per HACCP standards. The skin, feathers and meat are also fetching remunerative prices. Based on this demand, many farms will expand and new farms will emerge in India, as alternative to chicken farming.

Previously chicken or quail feeds were given to emus; but at present specialized emu feeds are given, inorder to achieve better growth rate and egg production. Both mash and pellets feeds are offered to the birds. Big farms are preparing their own feed; while small farms are buying feed from nearby big farms. Each adult bird is fed 700 – 1000 g of feed per day, depending on the season. Besides feed, fresh green grass or legumes are also fed to the birds. In addition to regular feeds, a special fattening feed is also given prior to slaughter, to obtain more emu oil; which fetch good price. Now emus are better managed to achieve lower rate of mortality. Leg weakness and injuries are mostly avoided. After initial outbreak of Newcastle Disease six years back, all farms are vaccinating their emus for ND several times, periodically. They are also worming their birds, to avoid intestinal parasites. Coccidiostats are added in feed, to avoid coccidiosis. Common causes of mortality in emus are omphalitis, enteritis, coccidiosis, impaction, conjunctivitis, injuries and ND. Expert veterinary aid is available for all farms. Health insurance is done for all birds and the insurance companies will pay in case of any death of the insured birds.

Table-7: Technical standards in emu farms in India

Sex ratio /mating type	Pairs or flock mating
Laying season	September – March
Daily feed intake /adult bird	700-1000g
Annual Egg production	10- 40 eggs- (average=30 eggs)
% Hatchability	60 – 80%
Incubation period	55 -60 days
Egg weight	450 - 700g
Chick weight at hatch	330 – 550g
Mortality during first month	<5%
Age at slaughter	16 – 20 months
Floor space (Breeding)	500 – 1000 sq.ft. / pair
Floor space (slaughtering)	50 – 100 sq.ft. / bird
Dressed meat yield obtained	40%
Oil obtained from one bird	6-7 liters

Duck farming in India

Duck eggs are popular in north –eastern states and in the southern state of Kerala; where they are mostly reared in free range system. Some farms are rearing Khaki Campbell X indigenous cross bred ducks on bamboo slat / cages and deep litter floors for better egg production. Indigenous ducks are highly disease resistance and can survive by grazing in the rice fields, canals, ponds, marshy lands, irrigation tanks and rivers. Hence they are more popular than Khaki Campbell ducks. Meat –type ducks are not popular; hence the surplus males are utilized for meat. Fish and duck combined farms are also available in north- eastern states.

Duck farmers are mostly nomadic type. They will take ducks to marshy areas and paddy (rice) fields soon after harvest; for feeding the fallen paddy, insects, crabs, small fish, toads, weeds etc. There will be no supplemental feeding of these ducks, except during dry season, when they will be fed with whole paddy grains (rice with husk intact).

Each indigenous duck will be maintained for 2 to 3 years. Each year, they will lay 120 to 180 extra large eggs, bigger than Khaki Campbell eggs. The egg weight will be 65 -80g, depending on the breed / variety. Since the ducks are mostly fed in the range with natural foods, mycotoxin problems are not there. The major disease challenging the ducks are duck plague, for which all the ducks are vaccinated periodically, starting from two months of age. Duck eggs are sold at a premium price of 50-100% more than the cost of the chicken egg; but duck meat is only a byproduct of the egg industry.

Turkey production

Turkey farming is not as much commercialized as that of quail and emu farming. The turkeys available in India are not hybrids. Beltsville small, bronze and their crosses are available; which will attain a body weight of 7 to 10 kg only, at 10 months of age. Turkeys are reared in deep litter houses, similar to broilers and fed with broiler or turkey feeds. Due to high cost of feed combined with poor feed efficiency, turkeys are often fed with vegetable, kitchen and slaughter house waste. Small flocks are maintained in the free range or pen-cum–run system; with free access to range.

Geese farming in India

In India there is no commercial goose production for meat or eggs. Small flocks or even a pair of Chinese geese are maintained as pets, ornamental birds, deweeders or watch dogs in orchards, gardens, parks and backyards. Goose eggs are hatched in chicken /duck egg incubators and sometimes even under a broody hen.

During brooding period, the goslings will be fed with other poultry feeds for a month and then left in the open yard, where they eat grass, greens, vegetable and kitchen waste. Therefore, in places where lots of grass or vegetable wastes are available, geese can be reared economically. Since there is no demand for goose meat or eggs in India, feeding geese with balanced feed is not economical; except feeding them with vegetable waste. Goslings are sold as pets to other farmers or pet lovers, who had enough space in the back yard.

Guinea fowls rearing in India

In some pockets of India, guinea fowls are reared and sold for breeding and / or meat purpose. Their eggs are also popular and sold at premium price in some places In such places, they can be reared and fed with balanced feed for more egg production and faster growth rate. Small flocks can be reared in free range. They are flying type and good grazers in the ranch. During nights they rest on tree tops or hay stakes in the back yard. The keets are brood and fed with chick mash for one month. There after they are allowed in the free range to gather their feed like weeds, insects, fallen grains and other agro waste. Hence they are reared in the free range, supplemented with a mixture of kitchen waste, vegetable and slaughter house waste, for economic egg and meat production. Since guinea fowls are having the habit of laying eggs anywhere and sometimes hide the eggs, they must be trained from the beginning to lay eggs in the nests.

Pigeon production in India

Pigeons are reared in India for racing purpose as well as for squab production and as pets. The racing pigeons are very expensive, compared to pets or squabs; costing US$ 50 -300 / pair. Like horse race, pigeon race and betting are conducted in many places, including Chennai. The owner will train the pigeon for races between two cities. Once they win any race, the owner will earn a good income and the bird's price will go up. They are reared in pairs and two pigeon holes are provided for each pair. The young ones are fed with pigeon milk by their parents until the market age of four weeks. Hence they don't need any special feeding. However, the breeding pairs are fed with a mixture of peas, soya seeds, mung bean, pigeon pea, sunflower seeds, chick peas and other legumes, depending on the local availability. No separate pigeon feeds are available in the market. Shell grit or lime stone and drinking water are provided in separate hoppers during breeding season. The pigeons are not confined; but allowed to fly freely. They will come back to the owners' house during nights. Paralysis, other nervous disorders and pox are common in pigeons. Hence racing pigeons are injected with vitamin B-complex, liver tonics during training period and racing season.

Poultry feed production

During the year 2009, India has produced about 19.2 million tonnes of poultry feed, to produce the specified number of eggs and meat mentioned in Tables 1 to 6 above. India is self sufficient not only in feedstuffs and animal feed production; but also in feed mill manufacturing. India has produced around 15 million tonnes of soy and 45 million tons of course grains in 2009, of which 25 m.t. is corn. India is exporting corn, soy and other feedstuffs as well as complete feed mills of various capacities, to Afro-Asian countries. Only amino acids and breeding stocks are imported.

Poultry feeds are mainly corn – soy based; but lots of sunflower meal, rapeseed meal, fish, DORB and MBM are also used, depending on the relative cost and availability. More than 90% of the poultry feed is prepared by poultry farmers and integrators for own use and the remaining by the feed manufacturers for sale. Due to own feed, the feed cost is lesser, quality is excellent and giving highly satisfactory performance by the birds. Various types of chicken, quail and emu feeds are prepared. Very little quantities of other poultry feeds are prepared, in small pockets.

Poultry equipment, medicines and vaccines

India is major manufacturer and exporter of various poultry equipment, especially incubators cages and feed mills. They are of reliable quality, but cheaper compared to international prices. India also manufactures

and exports most of the poultry pharmaceuticals, feed supplements and biologicals. Compared to International prices, they are cheaper; but of comparable quality. Hence many developing countries in Africa and Asia prefer pharmaceuticals, incubators and feed mills from India

Summary

- The modern poultry industry in the world is about 90 years old; whereas the Indian poultry industry is just four decades old. India is a developed country as far as poultry production is concerned.
- Most of the poultry activities are in the southern states of Andhra Pradesh, Maharashtra Tamil Nadu and Karnataka and in the northern states of Punjab and Haryana.
- Within this short period, India has not only became self sufficient in poultry production, but also capable of exporting eggs, egg powder, vaccines, medicines, cages, incubators, feed mills and other poultry equipment.
- The poultry houses and cages are designed, to suit the local conditions at low cost, but with excellent results and durability.
- Management, feeding, health care and production strategies are standardized for optimal performance of the birds at low cost.
- The overall performance of the birds, especially egg production, chick production/dam and J. quail growth rate are above the standard recommended levels.
- Indigenous chicken in free range is contributing 15% of total eggs and 18% of poultry meat; which fetch premium price.
- The per capita egg(48.6 eggs) and poultry meat consumption (2.75kg) in India is one of the lowest in the world, due to more vegetarian population.
- The production cost and market price of eggs in India is one of the lowest in the world.
- The poultry processing industry is not well developed, due to preference of live and hot chicken by Indians, instead of chilled / frozen chicken. This trend is changing now, mainly to capture the export market.
- Japanese quail farms are emerging as alternative to chicken for egg and meat production, due to lesser capital and growing demand for quail eggs and meat; which are considered as aphrodisiac and good for T.B. and H.I.V. patients.
- Emu farms with full integration are coming up for their valuable oil and leather production.

LIVESTOCK AND FISHERIES MARKET INTELLIGENCE- TOOLS AND RESOURCES

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Market Intelligence involves identifying the problems existing in the marketing links: why and where they occur with what effects. This broad set of market information gathering activities is required to inform managers how well the marketing is being done and where problems exist. Management information systems that deliver a wide variety of detailed information can be useful, especially if they are designed to report exceptions. For instance, consider a commercial organization marketing a large number of different products based on dairy processing with many product variations. Management will want to know, at frequent intervals, whether sales targets are being achieved. Ideally, the information system will report only those products/product variations which are performing substantially above or below target.

Marketing intelligence systems

Marketing research is focused, market intelligence is not. A marketing intelligence system is a set of procedures and data sources used by marketing managers to sift information from the environment that they can use in their decision making. This scanning of the economic and business environment can be undertaken in a variety of ways.

Unfocused scanning- The manager, by virtue of what he/she reads, hears and watches exposes him/herself to information that may prove useful. Whilst the behaviour is unfocused and the manager has no specific purpose in mind, it is not unintentional

Semi-focused scanning- Again, the manager is not in search of particular pieces of information that he/she is actively searching but does narrow the range of media that is scanned. For instance, the manager may focus more on economic and business publications, broadcasts etc. and pay less attention to political, scientific or technological media.

Informal search- This describes the situation where a fairly limited and unstructured attempt is made to obtain information for a specific purpose. For example, the marketing manager of a firm considering entering the business of importing frozen fish from a neighbouring country may make informal inquiries as to prices and demand levels of frozen and fresh fish. There would be little structure to this search with the manager making inquiries with traders he/she happens to encounter as well as with other ad hoc contacts in ministries, international aid agencies, with trade associations, importers/exporters etc.

Formal search: This is a purposeful search after information in some systematic way. The information will be required to address a specific issue. Whilst this sort of activity may seem to share the characteristics of marketing research it is carried out by the manager him/herself rather than a professional researcher. Moreover, the scope of the search is likely to be narrow in scope and far less intensive than marketing research. Marketing intelligence is the province of entrepreneurs and senior managers within an agribusiness. It involves them in scanning newspaper trade magazines, business journals and reports, economic forecasts and other media. In addition it involves management in talking to producers, suppliers and customers, as well as to competitors. Nonetheless, it is a largely informal process of observing and conversing.Some enterprises will approach marketing intelligence gathering in a more deliberate fashion and will train its sales force, after-sales personnel and district/area managers to take cognizance of competitors' actions, customer complaints and requests and

distributor problems. Enterprises with vision will also encourage intermediaries, such as collectors, retailers, traders and other middlemen to be proactive in conveying market intelligence back to them.

Marketing models: Within the MIS there has to be the means of interpreting information in order to give direction to decision. These models may be computerized or may not. Typical tools are: Time series sales modes, Brand switching models Linear programming, Elasticity models (price, incomes, demand, supply, etc.), Regression and correlation models,

Analysis of Variance (ANOVA) models, Sensitivity analysis, Discounted cash flow and Spreadsheet 'what if models. These and similar mathematical, statistical, econometric and financial models are the analytical subsystem of the MIS. A relatively modest investment in a desktop computer is enough to allow an enterprise to automate the analysis of its data. Some of the models used are stochastic, i.e. those containing a probabilistic element whereas others are deterministic models where chance plays no part. Brand switching models are stochastic since these express brand choices in probabilities whereas linear programming is deterministic in that the relationships between variables are expressed in exact mathematical terms.

Global Market Intelligence sources

A. General

1. Asian Food Information Centre (http://www.afic.org/index-old.htm)

The Asian Food Information Centre (AFIC) is a Singapore-registered non-profit organization whose mission is to provide sound science-based information on nutrition, health and food safety across the Asia Pacific region.Founded in 1998, the AFIC team of scientific, health and communications professionals work in close collaboration with the academic and scientific communities in the region to close the gap between scientific understanding and popular consumer perception on a wide range of food and health topics. AFIC is funded largely by the food, beverage and agricultural industries.

2. CommodityMine (http://www.infomine.com/commodities/)

CommodityMine is a comprehensive news and information source for metal commodities. In addition to the latest prices, users can find in-depth commodity news, a list of upcoming mining events and career information. The All Charts page allows users to compare price changes for gold, silver, copper and other commodities over a variety of time periods. Dynamic Charting allows to adjust individual commodity timelines.

3. Harmonized System (HS), World Customs Organization (WCO) (http://www.wcoomd.org/home_wco_topics_hsoverviewboxes.htm)

The Harmonized Commodity Description and Coding Systems generally referred to as "Harmonized System" or simply "HS" is a multipurpose international product nomenclature developed by the World Customs Organization (WCO). It comprises about 5,000 commodity groups; each identified by a six digit code, arranged in a legal and logical structure and is supported by well-defined rules to achieve uniform classification. The system is used by more than 200 countries and economies as a basis for their Customs tariffs and for the collection of international trade statistics. Over 98 per cent of the merchandise in international trade is classified in terms of the HS.

4. INFOCOMM, United Nations Conference on Trade and Development - UNCTAD, (http://r0.unctad.org/infocomm/anglais/indexen.htm)

The INFOCOMM – market information in the commodities area – project seeks to promote market transparency, to improve the understanding of commodity structures and to provide access to the analysis vital to the formulation of pertinent policies for commodity production, marketing, processing and financing. The project's website features more than 40 commodity profiles containing practical and added-value information on market structures and innovations.

5. Product Map Web, International Trade Centre (ITC) (www.intracen.org/pmaps)

The Product Map Web site consists of 72 Market Analysis Portals, covering over 5000 products classified within 72 product clusters, ranging from automotive components to fruit juice and wood products. Each portal offers extensive international trade statistics for over 180 countries and territories; market analysis tools for both quantitative and qualitative insights into global market trends; facilities to identify international trade opportunities in any product category; networking tools for subscribers with a choice of facilities to create a presence on the web; links to potential business contacts, to published market research and to numerous sources of market intelligence. All Product Map data is updated regularly. International trade statistics are updated annually. Access to all Product Map content is available on a subscription basis. The indicative cost for developing countries is: US$ 200.- per Product Map per year. It is also possible to get a free trial access.

6. United Nations Commodity Trade Statistics Database (Comtrade)(http://comtrade.un.org/)

The United Nations Commodity Trade Statistics Database is the largest depository of international trade data, containing well over 1.1 billion data. All commodity values are converted from national currency into US dollars using exchange rates supplied by the reporter countries, or derived from monthly market rates and volume of trade. Quantities, when provided with the reporter country data and when possible, are converted into metric units. Commodities are reported in the current classification and revision (HS2002 in most cases) and are converted all the way down to the earliest classification SITC revision 1. Time series of data for reporter countries starts as far back as 1962 and goes up to the most recent completed year. Information compiled by the Trade and Investment Division,

7. United Nations - UNESCAP (www.unescap.org/tid) & United Nations Food and Agriculture Organization – FAO (http://www.fao.org/)

The Food and Agriculture Organization of the United Nations leads international efforts to defeat hunger. The website of FAO provides a wide range of information, including the very comprehensive World Agricultural Information Centre Portal (WAICENT). The Fisheries and Aquaculture Department of FAO works to facilitate and secure the long-term sustainable development and utilization of the world's fisheries and aquaculture. The website also features FishStatPlus, a set of fishery statistical databases downloadable to personal computers together with a data retrieval, graphical and analytical software. Via WAICENT's Fisheries and Aquaculture centre, further information sites can be accessed, such as the State of the World Fisheries and Aquaculture (SOFIA). The Trade and Markets Division provides a comprehensive information and intelligence service on a broad range of commodities and monitors the world supply/demand outlook for basic foods. Information on this website covers wheat and coarse grains, rice, roots and tubers, pulses, sugar, oilcrops, meat, dairy, bananas, tropical fruits, citrus fruit, fruits and vegetables, coffee and cocoa, tea, cotton, jute and hard fibres, hides and skins and rubber. The website features publications, commodity-specific studies, information on meetings and events, statistics on prices, trade and more.

8. AGMARKNET (http://agmarknet.nic.in/agmarknet.htm)

The Directorate of Marketing and Inspection (DMI) headed by the Agricultural Marketing Advisor, Department of Agriculture & Co-operation (DAC) implements agricultural marketing policies and programmes of the Government of India. It undertakes: Standardisation, Grading and quality control of agricultural and allied produce- Market Research and Surveys, Market Development, Training of personnel in agricultural marketing in the country, Promotion of Cold Storages and Marketing extension, Agricultural Marketing Reforms and consumer education etc.

B. Fisheries

1. Globe Fish (http://www.globefish.org)

GlobeFish is the unit in the FAO Fisheries Department responsible for information on international fish trade.The core of GlobeFish is the GlobeFish Databank. GlobeFish produces a number of publications including fish price reports (European Fish Price Report), market studies (GlobeFish Research Programme) and trend analysis (GlobeFish Highlights).

2. Infofish (http://www.infofish.org/)

InfoFish was originally launched in 1981 as a project of FAO. Since 1987, it is an Intergovernmental Organization providing marketing information and technical advisory services to the fishery industry of the Asia-Pacific region and beyond from its headquarters in Kuala Lumpur, Malaysia. Fourteen countries are currently members of InfoFish: Bangladesh, Cambodia, India, Indonesia, Islamic Republic of Iran, Democratic People's Republic of Korea, Malaysia, Maldives, Sri Lanka, Pakistan, Philippines, Papua New Guinea, Solomon Islands and Thailand. InfoFish's activities include bringing buyers and sellers together, publication of current and long-term marketing information and operation of technical advisory and specialized services. In addition to organizing exhibitions, conferences, workshops, seminars and training programsmes, InfoFish undertakes consultancies on all aspects of fisheries-pre-harvest, harvest and post-harvest.

3. Network of Aquaculture Centre in Asia-Pacific –NACA (http://www.enaca.org/)

The Network of Aquaculture Centre in Asia-Pacific is an intergovemmental organization that promotes rural development through sustainable aquaculture. NACA seeks to improve rural income, increase food production and foreign exchange earnings and to diversify farm production. The core activities of NACA are: capacity building through education and training; collaborative research and development through networking among centers and people; development of information and communication networks; policy guidelines and support to policies and institutional capacities; and aquatic animal health and disease management. Current member Governments are Australia; Bangladesh; Cambodia; China; Hong Kong, China; India; Democratic People's Republic of Korea; Malaysia; Myanmar; Nepal; Pakistan; Philippines; Sri Lanka; Thailand; Viet Nam. Other participating (non-member) Governments include Indonesia; Islamic Republic of Iran; Republic of Korea; Lao People's Democratic Republic and Singapore.

4. OneFish Community Directory (http://www.onefish.org/)

With an overall focus on fisheries research and development, the oneFish Community Directory comprises an open-access, interactive internet portal in which a variety of information and knowledge is referenced, linked to or uploaded, including news, events, jobs, documents, projects, websites and multimedia. Online discussions are either archived or hosted in oneFish and polls can be initiated. Knowledge is added manually by members and editors, or captured electronically from originators' systems.

5. Southeast Asian Fisheries Development Center –SEAFDEC (http://www.seafdec.org/)

The Southeast Asian Fisheries Development is an autonomous intergovernmental body established as a regional treaty organization in 1967 to promote fisheries development in Southeast Asia. SEAFDEC aims specifically to develop the fishery potentials in the region through training, research and information services to improve the food supply by rational utilization and development of the fisheries resources. Its services cover the hroad areas of fishing gear technology, marine engineering, fishing ground surveys and stock assessment, post-harvest technology as well as development and improvement of aquaculture techniques. SEAFDEC is currently made up of 11 Member Countries, namely Brunei Darussalam, Cambodia, Indonesia, Japan, Lao PDR, Malaysia, Myanmar, The Philippines, Singapore, Thailand and Viet Nam.

6. World Fish Centre (http://www.worldfishcenter.org/)

The World Fish Centre works to reduce poverty and hunger by improving fisheries and aquaculture. It is an international, non-profit, non-governmental organization working in partnership with a wide range of agencies at regional, national and local levels in the developing world, and with advanced research institutions worldwide. The website features many resources, including FishBase, an information system on fish, with detailed information on 30,000 species; TrawlBase that provides data and tools to help specific Asian institutions develop strategies to improve the management and sustainable utilization of their coastal fisheries and related ecological systems; and many more.

C. Meat Products

1. Cattle Network (http://www.cattlenetwork.com)

Cattle Network is a commercial website that provides general information on cattle, including processing, feeding and so on. The website's news-ticker can be accessed for free.

Breeds of Livestock Page (http://www.ansi.okstate.edu/breeds)

The breeds of livestock page is maintained by the Department of Animal Science at Oklahoma State University and is intended as an educational and informational resource on breeds of livestock throughout the world. Information can be browsed on cattle, goats, horses, sheep, swine and other species as well as by world region.

British Meat Processors Association -BMPA (www.bmpa.uk.com)

The British Meat Processors Association (BMPA) is the United Kingdom's leading trade association in the meat and meat products sector. It represents businesses big and small, from smaller progressive abattoir businesses supplying local customers to large consumer brand owners. The website provides information on topics such as standards, health and safety, global warming, etc.

International Dairy Federation - IDF (http://www.fil-idf.org)

Founded in 1903, the International Dairy Federation is an organization created by the dairy sector worldwide where dairy specialists of all kinds meet to resolve common issues and exchange ideas and experience. IDF work is strategically focused on providing science-based information on which Governments and legislators can develop policy and regulations.

Meat Industry Association of New Zealand - MIA (http://www.mia.co.nz)

The Meat Industry Association of New Zealand Inc is a voluntary trade association representing New Zealand meat processors, marketers and exporters. The website features subscription to an electronic newsletter, as well as other relevant information such as statistics and reports.

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MATERIAL RESOURCE MANAGEMENT

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1. Definition

We can define Material Resource management as the functional responsible for the coordination of Planning, sourcing, purchasing, moving, storing, and controlling materials in an optimum manner so as to provide a pre – decided services to the customer at a minimum cost. Materials Resource Management is the branch of logistics that deals with the tangible components of a supply chain. Specifically, this covers the acquisition of spare parts and replacements, quality control of purchasing and ordering such parts, and the standards involved in ordering, shipping, and warehousing the said parts. Materials management is part of logistics and refers to the location and movement of the physical items or products. There are three main processes associated with materials management: spare parts, quality control, and inventory management. Materials management is important in large manufacturing and distribution environments, where there are multiple parts, locations, and significant money invested in these items.

2.1. Material Resource Management -Overview

1. Effective management & supervision
   It depends on managerial functions of
   a. Planning
   b. Organizing
   c. Staffing
   d. Directing
   e. Controlling
   f. Reporting
   g. Budgeting
2. Sound purchasing methods
3. Skilful & hard poised negotiations
4. Effective purchase system
5. Should be simple
6. Must not increase other costs
7. Simple inventory control programme

2.2. Purpose of Material Management

- To gain economy in purchasing
- To satisfy the demand during period of replenishment
- To carry reserve stock to avoid stock out
- To stabilize fluctuations in consumption
- To provide reasonable level of client services

Objective of material management

Primary

- Right price
- High turnover
- Low procurement & storage cost
- Continuity of supply
- Consistency in quality
- Good supplier relations
- Development of personnel
- Good information system

Secondary

- Forecasting
- Inter-departmental harmony
- Product improvement
- Standardization
- Make or buy decision
- New materials & products
- Favourable reciprocal relationships

Scope

From the definition it is clear that the scope of **Material Resource management is vast. We can broadly identify** the following functions:

1. Material planning and control
2. Purchasing
3. Stores and inventory control

2.3 Goals of Materials Management

The goal of materials management is to consolidate and efficiently handle core services. It creates truck deliveries and service vehicle routes that reduce conflicts for vehicles and pedestrians. Delivery sites and loading docks are more effective and reduce redundancy. Cost is reduced when it comes to solid and hazardous waste removal, storage, and recycling. Utility infrastructure and service equipment relocation can improve aesthetics.

2.4 Component of Materials Management

1. Quality Assurance

A large component of materials management is ensuring that parts and materials used in the supply chain meet minimum requirements by performing quality assurance (QA). While most of the writing and discussion about materials management is on acquisition and standards, much of the day to day work conducted in materials management deals with QA issues. Parts and material are tested, both before purchase orders are placed and during use, to ensure there are no short or long term issues that would disrupt the supply chain. This aspect of material management is most important in heavily automated industries, since failure rates due to faulty parts can slow or even stop production lines, throwing off timetables for production goals.

2. Standards

The other major component of materials management will be gradual movement toward compliance. There are standards that are followed in supply chain management that are important to a supply chain's function. For example, a supply chain that uses just-in-time or lean replenishment requires clarity. in the shipping of parts and material from purchasing agent to warehouse to place of destination. Systems reliant on vendor-managed inventories may begin to acquire up-to-date computerized inventories and begin to explore robust ordering systems for outlying vendors to place orders on.

2.5 Importance of Materials Management

In many organisations, materials from the largest single expenditure item. An analysis of the financials statements of a large number of private and public sector organisations indicates that materials account for nearly 60 % of the total expenditure.

Table 1

Average materials Expenditure	
Average Expenditure of materials percent	Industry Groups
Above 65	Cotton yarn, earthmoving equipments, sugar, wool, jute, commercial vehicles, fabrication.
60 – 65	Cotton textiles, bread.
55 – 60	Engineering, non – ferrous.
50 – 55	Shipbuilding, chemicals, type, machine tools, cement, electricity.
45 – 50	Pharmaceuticals.
40 – 45	Steels, newspaper, fertilizer, aircraft.

Thus, the importance of material management lies in the fact that any significant contribution

3. Benefits of Material Management

An effective materials management plan builds from and enhances an institutional master plan by filling in the gaps and producing an environmentally responsible and efficient outcome. An institutional campus, office, or housing complex can expect a myriad of benefits from an effective materials management plan. For starters, there are long-term cost savings, as consolidating, reconfiguring, and better managing a campus' core infrastructure reduces annual operating costs. An institutional campus, office, or housing complex will also get the highest and best use out of campus real estate. An effective materials management plan also means a more holistic approach to managing vehicle use and emissions, solid waste, hazardous waste, recycling, and utility services. As a result, this means a "greener," more sustainable environment and a manifestation of the many demands today for institutions to become more environmentally friendly. In fact, thanks to such environmental advantages, creative materials management plans may qualify for LEED Innovation in Design credits. And finally, an effective materials management plan can improve aesthetics. Removing unsafe and unsightly conditions, placing core services out of sight, and creating a more pedestrian-friendly environment will improve the visual and physical sense of place for those who live and work there.

Advantage of Materials Management

The following are the advantages

- Better Accountability
- Better Coordination
- Better Performance
- Adaptability to ERP
- Miscellaneous

4. ABC Analysis

ABC analysis is a business term used to define an inventory categorization technique often used in materials management. It is also known as Selective Inventory Control. ABC analysis provides a mechanism for identifying items that will have a significant impact on overall inventory cost, while also providing a mechanism for identifying different categories of stock that will require different management and controls. When carrying out an ABC analysis, inventory items are valued (item cost multiplied by quantity issued/consumed in period) with the results then ranked. The results are then grouped typically into three bands. These bands are called ABC codes.

ABC codes

1. "A class" inventory will typically contain items that account for 80% of total value, or 20% of total items.
2. "B class" inventory will have around 15% of total value, or 30% of total items.
3. "C class" inventory will account for the remaining 5%, or 50% of total items.

ABC Analysis is similar to the Pareto principle in that the "A class" group will typically account for a large proportion of the overall value but a small percentage of the overall volume of inventory.

Another recommended breakdown of ABC classes:

1. "A" approximately 10% of items or 66.6% of value
2. "B" approximately 20% of items or 23.3% of value
3. "C" approximately 70% of items or 10.1% of value

Purpose of ABC Analysis

The following broad policy guidelines can be established in respect of each category:v

	A – items	***B – Items***	***C – Items***
	High Consumption value	Moderate Value	Low Consumption Values
1	Very strict control	Moderate control	Lose control
2	No safety stocks	Low safety stocks	High safety stocks
3	Frequent ordering or weekly deliveries	Once in three months	Bulk ordering once in 6 months
4	Weekly control statement	Monthly control statement	Quarterly control statement
5	Maximum follow – up and expediting	Periodic follow – up	Follow – up and expediting in exceptional cases
6	Rigorous values analysis	Moderate value analysis	Minimum value analysis
7	As many sources as possible for each items	Two or more reliable sources	Two reliable sources for each items
8	Accurate forecasts in materials planning	Estimates based on past data on present plans	Rough estimates for planning
9	Minimisation of waste, obsolete and surplus	Quarterly control over surplus and obsolete items	Annual review over surplus and obsolete material
10	Individual posting	Small group Posting	Group Posting
11	Central purchasing and storage	Combination purchasing	Decentralised purchasing
12	Maximum efforts to reduce lead time	Moderate	Minimum clerical efforts
13	Must be handled by senior officer	Can be handled by middle management	Can be fully delegated.

Colour coding can be used to identify A, B, and C categories in stores. Usually red is used for A items, Pink for B items and blue for C items.This approach helps the material manager to exercise selective control and focus his attention only on a few items when he is confronted with lakhs of stores items.

5. Economic Order Quantity

Economic order quantity is the level of inventory that minimizes the total inventory holding costs and ordering costs. It is one of the oldest classical production scheduling models. The framework used to determine this order quantity is also known as Wilson EOQ Model or Wilson Formula. The model was developed by F. W. Harris in 1913, but R. H. Wilson, a consultant who applied it extensively, is given credit for his early in-depth analysis of it.

Overview

EOQ only applies where the demand for a product is constant over the year and that each new order is delivered in full when the inventory reaches zero. There is a fixed cost charged for each order placed, regardless of the number of units ordered. There is also a holding or storage cost for each unit held in storage (sometimes expressed as a percentage of the purchase cost of the item). We want to determine the optimal number of units of the product to order so that we minimize the total cost associated with the purchase, delivery and storage of the product The required parameters to the solution are the total demand for the year, the purchase cost for each item, the fixed cost to place the order and the storage cost for each item per year. Note that the number of times an order is placed will also affect the total cost; however, this number can be determined from the other parameters

Underlying assumptions

1. The ordering cost is constant.
2. The rate of demand is constant
3. The lead time is fixed
4. The purchase price of the item is constant i.e. no discount is available
5. The replenishment is made instantaneously; the whole batch is delivered at once.

EOQ is the quantity to order, so that ordering cost + carrying cost finds its minimum. (A common misunderstanding is that the formula tries to find when these are equal.)

Variables

- Q = order quantity
- Q * = optimal order quantity
- D = annual demand quantity of the product
- P = purchase cost per unit
- S = fixed cost per order (not per unit, in addition to unit cost)
- H = annual holding cost per unit (also known as carrying cost or storage cost) (warehouse space, refrigeration, insurance, etc. usually not related to the unit cost)

The Total Cost function

The single-item EOQ formula finds the minimum point of the following cost function:

Total Cost = purchase cost + ordering cost + holding cost

- Purchase cost: This is the variable cost of goods: purchase unit price × annual demand quantity. This is P×D

- Ordering cost: This is the cost of placing orders: each order has a fixed cost S, and we need to order D/Q times per year. This is S × D/Q

- Holding cost: the average quantity in stock (between fully replenished and empty) is Q/2, so this cost is H × Q/2

$$TC = PD + \frac{DS}{Q} + \frac{HQ}{2}$$

To determine the minimum point of the total cost curve, set the ordering cost equal to the holding cost:

$$\frac{DS}{Q} = \frac{HQ}{2}$$

Solving for Q gives Q* (the optimal order quantity):

$$\frac{H}{2} = \frac{DS}{Q^2}$$

$$Q^2 = \frac{2DS}{H}$$

Therefore: $$Q^* = \sqrt{\frac{2DS}{H}}$$

Note that interestingly, Q* is independent of P; it is a function of only S, D, H.

Example

- Annual requirement (AR) = 10000 units
- Cost per order (CO) = $2
- Cost per unit (CU)= $8
- Carrying cost %age (%age of CU) = 0.02
- Carrying cost Per unit = $0.16

Economic order quantity = $$\sqrt{\frac{2AR*CO}{CU*CC\%}} = \sqrt{\frac{2*10000*2}{8*0.02}}$$

Economic order quantity = 500 units

Number of order per year (based on EOQ)

Number of order per year (based on EOQ) = 20

Total cost = CU * AR + CO (AR / EOQ) + CC(EOQ / 2)

Total cost = 8 * 10000 + 2(1 0000 / 500) + 0.16(500 / 2)

Total cost = $80080

If we check the total cost for any order quantity other than 500(=EOQ), we will see that the cost is higher. For instance, supposing 600 units per order, then

Total cost = 8 * 10000 + 2(10000 / 600) + 0.16(600 / 2)

Total cost = $80081

Similarly, if we choose 300 for the order quantity then

Total cost = 8 * 10000 + 2(10000 / 300) + 0.16(300 / 2)

Total cost = $80091

This illustrates that the Economic Order Quantity is always in the best interests of the entity.

6.Summary

Material management is an important management tool which will be very useful in getting the right quality & right quantity of supplies at right time, having good inventory control & adopting sound methods of condemnation & disposal will improve the efficiency of the organization & also make the working atmosphere healthy any type of organization, whether it is Private, Government, Small organization, Big organization and Household. Even a common man must know the basics of material management so that he can get the best of the available resources and make it a habit to adopt the principles of material management in all our daily activities.

SMALL RUMINANT MARKETING

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Animal husbandry plays important role in the economy of small and marginal farmers. Sheep and goat are useful farm animals and sustain the rural economy of our country. Sheep and goats are reared for meat, milk, wool, skin and manure. Goat farming is one enterprise which has been practiced by the large human population in India since long (Deoghare and Ganga Ram, 1992) and play a vital role in economic sustains of millions of landless laborers and marginal farmers in poorly crop-cultivated areas of the country (Singh, 2001). The production of goats can be increased many folds under organized management system constituting selective breeding, intensive feeding and input – output marketing. Now a days, landless labourers, jobless youngsters, shelf help group, business men, advocates, engineers, medical doctors, veterinary doctors are doing the small ruminants business and its growing as industry. India constituted 16.55 per cent of total goat population of the world and ranked second in goat population next to China (FAO, 2000). India's annual chevon production is 470 thousand MT which constituted 12.70 per cent of the total chevon production in world (3700 thousand MT). The per capita meat availability of the World was 37.20 kg / year which was lowest i.e., 4.60 kg / year in India (FAO, 2001). The national institute of nutrition has recommended the per capita meat requirement 11.00 kg per year indicates the shortage of about 6.4 kg / year in India. Hence, there is vast scope to increase meat production to satisfy the demand of the consumers of optimum level. Marketing system for small ruminants and their product and bye-products is underdeveloped in India (Naidu et al., 1992) and Rathore (1993) in his study indicated that there is a tremendous potential for earning revenue from goat enterprise, provided the production and trade are organized. The prices of mutton are increasing in the country due to high demand in the domestic as well as in international market. Now, the marketing of sheep and goats through various mode.

1. Marketing of sheep and goat to the butchers

A sheep and goat meat are preferred as fresh hot meat in India and is accepted by society because there is no religious belief allotted to it. Cost of mutton and chevon increased steadily day by day because of the consumer preference and the awareness. The meat rates in Tamil Nadu are Rs 350, Rs 300 and Rs 250 in City, town and villages, respectively. Similarly, the meat were export to Arabian countries with huge prize.. In India more private franchises are also involved in the marketing of chevon. Chevon meat has less cholesterol than in the pork (66mg/100g), sheep (52mg/100g) and beef (44mg/100g). Nowadays, sheep and goat meat is being sold at Rs 100-150 per live weight body weight to the butchers.

2. Marketing through own shop (cutting and selling)

The sheep and goat meat available in the market is actually half as compared to its requirement. Due to shortage of meat in the market the rates are showing periodic increasing trend. Sheep and goats are slaughtered and can be sold to the consumers instead of selling to the butchers. Carcass yield from the sheep and goat slaughter are 50-52 per cent. We can get 11kg of meat by cutting 20kg body weight animal. So, we can get Rs 3300 – Rs 3500 from one animal by selling the meat for Rs 300-350. Apart from this, we can get Rs. 560 by selling of head (Rs 60), legs (Rs 40), intestine (Rs 150), skin (Rs 140), blood (Rs 100) and liver (Rs 70). Hence, we can get at least Rs 3860 – Rs 4060 per animal by selling in their own shop.

3. Marketing of mutton and chevon to the doorsteps

The peoples are expecting the work has to be done immediately. Nowadays, peoples are not ready to wait in the meat shop to get the good quality of meat. So the meat might be delivered to the consumer doorsteps like

the distribution of daily news paper and milk. The meat might also be delivered to the houses directly during the marriage, festivals and other function. The meat can be sold for higher prices by this purpose.

4. Sale of sheep and goat to the slaughter house

Nowadays private slaughter houses are purchasing the animals and selling the packed meat to the private franchise as a fresh meat or as frozen meat. Sheep and goat are being sold for Rs 150 – 160 per kg of live body weight basis for this purpose.

5. Sale of carcass

Now, the private franchises are ready to buy the carcass alone at the farm premises for higher prizes. They are willing to purchase only 7-10 kg carcass weight for higher prizes.

6. Sale of sheep and goat to the farmers for rearing purpose (Breeding sale)

A total of 42 sheep and 22 goat breeds are in India. Certain breeds are sold for higher prizes and they are purchased for breeding purposes viz., Boer, Jamunaperi, Sirohi, Barbari and Kanni. These breeds are reared for meat and also for milk. One has to go to Kerala, Rajasthan, Uttar Pradesh, UP and Tamil Nadu (Tirunelveli) to purchase pure breed. So farmers are rearing these breeds under stallfed condition and they are selling it for breeding purpose as a pure line. The animals are sold @ Rs 50,000, Rs 25,000, Rs 10,000, Rs 8,000, Rs 7000 and Rs 3000 per animal of Tellichery, Sirohi, Jamunapari, Barbari and Kanni respectively. Generally the animals are sold for various prizes depending on the breeds. Boer goats are being sold @ Rs 900 per kg body weight and the other animals are being sold not based on the body weight.

7. Sale of sheep and goat for research purposes

Research laboratories are purchasing the pure breed of milch and meat breeds of goats. They are buying the animals for the research purpose to test the drugs, vaccines and feed analysis. Goats are being sold for the above purposes @ Rs 250 – Rs 300 per kg of live body weight. The rates varies breeds to breed. So, the farm owners are getting Rs 7500 – Rs 9000 per animal by selling the lactating goat (30kg body weight).

8. Sale of sheep and goat for export

Chilled and frozen meats are the important items for export earnings giving substantial foreign exchange to the country. Being a lean meat, it is an excellent source for the preparation of low – fat meat production. Demand for goat meat products is growing due to recent trends towards global flavor. Large scale slaughter halls are in India to slaughter the sheep and goat and to export the carcass.

9. Sale of goat milk

Goat milk has medicinal properties. It cures the ulcer, pneumonia, TB, cancer, etc,. Goat milk is beneficial for infants and persons who are aged. Goat milk is also sold for preparation of beauty products. Jamunapari, Jackrana, Beetal, Barbari and Tellichery are reared for milk purposes. In Tamil Nadu, goat milk is being sold for Rs 50- RS 70 per liter of milk.

10. Sale of goat milk products

Goat milk is important for making cheese and ice cream. So chances are there to sell the milk products to the European countries. Factories are in France and Switcher land to produce the cheese from goat milk.

11. Sale of sheep and goat manure

Sheep and goat dung are the best natural fertilizers. The NPK content of gaot manure is 3 times more on compared to cow or buffalo manure. So that there is a more demand from farmers, horticulturists and floriculturist. Manure is used to cultivate cash fodders like Rose cultivation and also for tea and coffee cultivation. Sheep and

goat manure is being sold @ Rs 1000 per ton. One adult sheep or goat will pass one kg of dung per day and give 300 kg of dung per year. So the farmers may get Rs 300 from a sheep or goat per year.

12. Sale of sheep and goat skin

Sheep and goats skin are sold @ Rs 120 – Rs 140. The processed skins are being sold @ Rs 600 – Rs 800 per skin for exporting purposes. Processed skins are sold to the abroad @ Rs 1500 – Rs 2000 per skin.

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MARKETING MANAGEMENT : AN OVER VIEW IN THE CONTEXT OF LIVESTOCK BASED INDUSTRIES

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The human activity revolves around satisfying all human needs and wants. Philip Kotler dictates that Marketing is typically seen as the task of creating, promoting, and delivering goods and services to consumers and businesses. The future is not ahead of us. It has already happened. Unfortunately, it is unequally distributed among companies, industries and nations.

In this fast changing world the The New Economy experiences

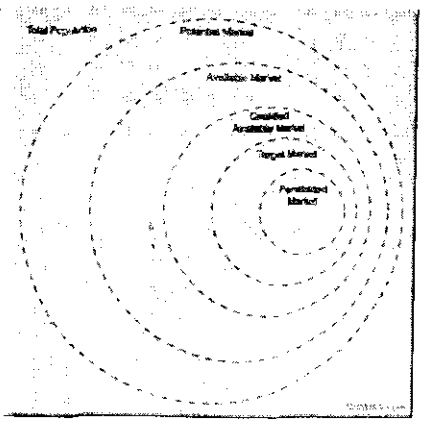
- Substantial increase in buying power
- A greater variety of goods and services
- A greater amount of information about practically anything
- A greater ease in interacting and placing and receiving orders
- An ability to compare notes on products and services

Marketing balances on the theory of Maslow's Hierarchy of Needs

When motivation is driven by the existence of unsatisfied needs, then it is worthwhile for a manager to understand which needs are the more important for individual consumer. In this regard, Abraham Maslow developed a model in which basic, low-level needs such as physiological requirements and safety must be satisfied before higher-level needs such as self-fulfillment are pursued. In this hierarchical model, when a need is mostly satisfied it no longer motivates and the next higher need takes its place. Maslow's hierarchy of needs is shown in the following order

Self-Actualization ← Esteem Needs ← Social Needs ← Safety Needs ← Physiological Need

I have observed A product may remain at one level or modifies to different form and find place at higher levels or lower level. The term market refers to any group of consumers or organizations that is interested in the product, has the resources and capacity to purchase the product, and is permitted by law and other regulations to acquire the product. The market definition begins with the total population and progressively narrows as shown in the following diagram. "Product" refers to both physical products and services. Since the market is likely to be composed of consumers whose needs differ, market segmentation is useful in order to better understand those needs and to select the groups within the market that the firm will serve.



The Marketing Concept

The marketing concept is the philosophy that firms should analyze the needs of their customers and then make decisions to satisfy those needs, better than the competition. Today most firms have adopted the marketing concept, but this has not always been the case. In 1776 in The Wealth of Nations, Adam Smith wrote that the needs of producers should be considered only with regard to meeting the needs of consumers. While this philosophy is consistent with the marketing concept, it would not be adopted widely until nearly 200 years later.

To better understand the marketing concept, it is worthwhile to put it in perspective by reviewing other philosophies that once were predominant. While these alternative concepts prevailed during different historical time frames, they are not restricted to those periods and are still practiced by some firms today.

The Production Concept

The production concept prevailed from the time of the industrial revolution until the early 1920's. The production concept was the idea that a firm should focus on those products that it could produce most efficiently and that the creation of a supply of low-cost products would in and of itself create the demand for the products. The key questions that a firm would ask before producing a product were:

- Can we produce the product?
- Can we produce enough of it?

At the time, the production concept worked fairly well because the goods that were produced were largely those of basic necessity and there was a relatively high level of unfulfilled demand. Virtually everything that could be produced was sold easily by a sales team whose job it was simply to execute transactions at a price determined by the cost of production. The production concept prevailed into the late 1920's.

The Sales Concept

By the early 1930's however, mass production had become commonplace, competition had increased, and there was little unfulfilled demand. Around this time, firms began to practice the sales concept (or selling concept), under which companies not only would produce the products, but also would try to convince customers to buy them through advertising and personal selling. Before producing a product, the key questions were:

- Can we sell the product?
- Can we charge enough for it?

The sales concept paid little attention to whether the product actually was needed; the goal simply was to beat the competition to the sale with little regard to customer satisfaction. Marketing was a function that was performed after the product was developed and produced, and many people came to associate marketing with hard selling. Even today, many people use the word "marketing" when they really mean sales.

The Marketing Concept

After World War II, the variety of products increased and hard selling no longer could be relied upon to generate sales. With increased discretionary income, customers could afford to be selective and buy only those products that precisely met their changing needs, and these needs were not immediately obvious. The key questions became:

- What do customers want?
- Can we develop it while they still want it?
- How can we keep our customers satisfied?

In response to these discerning customers, firms began to adopt the marketing concept, which involves:

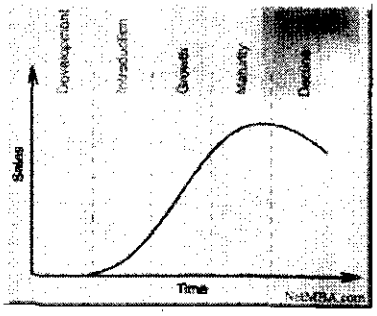
- Focusing on customer needs before developing the product
- Aligning all functions of the company to focus on those needs
- Realizing a profit by successfully satisfying customer needs over the long-term

When firms first began to adopt the marketing concept, they typically set up separate marketing departments whose objective it was to satisfy customer needs. Often these departments were sales departments with expanded responsibilities. While this expanded sales department structure can be found in some companies today, many firms have structured themselves into marketing organizations having a company-wide customer focus. Since

the entire organization exists to satisfy customer needs, nobody can neglect a customer issue by declaring it a "marketing problem" - everybody must be concerned with customer satisfaction.

The marketing concept relies upon marketing research to define market segments, their size, and their needs. To satisfy those needs, the marketing team makes decisions about the controllable parameters of the marketing mix.

The Product Life Cycle



All products have a defined path and is called the product's life cycle (PLC) can be divided into several stages characterized by the revenue generated by the product. If a curve is drawn showing product revenue over time, it may take one of many different shapes. As the product progresses through its life cycle, changes in the marketing mix usually are required in order to adjust to the evolving challenges and opportunities.

Introduction Stage

When the product is introduced, sales will be low until customers become aware of the product and its benefits. Some firms may announce their product before it is introduced, but such announcements also alert competitors and remove the element of surprise. Advertising costs typically are high during this stage in order to rapidly increase customer awareness of the product and to target the early adopters. During the introductory stage the firm is likely to incur additional costs associated with the initial distribution of the product. These higher costs coupled with a low sales volume usually make the introduction stage a period of negative profits. During the introduction stage, the primary goal is to establish a market and build primary demand for the product class.

Growth Stage

The growth stage is a period of rapid revenue growth. Sales increase as more customers become aware of the product and its benefits and additional market segments are targeted. Once the product has been proven a success and customers begin asking for it, sales will increase further as more retailers become interested in carrying it. Tbe marketing team may expand the distribution at this point. When competitors enter the market, often during the later part of the growth stage, there may be price competition and/or increased promotional costs in order to convince consumers that the firm's product is better tban that of the competition.

Maturity Stage

The maturity stage is the most profitable. While sales continue to increase into this stage, they do so at a slower pace. Because brand awareness is strong, advertising expenditures will be reduced. Competition may result in decreased market share and/or prices. The competing products may be very similar at this point, increasing the difficulty of differentiating the product. The firm places effort into encouraging competitors' customers to switch, increasing usage per customer, and converting non-users into customers. Sales promotions may be offered to encourage retailers to give the product more shelf space over competing products.

Decline Stage

Eventually sales begin to decline as tbe market becomes saturated, the product becomes technologically obsolete, or customer tastes change. If the product has developed brand loyalty, the profitability may be maintained longer. Unit costs may increase with the declining production volumes and eventually no more profit can be made.

During the decline phase, the firm generally has three options:

- Maintain the product in hopes that competitors will exit. Reduce costs and find new uses for the product.

- Harvest it, reducing marketing support and coasting along until no more profit can be made.
- Discontinue the product when no more profit can be made or there is a successor product.

The Marketing Process

Under the marketing concept, the firm must find a way to discover unfulfilled customer needs and bring to market products that satisfy those needs. The process of doing so can be modeled in a sequence of steps: the situation is analyzed to identify opportunities, the strategy is formulated for a value proposition, tactical decisions are made, the plan is implemented and the results are monitored.

Situation Analysis
V
Marketing Strategy
V
Marketing Mix Decisions
V
Implementation & Control

The Marketing Process

I. Situation Analysis

A thorough analysis of the situation in which the firm finds itself serves as the basis for identifying opportunities to satisfy unfulfilled customer needs. In addition to identifying the customer needs, the firm must understand its own capabilities and the environment in which it is operating. The situation analysis thus can be viewed in terms an analysis of the external environment and an internal analysis of the firm itself. The external environment can be described in terms of macro-environmental factors that broadly affect many firms, and micro-environmental factors closely related to the specific situation of the firm.

The situation analysis should include past, present, and future aspects. It should include a history outlining how the situation evolved to its present state, and an analysis of trends in order to forecast where it is going. Good forecasting can reduce the chance of spending a year bringing a product to market only to find that the need no longer exists. If the situation analysis reveals gaps between what consumers want and what currently is offered to them, then there may be opportunities to introduce products to better satisfy those consumers. Hence, the situation analysis should yield a summary of problems and opportunities. From this summary, the firm can match its own capabilities with the opportunities in order to satisfy customer needs better than the competition.

There are several frameworks that can be used to add structure to the situation analysis:

- 5 C Analysis - company, customers, competitors, collaborators, climate. Company represents the internal situation; the other four cover aspects of the external situation
- PEST analysis - for macro-environmental political, economic, societal, and technological factors. A PEST analysis can be used as the "climate" portion of the 5 C framework.
- SWOT analysis - strengths, weaknesses, opportunities, and threats - for the internal and external situation. A SWOT analysis can be used to condense the situation analysis into a listing of the most relevant problems and opportunities and to assess how well the firm is equipped to deal with them.

II. Marketing Strategy

Once the best opportunity to satisfy unfulfilled customer needs is identified, a strategic plan for pursuing the opportunity can be developed. Market research will provide specific market information that will permit the firm to select the target market segment and optimally position the offering within that segment. The result is a value proposition to the target market. The marketing strategy then involves:

- Segmentation
- Targeting (target market selection)
- Positioning the product within the target market
- Value proposition to the target market

III. Marketing Mix Decisions

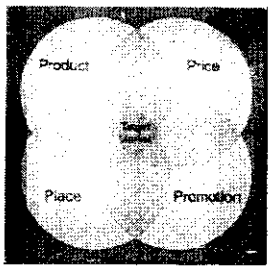
Detailed tactical decisions then are made for the controllable parameters of the marketing mix. The action items include:

- Product development - specifying, designing, and producing the first units of the product.
- Pricing decisions
- Distribution contracts
- Promotional campaign development

IV. Implementation and Control

At this point in the process, the marketing plan has been developed and the product has been launched. Given that few environments are static, the results of the marketing effort should be monitored closely. As the market changes, the marketing mix can be adjusted to accomodate the changes. Often, small changes in consumer wants can addressed by changing the advertising message. As the changes become more significant, a product redesign or an entirely new product may be needed. The marketing process does not end with implementation - continual monitoring and adaptation is needed to fulfill customer needs consistently over the long-term.

The Marketing Mix



(The 4 P's of Marketing)

Marketing decisions generally fall into the following four controllable categories:

- Product (Milk/Meat/Fish /Poultry/Livestock)
- Price
- Place (distribution)
- Promotion

The term "marketing mix" became popularized after Neil H. Borden published his 1964 article, The Concept of the Marketing Mix. Borden began using the term in his teaching in the late 1940's after James Culliton had described the marketing manager as a "mixer of ingredients". The ingredients in Borden's markcting mix included product planning, pricing, branding, distribution channels, personal selling, advertising, promotions, packaging, display, servicing, physical handling, and fact finding and analysis. E. Jerome McCarthy later grouped these ingredients into the four categories that today are known as the 4 P's of marketing, depicted below:

The Marketing MixThese four P's are the parameters that the marketing manager can control, subject to the internal and external constraints of the marketing environment. The goal is to make decisions that center the four P's on the customers in the target market in order to create perceived value and generate a positive response.

Product Decisions

The term "product" refers to tangible, physical products as well as services. Here are some examples of the product decisions to be made:

- Brand name, Functionality, Styling, Quality, Safety, Packaging, Repairs and Support, Warranty, Accessories and services

Price Decisions

Some examples of pricing decisions to be made include:

- Pricing strategy (skim, penetration, etc.), Suggested retail price, Volume discounts and wholesale pricing, Cash and early payment discounts, Seasonal pricing, Bundling, Price flexibility, Price discrimination

Distribution (Place) Decisions

Distribution is about getting the products to the customer. Some examples of distribution decisions include:

- Distribution channels, Market coverage (inclusive, selective, or exclusive distribution), Specific channel members, Inventory management, Warehousing, Distribution centers, Order processing, Transportation, Reverse logistics.

Promotion Decisions

In the context of the marketing mix, promotion represents the various aspects of marketing communication, that is, the communication of information about the product with the goal of generating a positive customer response. Marketing communication decisions include:

- Promotional strategy (push, pull, etc.), Advertising, Personal selling & sales force, Sales promotions, Public relations & publicity, Marketing communications budget

The following are some of the marketing mix implications of the introduction stage:

- Product - one or few products, relatively undifferentiated
- Price - Generally high, assuming a skim pricing strategy for a high profit margin as the early adopters buy the product and the firm seeks to recoup development costs quickly. In some cases a penetration pricing strategy is used and introductory prices are set low to gain market share rapidly.
- Distribution / Place - Distribution is selective and scattered as the firm commences implementation of the distribution plan.
- Promotion - Promotion is aimed at building brand awareness. Samples or trial incentives may be directed toward early adopters. The introductory promotion also is intended to convince potential resellers to carry the product.

During the growth stage, the goal is to gain consumer preference and increase sales. The marketing mix may be modified as follows:

- Product - New product features and packaging options; improvement of product quality.
- Price - Maintained at a high level if demand is high, or reduced to capture additional customers.
- Distribution - Distribution becomes more intensive. Trade discounts are minimal if resellers show a strong interest in the product.
- Promotion - Increased advertising to build brand preference.

During the maturity stage, the primary goal is to maintain market share and extend the product life cycle. Marketing mix decisions may include:

- Product - Modifications are made and features are added in order to differentiate the product from competing products that may have been introduced.
- Price - Possible price reductions in response to competition while avoiding a price war.
- Distribution - New distribution channels and incentives to resellers in order to avoid losing shelf space.
- Promotion - Emphasis on differentiation and building of brand loyalty. Incentives to get competitors' customers to switch.
- The marketing mix during decline stage may be modified as follows:
- Product - The number of products in the product line may be reduced. Rejuvenate surviving products to make them look new again.
- Price - Prices may be lowered to liquidate inventory of discontinued products. Prices may be maintained for continued products serving a niche market.
- Distribution - Distribution becomes more selective. Channels that no longer are profitable are phased out.
- Promotion - Expenditures are lower and aimed at reinforcing the brand image for continued products.

Reference

http://www.scribd.com/doc/15040347/Marketing-Management-by-Philip-Kotler

LIVESTOCK MARKET DATA ANALYSIS USING SAS

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Introduction

SAS is a statistical software package that allows the user to manipulate and analyze data in many different ways. Because of its capabilities, this software package is used in many disciplines (not just statistics!), including medical sciences, biological sciences, and social sciences. Knowing the SAS programming language will help one not only in his / her current class or research, but also possibly in obtaining a job. To get into the program, click Start, All Programs, Standard Software, Statistical Packages, and finally SAS. After we open SAS, we will see three windows, the program editor, an explorer window, and the log window. Also, there is an output window that is hidden until we actually have output. The program editor is where we type the program that we will eventually run. It works almost exactly like Microsoft Word (We can cut, paste, move the cursor, etc.). The enhanced program editor will give the color-coded procedures, statements, and options that will help us to find errors in our program before we even run it. The log window will inform us of any errors in our program and the reason for the errors. This window is extremely important if we want to figure out what is wrong with our program. Always check it first to see if our program ran properly! The output window is where, once we run our program from the program editor, our output appear. (Note: We can also cut, paste, etc. from the log and output windows.) With the explorer window, we can open \ view data we have read into SAS. Click on libraries, then the work folder, and this will show us any datasets we have read into or created in SAS for that session.

Reading data into SAS

There are three basic options (besides others) for reading datasets into SAS so we can begin analysis.

1) With an infile statement:

Using an infile statement will bring data in from a different drive (i.e. A, H, C, F) and make them available for the entire SAS session that we run. To do this, the commands could be, for example, if our data were saved on a disk: data a1; infile 'A:\filename'; input x1 x2;

We must also name our dataset. We can name it anything we like; here it is named a1. The input statement identifies the variables in our dataset so we can use them for analysis. They can also be named whatever we would like; here they are named x1 and x2.

2) Importing the dataset:

To import the data from another drive, go to File, then import data. In a few seconds, a window will pop up and ask us the format of the file to import. Click on the pull-down menu and select our file type (i.e. Excel, Lotus, text, etc.). Then, click next which will take us to a window that asks the file's pathname. Type in the place where our file exists (e.g., H:\StatHW\data). Or, if we are not exactly sure where our file is, click on browse, and this will help us to locate it. Click next again, and then it will ask us to name our data set. This can be anything we would like. Once we name it, we must continue to use this name in our program to reference this particular data set. Click next one more time, and then click on the finish button.

3) Using the cards or datalines statements:

Another option is to put our dataset directly into the program editor. This generally works best when our dataset is fairly small (e.g., for a class assignment). The code for this is:

data a1; **input x1 x2; cards; our data here ;**

OR

datalines; our data here;

It is very important that the last semi-colon **go on the next line after all of the data (as shown above),** otherwise our last observation will be deleted!

Important basic syntax to know

In order to successfully run any program, we need the following basic **elements:**

1) a semi-colon at the end of every line
2) a data statement that names our data set (unless we import the data set)
3) input statement (unless we import the data set)
4) at least one space between each word or statement
5) a run statement

A semi-colon is the way to tell SAS that a particular operation, procedure, or statement is finished, and tells SAS to look for the next one. The data statement names our data set so we can reference it later in our program. The input statement tells SAS the names of the variables in our data set so that they can also be referenced later. Only one space is required to tell SAS that things are separate. If we have more than one space, that is fine too. A run statement tells SAS to process the previous bit of code that we wrote. If there is no run statement, SAS will not process anything. (Lack of semi-colons and run statements are two most common mistakes in a program.). An example of this follows:

data ourdatasetname; infile 'H:\StatHW\ourfilename.dat';

input variable1 variable2 (up to many variables that we have);

If we use the cards or datalines statements instead, they must both be preceded by the input statement.

Data Steps and Procedures

A SAS program is composed of two parts: data steps that deal with data cleaning and data format, and procedures that perform required statistical analyses and/or graphically present the results. Data steps are important for several reasons. First, the dataset may not be in a SAS compatible format. Second, sometimes we need to extract some of the variables or some of the observations from the dataset to perform analysis. Third, different procedures may require the same dataset in different format. A data step is needed to transform the dataset into the appropriate format for a procedure.

Mathematical operations:

Function	**Operator**	**Example**
Addition	+	Height + weight
Subtraction	-	Height – weight
Multiplication	*	Height * age
Division	/	Weight / height
Power	** or ^	Weight ** 2
Equal	= or eq	Weight = 120
Unequal	< > or ne	Weight < > 120
Less than	< or lt	Weight < 120 or weight lt 120
Less than or equal to	<= or le	Weight le 120
Greater than	> or gt	Weight gt 80
Greater than or equal to	>= or ge	Weight ge 80

Manipulating variables in a data step (recoding, if/then statements)

To illustrate the data manipulation, let's take a sample data set:

```
data a1;  input gender $ age weight;  cards;  M 13 143  M 16 132  F 19 140
M 20 120  M 15 110  F 18 95  F 22 105;
```

Suppose we want a data set of females only. The following SAS code will create a new data set called aa and store those observations whose value for the variable gender is not 'M'. The set a1 statement after the data aa statement tells SAS to make a copy of the dataset a1 and save it as aa. The if/then statement deletes the observations in dataset aa whose gender variable has a value 'M'. Quotation marks are used on M because gender is a categorical variable. The dollar sign ($) is used when we have a text variable rather than a numerical variable (i.e., gender coded as M, F rather than as 1 denoting male and 2 denoting female).

```
data aa;  set a1;  if gender eq 'M' then delete;  OR  if gender eq 'F'; run;
```

If we want to include those who are 16 years or older, we can do:

```
data ab;  set a1;  if age lt 16 then delete;  run;
```

We can also select variables from a dataset for analysis. The statement is keep or drop. For example, if we do not need the variable age in our analysis, we can do:

```
data ac;  set a1;  drop age;  OR  data ac;  set a1;  keep gender weight;
```

This last statement will create a dataset that only contains the two variables specified, gender and weight.

SAS procedure

A SAS program is composed of one or more (statistical) procedures. Each procedure is a unit, although some are needed to run others. Some often-used procedures for statistical analysis are explained in detail.

Proc print

The output of this procedure is the data set that we specified by writing data=dataname option after the print key word. This data= option is common for almost every SAS procedure. It is a good habit to use this option all the time so that we know with which dataset we are working. This is helpful especially when there are multiple datasets, which is usually the case when we are performing statistical analysis using SAS. Here's an example of how proc print works. In the data step section, we created a data set called a1 with three variables (gender, age, weight), and seven observations. It's a good idea to always check if SAS has read our dataset correctly before performing any analyses on the data.

```
proc print data=a1;  run;
```

If we highlight this section of code and click on the run button, we'll see the dataset in the output window as follows:

Obs	gender	age	weight
1	M	13	143
2	M	16	132
3	F	19	140
4	M	20	120
5	M	15	110
6	F	18	95
7	F	22	1056

If we want to see only some variables in the data set, we could add a statement after the proc print line in the format of var gender age;. This would generate output similar to that shown above except that the weight variable will not be included.

Proc univariate

It is one of the most important procedures for elementary statistical analysis. It outputs the basic statistics of one or more variables, and has optional statements to generate qqplots and histograms. Sample code follows:

proc univariate data=a1; var weight; qqplot; histogram; run;

The var statement is optional. Without this statement, a univariate analysis is performed for all numeric variables in the order they appear in the dataset.

Proc capability

It has a variety of functions including creating a normal qq plot, histogram, and probability plots, although it is often used to create a normal qq plot in elementary statistical analysis. A normal qq plot and a histogram can be created using the code in the univariate example, just replacing univariate with capability.

Proc sort

Proc sort sorts the observations in a dataset by some variables in either ascending or descending order. For example: proc sort data=a1 out=a2; by gender; run;

The observations of dataset a1 are sorted in ascending order, by default, of the variable gender, and the sorted data is saved in a dataset named a2. Without the out=a2 option, the unsorted dataset named a1 will be replaced by the sorted dataset. We can also sort the observations in the descending order of some variable by specifying the descending option in the by statement, e.g. by gender descending. If we need to sort by more than one variable, list all the variables in the by statement. For example, by gender age will sort in the ascending order by gender, and then the observations with the same gender value will be sorted in the ascending order by the values of age.

Proc means

This procedure produces simple univariate descriptive statistics for numeric variables. It also calculates confidence limits for the mean, and identifies extreme values and quartiles. Here's an example for mean and its confidence limit calculation: proc means data=a2 alpha=0.05 clm mean median n min max; run;

The mean, median, sample size, minimal value, maximal value, and 95% confidence intervals will be computed for variables age and weight. The alpha option specifies the confidence level for the confidence limit, clm tells SAS to calculate the confidence interval of the mean. Since gender is a categorical variable, no mean will be computed for it. If we have a lot of variables and we only want to calculate the mean for some of them, use the var option and list the variables after the keyword var. If we want the means of the variables by group, use the 'by option'. For example,

proc means data=a2 alpha=0.05 clm mean; var weight; by gender; run;

tells SAS to compute the mean and confidence interval of weight for each value of gender, i.e. male and female. If the by statement is used, the observations need to be sorted by the same variable before the proc means procedure. Note data a2, the sorted dataset, was used in our proc means example.

Proc summary

It computes descriptive statistics on numeric variables in a SAS dataset and outputs the results to a new SAS dataset. The syntax of proc summary is the same as that of proc means. An example follows:

proc summary data=a2 print; var weight; by gender; output out=3; run;

Proc summary will not run without either the print option or the output statement.

Proc corr

This procedure is used for calculating the correlation between numeric variables. For example, the Pearson correlation coefficient and its P-value can be computed.

proc corr data=a1; var age weight; run;

A correlation coefficient matrix is created:

Pearson Correlation Coefficients, N = 7

Prob > |r| under H0: Rho=0

	age	weight
age	1.0000	-0.4302
		0.3354
weight	-0.4302	1.0000
		0.3354

The correlation coefficient between age and weight in this example is -0.4302, and 0.3354 is the P-value for testing the null hypothesis that the coefficient is zero. In this case, the P-value is greater than 0.05, and the null hypothesis of zero coefficient cannot be rejected.

Proc glm

It performs simple and multiple regression, analysis of variance (ANOVA), analysis of covariance, multivariate analysis of variance, and repeated measures analysis of variance.

proc glm data=a1; model weight=age; output out=a3 p=pred r=resid; run;

performs a simple linear regression with weight as the dependent variable and age the independent variable. The predicted values of weight (the dependent variable) and the residuals are saved in a new dataset called a3 using the output statement. For multiple regression where we have more than one independent variable, simply list in the model statement all the variables on the right hand side of the equal sign with one space in between, e.g. model weight=age height;

In case of ANOVA, a class statement is needed for categorical variables before the model statement. The following code is an ANOVA analyzing the effect of gender on weight. It tests whether the weight is the same for females and males.

proc glm data=a1; class gender; model weight=gender; run;

Proc reg

Proc reg is a procedure for regression. It is capable of more regression tasks than proc glm. It allows multiple model statements in one procedure, can do model selection, and even plots summary statistics and normal qq-plots. We can specify several PLOT statements for each MODEL statement, and we can specify more than one plot in each PLOT statement.

proc reg data=a1; model weight=age; plot weight*age;

plot predicted.*age; plot residual.*age; plot nqq.*residual.; run;

In the above example, a simple regression is performed with weight as the response and age as the explanatory variable. The plot statements request four plots: weight versus age, predicted values of weight versus age, residuals versus age, and normal qq plot versus residuals. Predicted., residual., and nqq. are keywords that SAS recognizes. Make sure we keep a dot after the word.

Basic Options and Statements within the Procedures

The option or statement

A statement is a command nested within the procedure commands that tells SAS a bit more about the procedure we want to perform or in some cases, allows we to make our analysis more specific. An option is something that even further describes a statement, or in some cases, it may also further describe a procedure. Some statements are necessary while others are optional

The Var Statement

In many of the above SAS procedures, a var statement is either required or may be needed if we are dealing with a large data set with many variables. For example, if we are using the proc corr procedure (outlined above), we may want to tell SAS which variables in our dataset we are interested in obtaining correlations for. It would work as follows if we had three variables for which we needed to obtain the correlations:

proc corr data=ourdatasetname; var V1 V2 V3; run;

If we have a dataset with many variables, but we only want to check normality assumptions for a few of them, use: proc univariate data=ourdataset; var response1 response2; run;

The By Statement

The by statement is required for the proc sort procedure. After using it in proc sort, we can then use it in other procedures. For example, say we were interested in performing regressions of height on weight by gender. First, we would want to sort our dataset by gender as follows:

proc sort data=ourdataset; by gender; run;

Then, we can use the sorted data to obtain two separate regressions, one for males and one for females as follows: proc reg data=ourdataset; model weight=height; by gender; run;

The Class Statement

The class statement tells SAS that we have a variable in our data set that is categorical. For example, if we had data from an experiment with 20 subjects where five subjects received treatment 1, five received treatment 2, five received treatment 3, and the final five received treatment 4, treatment would be considered a categorical variable, and thus must appear in the class statement of the glm procedure. The most common usage of the class statement for we will most likely be in the univariate, means, and glm procedures. It is required for the glm procedure only if we have a categorical variable such as gender.

The coding of the above example could look as follows:

proc glm data=ourdataset; class treatment; model resp=treatment; run;

where resp is the response for each of the 20 subjects.

The Model Statement

By now, we have already seen the model statement in a few of the above examples. The model statement tells SAS which model we would like to use for our data. The dependent or response variable always goes on the left of the equals sign while the independent variable(s) come after the equals sign on the right. The above glm example shows how the model statement works. For the procedure statements we have learned thus far, the model statement is only required (and accepted) in the glm and reg procedures. The model statement also supports many options in both glm and reg. For example, in the glm model statement, options exist for choosing the types of sums of squares and asking for confidence and prediction intervals. In proc reg, the model statement has options for these same things, plus many other options such as standard errors for the regression coefficients, step-wise regression and specialized regression diagnostics. An example of how to use options in the model statement is as follows:

proc reg data=ourdataset; model weight=height / stb; run;

(following the earlier example of weight and height). We must always use the forward slash to tell SAS that there are options coming after the model statement. We can use as many options as we need in one model statement, but just make sure that all of them are separated by one space. The option stb asks for the standardized regression coefficients.

The Means and Lsmeans Statements

Often in an analysis, once differences are found among groups, we would like to see exactly where those differences occur; this is done in SAS by the use of the means and lsmeans statements in proc glm or proc reg. Both the means and lsmeans statements can be used in conjunction with a variety of options. If we have no missing values in our data set, our design is a balanced one and we use no covariates, we can use the means statement. However, if missing values exist or there is an imbalance in our design, or we have covariates on our model, we must use lsmeans to obtain the proper means and comparisons. An example follows:

```
proc glm data=ourdataset;  class treatment; model resp=treatment;
means treatment / lines tukey bon;  run;
```

The means statement will perform means comparisons for all four treatment groups in this case. The options lines, Tukey, and Bon are used. The lines option displays the means comparisons in a more readable format. The Tukey and Bonferroni options correspond to two types of means comparisons procedures. Many other options for different means comparison procedures also exist (i.e. Dunnett, least squared differences, Duncan, Scheffe, Student-Newman-Kuels). When using the lsmeans statement, the syntax is a bit different.

```
lsmeans treatment / adj=tukey stderr;
```

When using lsmeans, we must use the "adj=" option to obtain Tukey and Bonferroni comparisons, for example. The stderr option gives the standard errors for the least squares (ls) means.

Options in the Procedures

Some options contained in the procedures come not in the model or the means statements, but directly after the proc statement. An example of this is:

```
proc glm data=ourdataset alpha=.05;        class treatment; model resp=treatment;
means treatment / lines tukey bon;  run;
```

In this example, it becomes apparent that the "data=" option is really an option in the procedures statement. The alpha=.05 option tells SAS that for any confidence intervals, significance testing, etc. we want an alpha of .05. (This option is such that any tests in the model statement, lsmeans, means, and any confidence intervals outputted with the output statement are performed at the .05 level).

Another useful example of options in the proc statement is with proc univariate. By using options in the procedures statement, we can obtain stem-and-leaf plots, normal probability plots, boxplots, and tests for normality.

```
proc univariate data=ourdataset normal plot;        var response1 response2;        run;
```

The normal option gives the Shapiro-Wilks test of normality, while the plot option produces the stem-andleaf plot, boxplot, and normal probability plot.

Output Statements (used in many procedures)

How does the output statement normally work?

The basic function of the output statement is to create a new dataset containing both the information in the old dataset plus any new diagnostics or statistics that the procedure has created. For example, if we specify a dataset for our reg procedure, we may want to output that dataset along with predicted values and residual values.

Options for obtaining **predicted values, residual values, and other statistics and diagnostics**

This is how it works:

proc reg data=one; model response=var1 var2; output out=two r=res p=pred; run;

So, now we have a data set named "two" which contains everything that dataset one contains, plus the predicted and residual values from our proc reg model. Now, we can make diagnostic plots as follows:

proc gplot data=two; plot res*pred; plot res*var1; plot res*var2; run;

These plots can help to assess normality, independence of observations, and constancy of variance. There are many other options besides residual and predicted values depending on which procedure we are using for our analysis. By looking in the SAS help menu, we can find the keywords (e.g., for residuals, the keyword is just r=) for other diagnostics such as Cook's distance, standard errors, prediction, etc.

Another example of an output statement used with the proc univariate statement:

proc univariate normal plot data=old; var y1;

output out=new max=maximum min=minimum mean=mean; run;

This will give the mean, maximum, and minimum values for y1 in the data set "new". Note that max, min, and mean are how SAS recognizes that we are asking for these values. What comes after the equals sign (=) is whatever WE choose to name that new value or variable.

How can we be sure that correct values and variables were output?

The best way to assess whether our output statement worked is to use the proc print procedure as follows (building from the univariate example above):

proc print data=new; run;

This will print out all variables and values in our new data set.

How does SAS know which dataset to use?

If we are working with multiple datasets that we have output from multiple procedures (e.g., we have one data set that SAS made from a proc glm and another from a proc reg), we must always name the data set we wish to use, otherwise SAS will use the dataset just previously used by default.

ECONOMETRIC MODELS FOR EVALUATING CONSUMER PREFERENCES FOR LIVESTOCK AND THEIR PRODUCTS

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Introduction

In the history of demand analysis two threads, related but separable, can be discerned. These are first the work of economists interested in the discovery of general laws governing the operation of markets, particularly agricultural markets; and second the work of those, originally statisticians, interested in the psychological laws governing what has come to be called consumer preference. This dichotomy continues to characterise the subject. As computing opportunities and skills have expanded, empirical research has produced more sophisticated demand equations while, at the same time, theoretical economists and mathematicians have enormously increased our knowledge of the pure mathematics of preference relations.

Most food markets do not count on complete information about food quality for consumers. As a consequence, quality has become a crucial concept in the new approaches of the Demand Theory and so, economists started to incorporate it in food demand functions as an additional variable. Quality is a wide and subjective notion that refers to different kinds of attributes that could either be verified by consumers or not, before or after purchasing food, e.g. colour, temperature, taste, nutritional facts, applied processes -such as irradiation or genetic manipulation and added substances during the productive processes. Quality uncertainty has played a key role in the literature about safety and products liability. Several articles have dealt with quality and uncertainty, the most relevant of which is that by Akerlof (1970), which demonstrates that, even though suppliers can determine quality by incurring greater costs, consumers cannot test quality before purchasing, and then bad goods tend to drive good ones out. Consumers acquire products based on their perceived quality expectations. The attributes of the quality-nutritional content, i.e. food safety attributes, convenience, place and manner of production, including environmental production processes, are all valued in accordance with consumers' subjective perception. When purchasing food, consumers make their choices by comparing prices and qualities. Such choices are definitely conditioned by the uncertainty they perceive in relation to the different qualities offered; in other words, by the information available to them. Before purchasing, consumers could get better informed, though to a certain extent, since that would imply additional search costs. Hence, food quality information is an attribute in itself and becomes a crucial factor when explaining the differences existing between demand profiles.

During the transitional period of the last two decades, substantial research was carried out on various issues of the Indian economy. In the initial stage, most studies focused on the impacts of institutional reforms, decollectivisation, which was started in the late 1990s. Later, research topics focused on more diversified subjects, such as market development, food demands and environmental problems. Marketing reforms and development have been studied from the perspective of institutional innovation, market integration and household consumption behavior. Besides the agricultural economic approach, substantial research has also been carried out in the marketing domain related to consumer behavior. During all the planning periods, ensuring sufficient supplies for consumers was the government's priority given its shortage economy. Consumer research topics related include analyses of consumers' purchasing behavior, segmentation of consumers' food consumption pattern, consumers' dietary pattern and its cultural issues, etc.

The consumer buying process is a complex matter as many internal and external factors have an impact on the buying decisions of the consumer. And hence, it requires sophisticated statistical and econometric tools

to analyse and decompose individual factor's effect on buying behavior of a consumer. With the increased computing standards, more studies involving complex models are being undertaken. The results so far obtained induce complacency. Although many tools are in vogue to study consumer behaviour, a few commonly used modelling techniques narrated in the section that follows.

Conjoint Analysis

Conjoint analysis is a decomposition technique used to measure a respondent's preference given his/her evaluation of various combinations of attributes and levels that define a particular product or a service. If products are composed of attributes, conjoint analysis determines which combination of attribute levels are most preferred by consumers. Consumers indicate their preferences by ranking a number of different combinations of attribute levels. Conjoint analysis assumes that consumers make purchases by simultaneously considering several attributes of a product. The ability to analyze several attributes at once distinguishes conjoint analysis from traditional market research methods where each attribute is studied separately. The conjoint approach makes use of consumer choice theory, where a respondent's preference can be measured in terms of utilities for individual attributes of the products or services. An advantage of conjoint analysis relative to other multivariate analysis is the way it decomposes the overall preference of a respondent to determine the value of each attribute.

Conjoint analysis helps you discover how consumers make trade-offs between the various possible attribute combinations available. Usually, conjoint analysis consists of a main-effects analysis of variance with ordinally scaled dependent variables. Consumer preferences are the dependent variables, and product attributes are the independent variables. The following are some of the questions that can be answered with a conjoint analysis.

- How important is each product attribute to consumers?
- *Which existing products do consumers prefer?*
- What combination of product attributes do consumers prefer most?
- How well will my product do in the current market?

Conjoint rating and ranking

Conjoint rating was another method that can be used to elicit consumer preference for novel goods or services. Conjoint rating has been frequently used in marketing, transportation and environmental valuation literature. In a conjoint rating framework, consumers were typically confronted with a choice between alternative products where the products were defined by several attributes, such as price and quality. The consumer is typically asked to choose which product they would purchase, given several product descriptions. The advantage of the conjoint rating framework is that hypothetical responses to conjoint rating questions have been found to be similar to revealed preferences.

Estimation of Part-Worth Utilities

The most commonly used methods for coding consumer preferences in the CA literature are rank order (RO) and interval rating (IR) scales. The primary difference between these methods is associated with the restriction each places on the metric and nonmetric properties of the subject's utility function. The RO method requires subjects to unambiguously rank all hypothetical product choices, which provides a nonmetric ordering of respondent preferences. The IR method allows subjects to express order, indifference, and intensity across product choices, a feature allowing both metric and nonmetric properties of utility to be elicited. Since RO scaling offers no provision for subjects to express indifference or intensity across product attributes, information is lost if respondents wish to express cardinal properties in their preference ordering.

The method used to scale preferences also has implications regarding the model used to estimate part-worth values. If RO scaling is used, then the dependent variable (i.e., the RO scale) is clearly ordinal, and

ordered regression models such as ordered probit or logit are best suited for estimating conjoint parameters. However, model selection becomes less clear if the IR method is used. A number of studies have used IR scaling in combination with linear regression (LR) to estimate part-worth parameters.

Conjoint Analysis - Steps

- Identifying key attributes and their levels in livestock services
- Generating orthogonal set of combinations
- Designing illustrations of the attribute levels
- Administering ranking experiment with sample farmers
- Analysing the ranks

Correspondence Analysis

Market research frequently involves categorical data. Correspondence analysis characterizes the associations between the levels of two or more categorical variables by performing a weighted principal component analysis of a contingency table. The result of a correspondence analysis is a two-dimensional graphical representation of the association between rows and columns of the table. The plot contains a point for each row and each column of the table. Rows with similar patterns of counts produce points that are close together, and columns with similar patterns of counts produce points that are close together. Simple correspondence analysis analyzes a contingency table made up of one or more column variables and one or more row variables. In multiple correspondence analysis, only column variables are used and a Burt table is produced. The following are some of the questions that can be answered with a correspondence analysis.

- Who are my customers?
- Who else should be my customers?
- *What new products should I create?*
- Who should I target with my new products?

Correspondence analysis is primarily a technique for representing the rows and columns of a two way contingency table in a joint plot. It is by no means a 'new' technique for data analysis. Proponents trace its development from the mid 1930s, for example in the work of Hirschfield (1935). One source of confusion is that correspondence analysis is equivalent to a number of techniques which have appeared in different contexts under different labels. Correspondence factor analysis, principal components analysis of qualitative data and dual scaling are but three of a long list of alternative names.

There are several reasons why a market analyst could be attracted to correspondence analysis.

- Correspondence analysis is an appropriate method for the analysis of categorical data; it avoids the unease of using traditional multivariate techniques such as factor analysis on such data.
- It produces a visual representation of the relationships between the row categories and the column categories in the same space.
- The technique is versatile: it can be used with frequency data, with percentages, with data in the form of ratings and with heterogeneous datasets.
- Correspondence analysis can suggest unexpected dimensions and relationships in the tradition of exploratory data analysis even if, in this post-empiricist age, no-one expects 'theory' to emerge automatically from the data.
- Although 'model-free' itself, the results of correspondence analysis are often a useful preliminary to a more structured and traditional multivariate modelling of categorical data.

Inevitably, with easier access to the relevant computer software, there is the danger of an unthinking, 'black-box' approach to correspondence analysis. It would also be misleading to 'over-interpret' an essentially descriptive map. Moreover, correspondence analysis is merely one of a wide range of alternative ways of handling and representing the relationships between categorical data.

Discrete Choice Modeling

Discrete choice analysis is used to evaluate consumer choice. In conjoint analysis, consumer preferences for a product are evaluated by having a number of consumers rank different combinations of attribute levels. In discrete choice analysis, each consumer chooses one combination of attribute levels from a particular set of attribute level combinations. A set of attribute level combinations is called a choice set. Each consumer may be asked to choose one combination from each of several different choice sets. The attributes of the product that define the choices are called choice attributes to distinguish them from other attributes that may be of interest but do not contribute to the definition of the choices. For example, you may want to include demographic variables related to the consumers in the analysis. The following are some of the questions that can be answered with a discrete choice analysis.

- Which combination of attribute levels is most likely to be chosen by consumers?
- Which combination of attribute levels is least likely to be chosen by consumers?
- What is the probability of my product being chosen by a consumer?

In a discrete choice experimental task, respondents are asked to indicate their preference for experimentally varied products or product profiles. This preference is practically and realistically expressed by a choice to be made between two, three, or more product alternatives each time, for a predefined number of times imposed by the research design. This choice is statistically represented with a multinomial dependent variable, for instance, (1 0 0) if the first of three alternatives is chosen by a specific respondent, or (0 1 0 0) if the second of four alternatives is chosen, and so on.

Each product alternative is made of preselected product attributes, which serve as independent variables of the multinomial model that influences choice. More precisely, given some values for the independent variables, or in other words, some attributes of the alternative products, an individual simply chooses one of the alternatives (the response vector is multinomial with zeroes except for the chosen alternative, which corresponds to 1), which is the one with particular attributes that corresponds to the highest utility delivered from its selection/choice. The investigator observes a multinomial vector, but must uncover the utilities of all the alternatives that are hidden in the multinomial vector; only the alternative with the highest utility succeeds and appears, even though the utilities for all the alternatives have to be calculated to understand or predict an individual's behavior.

Multidimensional Scaling

Multidimensional scaling (MDS) analysis takes consumer judgments of similarity (or difference) of pairs of products and produces a map of the perceived relationship among the products. Each consumer evaluates the similarity (or difference) of each pair of products. MDS determines the relative similarity perceived by consumers among all the products. The results enable you to identify products that consumers see as similar. The following are some of the questions that can be answered with a multidimensional scaling analysis.

- Which products do consumers see as similar to my product?
- Which products do consumers see as different from my product?

In a conjoint analysis, consumers indicate their preferences for products that are composed of attributes. Sometimes in market research, the available data consist of consumer preferences for products for which attributes are not defined. Multidimensional preference analysis (MDPREF) is used to analyze such data. MDPREF analysis is a principal component analysis of a data matrix with columns that correspond to consumers and with rows that correspond to products. The analysis results in a plot that reveals patterns of consumer preference for

the products. The following are some of the questions that can be answered with a multidimensional preference analysis.

- *Who are my customers?*
- Who else should be my customers?
- What new products should I create?

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LIVESTOCK BUSINESS AND MARKET LINKAGE THROUGH CONTRACT FARMING

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Introduction

The globalization of Indian agriculture in recent years has resulted in the need for the production of quality products having competitive advantage both for domestic and export purposes. To meet the commitment of world trade organization, the recent dismantling of the system of quantitative restrictions on imports by the Indian government has provoked new challenges to the Indian farmers to compete in the world market. The agriculture sector provides a sound platform for establishment of agro processing industries to enhance exports by allowing diversification and value addition to agricultural produce. The fruits and vegetables farming for processing is not only employment intensive, but also enhance the gross as well as net returns of farmers. With the WTO's demand for trade liberalization and subsidy-cut to farmers, the Indian farmers especially small and marginal farmers are facing threats to their survival from every quarter. In this context, contract farming could be one of the solutions as it provides assured market and technology at the farm gate.

Of late, farming is increasingly being felt as less remunerative on account of various risks of production, prices and marketing. Further, the small and scattered land holdings and poor resource base constrained increased production and profitability. In the era of market liberalization and expansion of agribusiness there is apprehension that small and marginal producers will experience difficulties in participating in the market economy. Exclusion of small-scale producers may widen preexisting economic disparities and further concentrate the accumulation of capital and means of production among wealthier producers. However, the perception also exists that a successfully implemented contractual arrangement may increase small-scale producers' participation and profitability. In such a situation, contract farming assumes significance.

Contract Farming

Contract farming is the contractual arrangements between the producers and the company, whether oral or written, specifically one or more condition of production and marketing. Contracts are generally signed at the time of planting and specify how much produce the company will buy at what price. The firm provides credit, input, farm machinery and technical guidance and retains the right to reject the sub standard produce. However the concept of contract farming comes a long way from such origins. The contract farming is viewed as a tool to provide the technology, extension services, credit, etc to the producers. It is perceived as mutually beneficial to firms and producers by government and international aid agencies.

Contract farming basically involves four components, pre-agreed price, quantity or acreage (minimum/ maximum) quality and time. It is a case for bringing the market to the producers, which is navigated by agribusiness firms. There is no standards and homogeneity in contract farming in agriculture. Simple market specification contracts or future purchase agreements in agriculture like supplying labour and machinery are more common.

In India, contract farming has considerable potential where small and marginal producers can no longer be competitive without access to modern technologies and support. These small and marginal producers are generally capital starved and cannot make major investment in the production process and modern inputs. Further, poor efficiency in the marketing channels and inadequate market infrastructure especially for the perishables led to poor realization of net margin to the producers. Contract farming can fill up this gap by providing the producers with quality inputs, technical guidance, management skills, credit as well as knowledge

of new technology and assured market. Of late, contract farming is emerging for different farm enterprises. These companies directly outsource production of quality raw material to the producers under their supervision, as it is cost effective to them since they need not invest on land, water and labour inputs.

Reasons for farmers to enter contracts

- Producers, especially smallholders, are likely to have advantage that allow cost savings through contracting
- They may have access to product markets where high transactions costs effectively prevent smallholder access
- They may have access to relatively inexpensive credit where, for a range of reasons, smallholders face high interest rates or have no access
- They may provide information on extension, logistics and marketing at relatively low cost

Contracted crops

There are several agricultural and horticultural crops as also livestock products such as tomato, baby corn, potato, chilli, gherkin, eggplant, ladies finger, medicinal plants, chicken, etc., produced in some form of contractual arrangements with the producers by both domestic and multinational firms. There are several domestic players in the market involved in the contract farming. There are many success stories on contract farming in respect of potato, tomato, groundnut and chillies in Punjab, Safflower in Madhya Pradesh, oil palm in Andhra Pradesh, contracts for hybrids seed production in Karnataka, cotton and chicken in Tamil Nadu and Maharashtra etc. which helped the growers in realization of better returns for their produce. Leading industrial houses, especially for whom agricultural produce forms an integral part of processing functions have evinced significant interest in the practice of contract farming. Contract farming seems to be an attractive alternative for the farmers of India.

Institutional arrangements in contract farming

There are no set guidelines as far as the institutional arrangements in contract farming are concerned. The arrangements vary from company to company and from crop to crop. However, the general features in contractual arrangements are indicated below.

- The head office of the Company will fix the target of quantity to be procured, by each regional office, in the current year, by March itself.
- Accordingly, the regional offices plan about the area to be targeted, to reach the target set for them.
- The minimum requirements of a producer to make contract are that,
  1. He should be cultivating the crop under a specified minimum area.
  2. He should have assured irrigation facilities.
- After assessing areas with good irrigation facilities, the Company will identify a progressive producer in the targeted area and with the help of him, will identify other producers with whom, they can make contract.
- The Company will approach such producers and make contract with them.
- The contract will be a written agreement, depicting the purchase price clearly. However, the contract is not legally tenable.
- The Company supplies critical inputs to the producers at cost.
- Later, the field officer from the Company will make periodic visits during the production period for regular inspection and will give all the necessary technical advice
- The producer should use the inputs that are supplied by the Company as per the specified schedule.
- The Company will strictly iuspect all operations.
- After the harvest of the produce, the producer should make primary grading on the farm itself and handover the entire produce to the Company, otherwise, he will be blacklisted and no contract will be made with him in future.

- The Company will procure the produce from the farm gate itself
- The Company will transfer the produce to the processing plant, re-grade it and assess quantity procured, grade-wise.
- The whole amount will be paid to the producer, within a week from date of procurement, through cheque.

Economics of contract farming

Many studies have shown that contract farming leads to the producer benefiting by way of technical support, increased yield, production of quality output and realization of assured price, all of which leading the producer to secure higher net benefits. The other benefit to the contract producer, which is generally ignored in accounting, is large saving on transaction costs. These costs are associated with acquisition of inputs, acquisition of information, communication and marketing.

Merits and demerits of contract farming

Merits of contract farming to the producer:

- Better quality, high yielding and disease resistant seeds/chicks
- Timely performance of production/cultural operations
- Better management due to timely and periodic technical guidance by the company
- Procurement of the produce from the farm gate leading to saving on cost of transportation.

Demerits of contract farming to the producer

- Realization of relatively lower price compared to the average market price prevailing at the time of harvest, in situations of increasing prices.
- Insistence on application of relatively higher doses of inputs which may affect net returns.

Merits of contract farming to the Company

- Assurance on availability required quantity before hand
- Can avoid high price risk during procurement
- Availability of quality output because of better output management

Demerits of contract farming to the Company

- Procurement of lower quantity than anticipated due to sale of output by the producers in open market.
- There are chances of reduction in quantity of quality output, than planned at the time of contracting.
- Higher price to be incurred in procuring the deficit quantity of output from the open market, without the assurance of quality.

Conclusion

- Contract farming is beneficial to producers as there is assured price and better crop management
- Contract farming provides resource poor producers access to technology and access to markets, both domestic and global.
- Legalizing the contracts is needed to avoid distress to the producers, without harming the interests of contracting companies.
- Contract farming may lead to more stable market prices thus benefiting other producers (who sell the produce in the open market) also.

MARKET INTELLIGENCE FOR FARM AND LIVESTOCK PRODUCTS

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Agricultural marketing can be defined as series of services involved in moving a product from the point of production to the point of consumption. Thus agricultural marketing is a series of inter-connected activities involving: planning production, growing and harvesting, grading, packing, transport, storage, distribution and sale. Such activities cannot take place without the exchange of information.

With the transformation of agriculture from subsistence to commercial production systems, farmers also needed more market orientation to succeed in business because commercial production is basically market - oriented. Only market orientation and market responsiveness could fetch better prices under the changed situation. Thus there is an increasing awareness that it is not enough to produce a crop or commodity; it must be marketed as well. In this aspect, production is only half battle won.

It is that wherever there is a market, an information network also co-exists. New market trends, consumer preferences, new suppliers or new markets can alter the nature and pattern of transaction. A single farmer while giving his entire time of planning production related activities single handed cannot keep track of the changing market or price signals. The relevance and need of institutional mechanisms to advise the farmer on such trade related aspects assume significance in this context because the trader is very organized, but the farmer is not.

Efficient market information can be shown to have positive benefit for farmers and traders. Up-to-date information on prices and other market factors enables farmers to negotiate with the traders and also facilitates spatial distribution of products from rural to urban areas and between markets. Most governments in developing countries have tried to provide market information services to farmers but these have tended to experience problems of sustainability. Moreover, even then they function; the service provided is often insufficient to allow commercial decision to be made because of time lags between data collection and dissemination. Very few farmers participate in commercial markets due to lack of access to market information and understanding as to how the market operates. The inability to access agricultural marketing information has denied most of the farmers, the opportunity to effectively plan and market their produce. Furthermore lack of access to market information is one of the contributing factors to the slow development of market opportunities. As a result a majority of the farmers are still trapped in vicious cycle of poverty characterized by low economic returns.

The basic objective of market information is to increase the awareness of the working of the market to the market participants. The market participants are farmers, trades and consumers. Farmers need information on what crop to grow, when to grow, when to sell and where to sell. The information that the trades need revolve around the returns that they receive from trading of a crop besides selection of market to sell. Analougously consumers too want information on what to buy, where to buy and when to buy. Such information helps policy markets also to bring in the needed changes with the government marketing policy.

Livestock sector

The importance of livestock to our national economy may be gauged from the fact that it contributes to over six per cent of national gross domestic product, a little over a third of the agricultural GDP and provides employment to about 8.5 per cent of the workforce. At over 500 million, India's livestock population is among the world's highest.

No wonder, the country is the world's top milk producer with 2009 output estimated at 110 million tonnes. Also, India produces about 55 million eggs, nearly 50 million kg of wool and over 2.5 million tonnes of meat.

The exciting part of the animal feed industry is the prospect of robust growth in the coming years. With rising purchasing power, population pressure, urbanization and changing food habits, demand for dairy and poultry products has been on an upward trajectory and is expected to remain so in the foreseeable future. While the dairy sector has recorded a CAGR of 3.5-4.0 per cent broiler (12 per cent), layer (6.3 per cent), marine fish (2.4 per cent) and fresh water fish (5.2 per cent) have shown robust growth in recent years.

Consumption of chicken

The current chicken consumption is under 3 kg per head a year and the poultry industry expects the consumption to double in the next five years. The Rs.40,000 crore domestic poultry industry produces 240 crore birds commercially every year. To cope with the doubling of demand by 2014-15 the industry will need to expand at a rate of 12-15 per cent annually.

Dairy sector

The reason for dairy becoming the most-sought after business is that there is a huge demand for milk in domestic as well as international markers. "Milk prices in the domestic market are growing at 20 per cent annum and the demand for milk is growing at 7per cent. Adulteration is such a big issue in front of the dairy sector in India, including the big brands, that there is huge market for good quality milk," Dairy has become an unpopular business in Europe and leading dairy nations like New Zealand and Australia. India will have to meet the international milk demand. The farm size and labour involved in dairy sector in Europe is declining, though their productivity is increasing. So the dairy industry from these countries will like to have cheaper milk from developing world". Currently only Saudi Arabia has huge cattle farms of sizes ranging between 5,000 and 25,000. The middle-class milk consumer is ready to pay more for quality milk, which has also attracted entrepreneurs to this sector.

Buffalo meat

India, the fourth largest buffalo meat exporter in the world, is looking to cash in on its price advantage to compete in the global market. The Rs. 7,000-crore industry has already set its sight on newer markets. Indian buffalo meat is currently exported to 64 countries. Apart from its traditional markets like Egypt, Malaysia, Syria and Jordan, the country also exports huge quantities to Turkey, Kuwait, Oman and Saudi Arabia. "We have opened new markets at Algeria," said a leading buffalo meat exporter.

Price forecasting for farm commodities

Price forecasts (pre-harvest) for maize, groundnut, sunflower and soybean for Andhra Pradesh are presented in Tables 1, 2, 3 and 4 respectively.

Table 1. Maize (Nizamabad Market)

ARIMA		Single exponential smoothing	Traders' price	Price Forecasted
2010 September	882	913	Rs.900-1000	Rs.900-950
October	888	913		
	010	MAPE 5.28		

Table 2. Groundnut (Kurnool Market)

ARIMA		Single exponential smoothing	Traders' price	Price Forecasted
2010 Nov	3132	3117	Rs.2600-Rs.2800	Rs.2700-2900
Dec	3152	3117		
Jan, 2011	3164	3117		
	001	MAPE 7.0		

Table 3. Sunflower (Kurnool Market)

ARIMA		Single exponential smoothing	Traders' price	Price Forecasted
2010 Sep	2692	2761	Rs.2500-2700	Rs.2550-2650
Oct	2635	2761		
Nov	2731	2761		
	011	MAPE 6.5		

Table 4. Soybean (Nizamabad Market)

ARIMA		Single exponential smoothing	Traders' price	Price Forecasted
Nov2010	2189	2019	Rs.1900 to 2100	Nov-1950
Dec	2184	2019		Dec-2183
Jan2011	2239	2019		Jan-2239
	111	MAPE 6.6		Feb-2256

Validation of price forecast

The details of validation of price forecasts are shown in Tables 5 and 6

Table 5. Validation of pre-harvest price forecasts (2009-10)

Crop	Date of release of price forecast	Sowing/ Harvesting	Period of forecast	Name of the Market	Forecasted Price Rs.	Real Time price Rs.	Validation percentage	Advise
Chillies	13-11-09	Pre-harvest	Nov-Jan 2010	Gunture	5000- 5300	5300-5700	98	Dispose the stock before January,2010
Sunflower	22-01-10	Rabi Pre-harvest	Jan-April 2010	Kurnool	2200-2300	2150-2250	98	Sell the seeds on harvest without going for storage
Groundnut	23-01-10	Rabi Pre-harvest	Jan-March 2010	Kurnool	2400- 2600	2200-2500	91.6	Dispose immediately after harvest

Table 6.Validation of pre- harvest price forecasts (2010-11)

Crop	Date of release of price forecast	Sowing/ Harvesting	Period of forecast	Name of the Market	Forecasted Price Rs.	Real Time price Rs.	Validation percentage	Advise
Maize	21-10-10	Kharif pre-harvet	Oct	Nizamabad	900-950	910-980	100.00	Dispose upon harvest
Ground nut	28-10-10	Kharif pre-harvet	Oct-Nov	Kurnool	2700-2800	2600-3080	98.31	Sell groundnut upon harvest
Sunflower	12-10-10	Kharif pre-harvet	Sep-Oct	Kurnool	2550-2650	2450-2970	96.43	Sell upon harvest
Soybean	28-10-10	Kharif pre-harvet	Nov- Dec-	Nizamabad	1950 2183	1700-2000 1900-2200	87.22	Store till January 2011

Market Inelligence For Livestock Products

A poultry owner in Namakkal, hub of egg trade, said in November 2010 that for the first time the price had not dropped despite healthy production. "The price of eggs on earlier occasions had fallen due to excess production. The current price tag, we hope, will remain stable for quite some time now," he said.

"Egg prices in Delhi and Kolkata during November 2010 were ruling at Rs 3 and Rs 3.21 a piece respectively. Whatever the eggs that are produced in the North, Andhra Pradesh, Maharashtra are consumed in northern States. This has created a vacuum in Kerala and Pondicherry. Demand from these States will be met by production in Tamil Nadu and Karnataka. "The improved market sentiment for table eggs has led to resumption in the new bird placements in the Namakkal region. We expect an average 25-lakh new chicks to be taken in very month by the farmers, some four lakh chicks more than what it used to be in the previous year," the chairman, NECC, Namakkal zone said. During the Sabarimala season that is till January 15, consumption of non-vegetarian food, including egg, is low in the South. Industry sources see the price cut as a move to pep up offtake. An NECC spokesperson told Business Line that the resistance to the soaring egg price had led to fears that the inventories would build up. "We cannot pile up the stocks as egg is a perishable commodity".

With torrential rains lashing the North and New Year demand kicking in, egg prices were set to rise further in the January 2011. Prices of poultry feed-a mix of soya meal and maize- have been on the rise in the last few months because of increase in exports of soya meal, industry sourees said. "Due to a sudden spurt in exports, the wholesale price of soya meal rose to more than Rs 18,000 at tonnes in December 2010 from Rs 16,100 witnessed in October," Namakkal and Palladam prices are the benchmarks for eggs and chicken respectively in the country. In December 2010, Sri Lanka decided to import up to 2,000 tonnes of chicken from India to meet short ages ahead of the Christmas holiday season. Sri Lanka produces about 9800 tonnes a month but there is a demand-supply gap of a million one-day old chicks and the India trade hopes to cash in on this mismatch.

Egg prices are unlikely to come down as the poultry feed prices have surged 30-50 per cent in the past two years. The cost of production of an egg works out to Rs 2.35 and farmers get somewhere around Rs 2.46. While supply has decreased, demand for eggs is consistent and has even increased as substitute for other more expensive sources of protein such as fish.

Currently, the global demand for the buffalo meat is rising in such a pace that it will outstrip supply soon. Factors like a possible demand surge in Europe fall in Australian meat production and low investments in the US meat sector make the prospects of Indian meat exporters very bright. "The competition will ultimately boil down between India and Brazil," he said. "However, India, which is exporting nearly five lakh tonne buffalo meat a year, shouldn't make any compromise on quality," President of All India meat and livestock exporters association added The county today has 25 most modern intergrated slaughter houses-cum-meat processing units. This apart, it also has 60 to 70 separate meat processing units. Coming to the market intelligence provided by Nokia, the six-month-old portal already has 2.5 lakh users in different States. It runs a ticker on egg, broiler and feed rates in various markets across the country." They charge Rs 2,000 a year to get daily updates on poultry prices. If opted for, they send updates on mobile phones,

LIVESTOCK PROJECT PREPARATION AND ANALYSIS

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Livestock farming in our country is now moving towards high level of intensification. In this context, the introduction of high yielding breeds which demand a high dosage of biological inputs such as concentrate feed and fodder, medicines, growth promoters etc. have increased the demand for money very tremendously. Since a majority of the farmers are engaged in small scale farming, they need money from outside sources to meet the cash, requirements for various farm operations. They obtain such additional funds in the form of loans from private moneylenders, cooperative credit societies, or commercial banks etc. For setting up any enterprise, the entrepreneur is expected to prepare a project report. It should be prepared in such a way that it presents all technical and economic information about the proposed enterprise so that credit institutions like banks can consider it for financing. Economic analysis of livestock farming systems consists essentially of measuring how adequate and how effective an existing farming system. It has been in achieving its planning objectives over some past operating phase (season or operating year). In the simplest case assumed here, the objective will be generation of maximum net income in money terms - either directly for market-oriented farms or indirectly by imputation of values for subsistence-oriented farms. Thus the livestock farming economic analysis will refer primarily to financial criteria and to factors directly underlying those criteria; it reduces largely to a systematic consolidation of the costs and returns which arise in various parts of the system - i.e., in the separate livestock enterprises or activities and in the whole-farm service matrix. The agricultural sub-sector of animal production is part of a complex interdependent farming system.

Analysis of livestock production cannot be based solely on input and output, but must also take into consideration of other farming activities. The interaction between animal production and other sub-sectors can be complementary, as in the use of manure; or competitive, as in the allocation of land to crops or livestock grazing. The farming system as a whole, and animal production in particular, is influenced by external factors (including government policy on rural development, livestock development programmes and marketing), which must be considered in any analysis or evaluation. The feasibility of Livestock and poultry projects are evaluated by investment analysis technique. Since investment entails the allocation of limited funds to competing uses, the basic principles of investment analysis are similar between projects. Investments are made during different time periods and the associated benefits were also spread overtime. Financial principles of project Investment analysis deal with the cost and benefit flows over time. The time value of money has to be basically taken into computation in the investment analysis of livestock projects. It explained the various techniques have been given for analyzing/ranking/comparing the livestock projects. The project report should have a brief introduction about the activity proposed, its potential, the present status in relation to the demand and supply and general infrastructural facilities available.

Objectives

The entrepreneur should mention the broad objectives of the proposed development, specifically mentioning the size of the unit, purpose of the unit etc.

Entrepreneur

The details of the name of the promoter, experience in the proposed activity and financial worth need to be mentioned. If it is a partnership firm or company, names of directors and their financial worth, share capital, by-laws and memoranda / articles of association need to presented to the financial institutions.

Location

Mention clearly the specific site and its total area, distance from the nearest town where major inputs are available and also distance from the bank's branch from where the applicant intends to avail of the loan. Also indicate the availability of water, electricity and all-weather road near the farm. In some cases, summer peak temperature and other climatic conditions need to be considered.

Civil structures

Indicate the floor space required for each item of civil works wherever possible. Give map drawings and estimates. Justify the need for provision of various items and their respective sizes. Provision of items like sheds, feed store, feed plant room, fencing, overhead tank, equipment store, office room, staff quarters etc., should be mentioned. Depending upon the size, total floor area for shed should be worked out and cost per sq. ft indicated.

Minor irrigation structures

Indicate the requirement of water for the farm and for fodder cultivation (in case of dairy). Based on the requirement and water yield potential, the number of borewells/dug wells can be indicated along with the pumpsets and pipeline. The detailed estimates/quotations need to be submitted.

Equipment

The equipment requirements vary depending upon the size of the farm and the end product proposed. It is desirable to give a list of equipment to be purchased along with their approximate number and price. The cost can be worked out on per bird/animal basis. Wherever possible, enclose quotation for equipment.

Availability of inputs

Indicate the various sources of availability of animals/birds, feed/fodder, medicines, veterinary care etc. The report should also mention the arrangements made by the entrepreneur for the procurement of the same. In case of veterinary aid, the distance of the farm to the nearest veterinary centre needs to be mentioned. Availability of veterinary services on farm can also be indicated.

Marketing

Indicate whether any specific marketing arrangements have been made for selling the produce. The farm gate price per unit need to be indicated.

Project outlay

On the basis of the size of the unit and the cost of the various items of expenditure, the total financial outlay of the project need to be worked out. It has to be grouped under fixed capital (Land development, Civil structures, Minor irrigation structures, Equipment and miseellaneous) and working capital (cost of animals/ birds; feed/fodder and miscellaneous costs).

Margin

Indicate how much of the total investment required for establishing the project would be borne by the applicant from his own resources.

Bank Assistance

The total project outlay minus margin gives the financial assistance required by the entrepreneur for the project.

Security

The nature and extent of security to be provided by the entrepreneur need to be indicated.

Techno-Economic parameters

The various technical and economic assumptions made for working out the income – expenditure statement are to be indicated. The assumptions should be reasonable and attainable. The various livestock units techno economic assumptions are detailed below

Initial investment

This is the amount invested in the beginning of the business. It is an one time investment which is useful throughout the economical life span of the animal. Cost of buildings, equipments and parent stock (animal / birds) are considered as fixed investment.

Fixed Costs

The costs, which do not vary with the level of output, are called as fixed costs. Generally, interest on investment, Depreciation, tax, annual maintenance/repair cost, cost of permanent labour and insurance cost are considered as fixed costs.

Variable costs

Those costs, which vary with the level of production, are called as variable costs. Eg: Cost of feed, medicine, electricity, wage of casual labour and day old chick cost in case of poultry farms are considered as variable cost.

Total Cost

This is the sum of total fixed cost and total variable cost.

Methods and Criteria for Cost Calculation

The cost of production can be seen from various angles. The inputs may be external (Non-Factor costs) or internal (Factor costs). Internal input is under the control of the farming household, and includes land, labour, management and capital. The cash involved in production represents either Cash (Paid) Costs or Non-Cash (Calculated) Costs. Another way to categorize the costs is to distinguish Variable Costs from Fixed Costs. Variable costs rise and fall with the size of the output and the level of the operation. Variable costs (for items such as feed, vaccine and casual labour) can be controlled to some extent and are not incurred when there is no production. Fixed costs (for items such as taxes, insurance, interest, and depreciation on buildings and equipment), are incurred whether or not there is any output.

Poultry produce eggs, meat and manure. When calculating the cost-price per unit of production, the cash value of the by-products (sold externally or used as a substitute in another enterprise/subsystem of the farm), must be subtracted from the Total Gross Costs. This will result in the Total Net Costs. For the cost-price per unit of production, the Total Net Costs must be divided by the total number of units of production.

The cost-price calculation model splits production costs into two categories: Paid Costs and Calculated Costs. Paid costs involve actual payment in cash or kind for inputs or services used. Calculated costs are determined using mathematical formulae, and include the following:

- depreciation on the poultry house and equipment;
- interest on cash in hand and personal capital used to construct the poultry house and purchase equipment, birds and feed;
- maintenance of the poultry house and equipment; and
- labour supplied by the farm family.

By making use of locally available and renewable materials for poultry housing and equipment, family poultry producers minimize the introduction of external capital into their enterprise.

Large-scale poultry production cannot really be compared with smallholder family poultry, because smallholders often face such constraints as the absence of organized marketing systems and the lack of price rewards for produce quality and uniformity. Therefore, the cost-price calculation for large-scale poultry production (and also that for free-range commercial poultry production) may not be applicable to smallholder family poultry systems without modifications.

Returns

The major sources of return in livestock and poultry farms are from sale of milk / egg / meat, sale of manure, culled birds and gunny bags.

Net Return

Net Return = Total or Gross Return – Total or Gross Cost

Repayment period

Prepare a repayment schedule, giving details of income, expenditure and gross surplus for every year. The net surplus is worked out after deducting the loan instalments and interest on long-term loan to be paid back to the bank from gross surplus. The statement should be for a period within which the loan and interest will be paid back. Normally loan and interest recovery are fixed on a quarterly basis.

Type of loans

Loans that a farmer requires may be classified on the basis of time like long term, medium term and short-term loans.

a. Long term loans

These loans are generally given for a period of more than 7 years but not more than 20 years. Long term loans are required to purchase lands, to erect farm buildings, orchards etc.

b. Medium term loans

These loans are given for a period of more than 18 months but not more than 7 years. These loans are required to purchase livestock, equipments and machinery. They are called investment loans.

c. Short term loans

These loans are given for a maximum period of 18 months. These loans are also known as seasonal loans or production loans. They are needed to meet the working capital requirements of the farm.

Methods of repayment of loans

Four methods are commonly used.

Straight end repayment or lumpsum repayment

The entire loan is paid up on the expiry of the term but the interest on the loan is paid each year.

Partial repayment or variable repayment

A part of the loan together with a part of the interest on the loan is paid up every year. But the aggregate of the principle amount repaid every year is not large enough to cover the total loan, with the result that a large balance remains to be paid. This balance is to be paid up on the expiry of the period.

Amortized even repayment

An equal amount is repaid every year. This includes a larger proportion of the principal and a smaller amount of interest in each succeeding installment of payment. The method of repayment is suitable when income is likely to flow at a constant rate throughout the period.

Amortized decreasing repayment

The amount of the principal remains constant and the share of interest declines with every installment of repayment. Thus, the annual payment becomes smaller every succeeding year.

Financial analysis

Based on the assumptions, income-expenditure statement for the project is to be worked out to find out surplus income available to meet the repayment obligations. Further, estimating internal rate of return can be attempted at. It is the process of identifying the financial strength and weakness of the firm by properly establishing relationship between the items of the balance sheet and the profit and loss account. Ratio analysis *is the powerful tool of financial analysis for decision making.*

Types of Ratios

$$\text{a) Current ratio} = \frac{\text{Total Current assets}}{\text{Total Current liabilities}}$$

It is a measure of short-term solvency of the farm. This ratio indicates the liquidity of the farm. A ratio of more than one indicates a favourable run of the farm business.

$$\text{b) Acid – test ratio or Quick ratio} = \frac{\text{Current assets- Inventories}}{\text{Current liabilities}}$$

(Inventory generally refers to output stock)

This ratio reflects the adequacy of cash and income surpluses to cover all current liabilities during the period of one year.

$$\text{c) Leverage ratio or Debt – Equity Ratio} = \frac{\text{Total debts}}{\text{Net worth}}$$

It measures the financial risk and firm's ability of using debt for the benefit of investors. It indicates the farmer's immediate financial obligations against the net worth. Lower the ratio better the soundness of business.

$$\text{d) Intermediate or working ratio} = \frac{\text{Total Current Assets + Total Intermediate Assets}}{\text{Total Current Liabilities+ Total Intermediate Liabilities}}$$

It gives the indication of soundness of business in the intermediate period. This ration should be more than one.

e) Net Capital ratio = $\frac{\text{Total Assets}}{\text{Total Liabilities}}$

It indicates the long-term liquidity position of the farmers. A consistently increasing ratio over the years reveals the sound financial growth of farm business. It speaks about solvency.

f) Debt Service Coverage Ratio

Banks require DSCR 1.2. It should be more than 1 means the property is generating enough income to pay debt obligation.

DSCR = Net operating income / Total debt service (or)

= Monthly net income / monthly principal and interest payment on loan

Project Appraisal

The livestock project appraisal techniques are broadly classified under two heads namely, Undiscounted measures and Discounted measures.

Undiscounted measures

They are the simple methods of ranking livestock projects. The three important undiscounted measures are

a) Pay back period

b) Proceeds per rupee of outlay

c) Average annual proceeds of rupee outlay

a) Pay back period

Pay back period is a simple technique of ranking projects based on the actual period of time in which one can get back total investment.

$$P = \frac{I}{E}$$

Where, P is the pay back period, I is the total investment made in the project and E is the net cash revenues / net revenues per annum.

b. Proceeds per rupee of outlay

This is measured by dividing the total proceeds by the total investment. The projects are ranked by the *highest magnitude of the parameter.*

$$\text{Proceeds per rupee of outlay} = \frac{\text{Total proceeds}}{\text{Total investment}}$$

c. Average annual proceeds of rupee outlay

This method is another method of choosing between the projects and measured by the following formula

$$\text{Average annual proceeds of rupee} = \frac{\text{Total proceeds / life span of project}}{\text{Total investment}}$$

The projects are estimated by the magnitude of the estimate.

The major draw back of the undiscounted measures is that for the same data of the project, we will get different rankings. Thus undiscounted measures are inconsistent and incompatible in ranking.

Discounted measures

Here the cash flows which are accrued in the project are discounted with an appropriate discount rate. Generally, the existing interest rate is taken as discount rate for this purpose. The discount rate cash flows are the best estimates to measure the worth of the projects. The following three important discount rate measures are,

a. Benefit Cost Ratio (BCR)

$$BCR = \frac{\sum_{t=1}^{n} B_t/(1+r)^t}{\sum_{t=1}^{n} C_t/(1+r)^t}$$

B_t=Net benefit in a year, C_t= Net cost in a year, r =Rate of interest, t=Time period

b. Net Present Worth (NPW)

$$NPW = \sum_{t=1}^{n} B_t/(1+r)^t - \sum_{t=1}^{n} C_t/(1+r)^t$$

c. Internal Rate of Return (IRR)

The discount rate which makes the net present value of an investment project equal to zero. This is a widely used method of investment appraisal as it takes into account the timing of cash flow.

$$IRR = \sum_{t=1}^{n} B_t/(1+r)^t - \sum_{t=1}^{n} C_t/(1+r)^t = 0$$

$$\textbf{IRR} = \text{Lower discount rate} + \text{Difference in discount rates} \left[\frac{\text{Present worth of cash flow at lower interest}}{\text{Present worth of cash flow at both the discount rates}} \right]$$

$$\text{Present worth} = \frac{\textit{Future value}}{(1+r)^t}$$

For a viable project, it should have a BCR of greater than one at the opportunity cost of capital and a NPW of greater than zero at the opportunity cost of capital and the discount rate for IRR should be greater than the opportunity cost of capital.

Debt Service Coverage Ratio (DSCR)

Debt Service Coverage Ratio (DSCR) is a ratio to measure a property's amount of available cash remaining after servicing the loan payments. In addition to LTV, DSCR is the other loan constraint in any real estate transaction. It is calculated as:

DSCR = Net Operating Income

Annual Loan Payments

Example 1: Suppose an investor owns a property with an NOI of Rs.500,000. The annual principal and interest payment for his loan is Rs.370,000. The DSCR would be:

$$\frac{\text{Rs.500,000}}{\text{Rs.370,000}} = 1.35x$$

This result means that the property produces a net operating income 35% greater than what is required to pay the loan.

Rs.500,000 – Rs.370,000 = Rs.130,000

$$\frac{\text{Rs.130,000}}{\text{Rs.370,000}} = 0.35 \times 100 = 35\%$$

This additional income can be used by the investor as a return on his equity investment or for additional investment into the property. When a loan has an NOI that is equal to the annual loan payment, it is considered to be at breakeven. This means that the property is operating only enough to cover its loan obligations. When a property has an NOI that is below the annual loan payment, it is considered to be operating below breakeven.

Dairy enterprise economics

Dairying in India has wide variations in productivity and production systems across regions due to the differences in agro-climatic, socioeconomic and political features. Thus dairy farming is mostly done by part time farmers who depend on off-farm income for their livelihood. However, the farms with 4 dairy animals are able to make a living above poverty line. Cost of milk production is relatively lower in the farms with access to land than the landless farmers. Costs per unit and net returns in a dairy enterprise are highly dependent on the level of milk production. Production levels vary for a number of reasons such as livestock genetics, weather, input levels, and management. Budgeting at multiple production levels can help producers examine the financial risk of a livestock enterprise that is directly related to production risk. Dairy cows require high quality forage and grain. Concentrates and grain requirements increase as milk production increases. Efficiencies of this magnitude indicate that the value of increased production generally will offset the added feed cost associated with the higher production levels. Producers receive income primarily from the sale of milk. Additional income is received from the Market Income Loss Contract (MILC) payment if national prices are below a target level, sale of calves and culled breeding stock. However all the farms could generate a positive farm income out of dairying and most of them make a return to labour that is similar to the wage level. Inter regional variations in costs of milk production is smoothened out by the differences in land and wage rates and productivity.

Heifer Economics

Dairying with crossbred cattle and high yielding buffaloes has become a remunerative business. Studies have shown that dairy enterprise as against crop in rural areas is on the top with regard to profit in marginal, small and medium holdings ,also that dairying and crop production together for small farmers having irrigated land was more profitable than crop farming alone. Nucleus for this dairying is heifer raising. Today's successful dairy operation recognizes that heifers are an important investment in the future. They place high value on the heifer and regard it as a managed resource, whether raised on the farm or contract grown. Unfortunately, on many farms, the dairy heifer is the most overlooked and under managed asset on the farm. The main goal for managing replacement heifers is to freshen them between 22 and 24 months of age to reduce expenditures and to increase total milk production. This can be accomplished through good nutrition and sound animal management practices.

Economic Awareness

The costs involved in raising heifers should be an important issue for dairy farmers. Replacement animals typically account for 15 to 20 percent of milk production costs. Replacement heifers rank as the second or third largest component of production costs after feed and possibly labor on most dairy farms. These costs can vary from farm to farm depending on individual management strategies.

The cost of raising heifers is influenced by two main concerns, management and economic. The management concerns are: Herd morbidity and mortality rates and Age at first calving and herd replacement rates. The economic concerns are: Ownership costs and Operating cost. It is important for farmers to understand the total costs involved in raising dairy heifers. In order to operate a successful enterprise it is necessary to know the current costs in order to predict future costs.

Ownership costs

Ownership costs include buildings, equipment, property, machinery, and depreciation, interest on investment, repairs, taxes, and insurance. Many of these things that may seem obvious to the owner may get overlooked. Care should be given to include all ownership costs when evaluating a heifer-raising program. Each ownership cost adds significantly to the overall cost of raising a heifer.

Operating costs

Operating costs include feed, labor, bedding, utilities, veterinary care, breeding costs, and supplies. These vary nearly proportional to the number of heifers raised at one time. With good record keeping most variable costs are easily understood and calculated. The costs are separated by the following age periods: birth to weaning, weaning to 6 months, 6 months to first bred and bred to pre freshening. Calculating costs in this manner provides managers the ability to evaluate areas of strength and weakness within their heifer-raising program. Feed costs usually constitute 60 per cent of the total overall expense to raise heifers. The most expensive age period in feed cost per heifer is birth to weaning. This is due to the large labor and feed costs per animal. Labor costs calculate the time required raising a heifer. Every aspect has some cost associated with it, in this instance, the cost of time. Labor costs are the second highest expense in raising a heifer, around 13 per cent of the total cost. Breeding costs includes both artificial insemination and the use of a service bull. The use of a service bull is not a cheap breeding source.

Mortality and interest costs calculate the opportunity cost of raising a heifer. Mortality cost is associated with the loss of the investment, while interest cost is the opportunity cost of having capital invested in a heifer versus the bank. These two cost estimates are the most overlooked items when calculating heifer-raising costs. Expenses that are difficult to estimate include water, power, fuel for equipment, and time to transport or move heifers. Thus, when calculating the cost to raise a heifer it is advisable to incorporate a miscellaneous cost figure that can cover these costs.

Commercial Mutton/ Chevon Production

Commercial mutton/Chevon production programme can prove as a boon to meat industry. The major advantages of this are that sheep/goat owners can rear the animals only for about 3 months and not for the whole year. Further he will get the handsome profit after 3 months and this profit would be at par or even more than the lambs/kids are reared for 12 months under extensive grazing system. By considering all the inputs required for raising the lambs to attain finishing weight it is estimated that net profit of about Rs.680 per animal on slaughter basis and Rs.445 on live weight basis can be obtained. This technology would be helpful to the clientele for reducing the time from 12 to 5 months in getting almost the same profit per animal in addition to avoiding the mortality risk and unnecessary rearing of lambs for whole year.

Particulars of Expenditure

Approx. cost of 2 months old lamb (@Rs.90/- per kg live weight, for weaning weight 11.00kg)	Rs.990.00
Fattening cost (25kg live weight, Required body weight gain =14.0, Av. F.E = 18.7% or 5.35 Kg feed required for 1 kg gain in body weight, total feed required 14.0 X 5.35 74.9kg, (cost of feed @Rs.8.00 per Kg)	Rs.600.00
Labour cost (Rs 75/-per day for 90 days, one labour for 150 lambs)	Rs. 45.00
Health cover	Rs. 20.00
Interest on capital investment per lamb	Rs. 150.00
Rearing expenditure on each lamb Total	**Rs.1805.00**

Particulars of return through slaughter

Meat @Rs.180per kg (12.5 kg meat, Dressing % = 50)	Rs. 2250.00
Skin	Rs. 50.00
Head, Hooves and offals	Rs. 100.00
Manure	Rs. 25.00
Stomach / Intestine	Rs. 50.00
Lungs	Rs. 10.00
Return per lamb	**Rs. 2485.00**
(-) Expenditure per lamb	**Rs. 1805.00**
Net profit per lamb	**Rs. 680.00**

Income through sale of live animals

Return per lamb (25Kg @ Rs.90/Kg)	Rs.2250.00
Expenditure per lamb	Rs.1805.00
Net profit per lamb	**Rs. 445.00**

Commercial Rabbit Rearing

Rabbit meat production is more economical than other meat animals. Rabbits are best known prolific herbivores which efficiently convert fodder to food. Farm raised rabbit is low in cholesterol, slightly sweet meat

with a closely textured with very high protein. Rabbit is an alternative to chicken with the additional advantage that it is commonly raised without the use of hormones or steroids. They are being raised in different farming system like backyard rabbitry (1buck+3doe with yield of 1kg meat per week), small scale rabbitry (4+10 with sale of 120 kids Rs 14,400 per year), Medium scale rabbitry (50+100 with an income of Rs1.5 lakh per year) and Large size rabbitry with industrial size.

Commercial pig farming

Among the various livestock enterprises, piggery farming is most potential source of meat production and pigs are more efficient feed converters. Apart from providing meat, it is also a source of bristles, manure and supplementary income to improve the rural farmer's living standards. Pig farming provides quick returns since the marketable weight of fatteners can be achieved with in a period of 6-8 months. The approximate unit cost required for 10 sows and 1 boar is Rs.1,90,000/ with an total income of Rs.2,50,000/year (Sale of male piglets Rs.1,35,000/ and Sale of female piglets Rs.1,10,000/, Manure and Culled sow Rs.5,000/) and total expenditure of Rs.1,40,000/year. The marketable products of the piggery farming include the piglets as breeding stock, piglets as fatteners, marketable fatteners and culls. The marketing avenues for the above products are like satellite fattening farms / breeding cum rearing farms and pork consumption centers. In order to promote the consumption of pork it should be supplied to the consumers in an attractive form. Therefore availability of either slaughtering facilities or bacon factories are to be ensured to convert the fatteners into wholesome pork and their products.

Commercial Layer and Broiler Farming

The per bird capital investment was quite large on egg production farms as compared to broiler farms. The per bird capital investment was Rs.164.82 and Rs.33.03 for layer and broiler, respectively. About 70 per cent of the total fixed investment in layer group and about 90 per cent of investment in broiler at overall level was in the poultry house. In the total costs, share of feed cost was maximum on all categories of farms. It was about 65 per cent on layer farms and about 50 per cent on broiler farms. From the analysis of costs and returns per 100 birds, it was observed that, on layer farms the cost was Rs.31070.21, gross income was Rs.37630.64, showing net returns of Rs.6560.43. It is concluded that a layer bird can give a net profit of Rs.27.55 per year or Rs.2.29 per month. As the farm size increased, the net returns per 100 birds also increased. The input – output ratio was 1:1.22, 1:1.44, 1:1.82 and 1:1.79 for layer, broiler and overall, respectively. All the categories of selected poultry farms were running in profit. The per farm average egg production per layer was 278 eggs per cycle, while the average live weight per bird was observed at 1.401 kg for broiler. The major problems were output price fluctuation and high prices of feed. It is suggested that poultry owners should form a co-operative society and start their own poultry feed plant.

Mixed Farming

Crop and Dairy Enterprises

In crop and dairy enterprises mixed farming, the annual income increased from Rs.67,875 to Rs.2,15,091 across different size groups and the share of crops and milk enterprises was 73 and 15 per cent, respectively. The employment generated per family was 381, 452 and 450 man days in small, medium and large farms, respectively. The share of employment on own farm from crop production and milk production ranged from 37 to 55 per cent and 23 to 30 per cent, respectively. This has imply that crop and dairy enterprises provide additional income and employment and support the farmers in the case of adversity or failure of either one or another enterprise.

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E-BUSINESS

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The Internet is a powerful channel that presents new opportunities for an organisation to Touch Customers, Enrich products and services with information and to reduce costs. E-business or Electronic business is the organised effort of individual to produce and sell, for profit, the products and services that satisfy society's needs through the facilities available on the internet. It is also described as any form of electronic business run on the internet, or utilizing internet technologies to improve the productivity or profitability of a business which utilizes a computer. The most common implementation of e-business is as an additional, or in some cases primary, storefront. By selling products and services online, an e-business is able to reach a much wider consumer base than any traditional brick-and-mortar store could ever hope for. This function of e-business is referred to as e-commerce, and the terms are occasionally used interchangeably.

An e-business may also use the internet to acquire wholesale products or supplies for in-house production. This facet of e-business is sometimes referred to as e-procurement, and may offer businesses the opportunity to cut their costs dramatically. Even many e-businesses which operate without an electronic storefront now use e-procurement as a way to better track and manage their purchasing. E-Business is about understanding the potential of new technologies in your market and in your supply chain and then reorienting your business to implement your vision, and implementing it quickly enough to minimize the threat from competitors if you are defending your market share, or fast enough to take advantage of the opportunities if you are aggressive about growing market share.

E-business goes far beyond e-commerce or buying and selling over the internet, and deep into the processes and cultures of an enterprise. It is the powerful business environment that is created when you connect critical business systems directly to customers, employees, vendors, and business partners, using Intranets, Extranets, e-commerce technologies, collaborative applications, and the Web. Successful new-businesses can emerge from nowhere. Trends suggest it takes little more than two years for a start-up to emerge out of nowhere, formulate an innovative business idea, establish a web-presence and reach a dominant position in its chosen sector. The high valuation of the stocks of such start-ups and the massive amount of venture capital flowing into their businesses is proof enough that complacency is foolhardy here.

In the past the rules of business were simple – Beat the competition, squeeze your suppliers and keep your customers in the dark. But with increased collaboration in the completely networked world, uncertainties arise. Nobody can predict how the customer with all the perfect market information available at his disposal will respond to the rapidly shifting business alliances and federations or how companies will manage such customers. The need of the hour is a good strategy. Early e-commerce companies have used their understanding of the technology's potential and the absence of any competition to steal a march and enter markets that would previously have been closed to them, but in future simply having a good business idea and being technologically smart might not be enough. The global giants, after taking a while to see the opportunity seem to have worked out how to adapt their multi-layered supply chains and diverse distribution channels and are finally getting into the race.

In the past few years, virtually all businesses have become, to some degree or another, an ebusiness. The pervasiveness of internet technology, readily available solutions, and the repeatedly demonstrated benefits of electronic technology have made ebusiness the obvious path.

E-Business is changing the way we do business; at every step in the value chain (initial benefits for manufacturing firms will focus on the supply chain, which is the chain of activities from procuring raw materials, manufacturing the product to finally distributing it). It even beats EDI (Electronic Data Interchange) at its own game: EDI lowered transaction costs making feasible the rapid exchanges of orders in a just in time environment. E-Business lowers transaction costs to the point where entire new classes of customers and services are profitable. EDI is expensive to set up, and was only used by large companies with their regular business partners; it required a very high level of volume to make sense. E-Business is cheap, has hundreds of millions of participants already, and reaches into everything a business does. Another key change is people: the workforce is now full of people who are much more familiar with advanced technology than twenty years ago.

- Electronic data Interchange (EDI) is a computer-to-computer exchange of invoices, purchase orders, price quotations and other sales information.
- Extranets – offer an efficient way of business to collaborate with vendors, partners and customers.
- Private exchanges are the next generation of extranets where all types of data related to e-business is shared.
- E- Commerce is a part of e-business and is the term used to refer only to the buying and selling activities online including when a firm uses the internet to identify suppliers, select products or services, make purchase commitments, complete financial transactions and obtain services.

E-Business Models

An e-business model is simply the approach a company takes to become a profitable business on the internet. There are many buzzwords that define aspects of electronic business, and there are subgroups as well, such as content providers, auction sites, and pure-play internet retailers in the business-to-consumer space. The greatest strength of the internet is its ability to bring together people, governments, and businesses and facilitate the flow of information among them. This is one of the main reasons why business models for business-to-business online marketplaces are expected to succeed.

Business to Business - it is that business activity in which two firms or business units make electronic transaction in which one can be a producer firm and other are raw material supplier firm.

Business to Consumer – it applies to any business that sells its products or services over the internet.

Consumer to Business – it applies to any consumer that sells a product or service to a business over the internet.

Consumer to Consumer – it applies to sites primarily offering goods and services to assist consumers interacting with each other over the internet.

	Business	**Consumer**
Business	B 2 B	B 2 C
Consumer	C 2 B	C 2 C

Business to Business

Electronic market place (e-market place) interactive business communities providing a central market where multiple buyers and sellers can engage in e-business activities.

Business to Consumers

Common B2C e-business models include

e-shop - a version of a retail store where customers can shop at any hour of the day without leaving their home or office.

e-mall – consists of a number of e-shops; it serves as a gateway through which a visitor can access other e-shops.

Consumer to Consumer

Online auctions

Electronic auction (e-auction) – sellers and buyers solicit consecutive bids from each other and prices are determined dynamically.

Forward auction – sellers use as a selling channel to many buyers and the highest bid wins.

Reverse auction – buyers use to purchase a product or service, selecting the seller with the lowest bid.

Consumer to Consumer communities include

Communities of Interest- people interact with each other on specific topics, such as golfing and stamp collecting.

Communities of relations- people come together to share certain life experiences, such as cancer patients, senior citizens and car enthusiasts.

Communities of fantasy – people participate in imaginary environments, such as fantasy football teams and playing one-on-one with Michael Jordan.

E-Business Markets

The emerging e-business market affords companies of all sizes and types, the opportunity to leverage their existing assets, employees, technology infrastructure, and information to gain or maintain marketshare. For example, in the telecommunications industry, service, rather than technology, is now the key differentiator. With lower barriers to entry, new competitors are rapidly entering the market offering new services, such as online bill presentment and payment, and leveraging their unique digital assets.

Web sites and intranets are designed for the same reason—to provide information. In the business world, this information needs to be updated and changed constantly in order to stay abreast of a changing business climate. New product releases, price changes, and marketing promotions are just a few examples of information that companies need to constantly provide to their customers, suppliers, employees, and shareholders. In today's world of e-commerce and intense corporate competition, companies need the ability to instantly update published information in order to effectively communicate with their intended audience. Today's companies know that they have to have a dynamic and interesting Web presence, but they are struggling to find ways to effectively manage their internet strategy. Traditional advertising agencies and Web development firms are no longer meeting the all-encompassing internet requirements necessary for businesses in today's e-commerce-driven marketplace. Companies are looking for advertising agencies and Web development firms that address their initial Web development needs while also providing them with viable, affordable solutions that are designed to address, implement, and manage their overall internet strategy.

Finally, historically, companies outsourced the development of their Web sites because creation and maintenance required design and programming expertise. However, relying on third parties for all site maintenance limited a company's ability to quickly and easily update their published information. To solve this problem, many companies decided to bring Web site and intranet development in-house. Companies then discovered that hiring the necessary skilled personnel contains its own set of inherent problems. Information "bottlenecks" still occur when a company has one or two people in the internal IT department who are bombarded with the responsibility of publishing all company information. In addition, companies are also finding that Web

site designers are hard to find and even harder to keep. The recurring theme in the market is that companies are recruiting individual Web designers to build and maintain their Web sites and intranets in-house only to find that after several months of development, the designer may be lured away by the promise of a more exciting and rewarding career.

Capabilities and Benefits of E-Business

Global reach: Goods and services can be sold to customers worldwide.

Personalization: Companies can customize products and reduce inventory.

Interactivity: Customers and suppliers can negotiate prices online.

Right time and integrated marketing: Online retailers provide products when and where customers want them and promotions can be directed to individual customers.

Cost savings: E-business can reduce costs.

Lower prices: Many products cost less online. Internet allows customers to easily compare prices from multiple sellers.

Convenience: Can order products from around the world anytime, day or night. Can register customer information to streamline transactions.

Personalization: Emphasis on personalized, one-to-one marketing to increase repeat purchases.

Developing Safe Online Payment Systems

1. Through encryption, data is encoded for security purposes.
2. Many companies use Secure sockets layer (SSL) technology to encrypt information and verify senders and receivers.
3. An electronic wallet contains credit card and identification information. Customers can avoid retyping purchase information.

STRESS MANAGEMENT – TECHNIQUES FOR INCREASING THE EFFICIENCY OF SCIENTISTS

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Human beings have many biological, psychological and social needs. When these needs are not satisfied they experience stress besides the needs take and many challenges in human life and they are likely to produce stress. Stress in general and occupational stress in particular is a fact of modern day life that seems to have been on the increase. The increasingly demanding nature of our jobs has also increased pressure levels dramatically. Occupational stress has become one of the most serious health issues in the modern world. Many scientists and executives of our Indian continent are working much below their capacity due to stress consequently majority of enterprises are incurring huge losses.

Stress Mechanism

The physical meaning of stress when applied to material is pressure. The term used in physics to mean stress, pressure or force on a system. When applied to human beings it indicates the pressure on muscles and its reaction. The internal pressure could create tension or relaxation of muscles depending upon the nature of pressure whether it is pleasurable while negative stress is painful. The application of pressure on the muscles of body is through a process involving body and mind. The emotional disturbance arising out of negative stress induced within the individual alters body chemistry. This chemical change results in emotionality induced illnesses. Negative stress which alters body chemistry initiates wearing out process within the body. This process also lowers the immunity levels in the biological system. Hence an has been made in this paper to develop skills for identifying the strengths and weaknesses of self and others.

Stress and stressors

Stress is taken to mean a fairly predictable arousal of psycho physiological (mind – body) systems which, if prolonged can fatigue or damage the system to the point of malfunction and disease. Any external events or internal drive which threatens to upset the organism equilibrium is stress. Stress is not itself an illness but it is a condition that can give rise to very real illness. Stress, in general, can be defined as the reaction of individuals to demands (stressors) imposed upon them. Occupational stress, in particular, is the inability to cope with the pressures in a job because of a poor fit between someone's abilities and his/her work requirements and conditions. Integrated approach of Bio-psycho-social system is found to be necessary to fully utilize the capacity of Vets in organization. Stressors (job-related and extra-organizational) are objective events, stress is the subjective experience of the event, and strain is the poor response to stress.

Micro-stressors

Hundreds of different stimuli will be evolving responses every instant. Most of the stressor in daily life of executives is mild requiring little effort for adjustment. Usually we are unaware of many micro-stressors which confront us for a short period. For instance, sound, smells, tastes, temperatures, etc., do not call for grates effort for adjustment. However, if he is subjected to repeated exposure to these micro-stressors negative effect of their cumulative impact will he felt.

Macro-stressors

Macro-stressors may be acute stressors or chronic stressors. Acute macro-stressors are those which last for relatively short time. while chronic macro-stressors comfort the executive continuously over long periods of time. Intense pressure such as unexpected transfer from one place to other place is an acute macro stressor – and living with unhappy family relationship is a chronic macro stressor.

General Causes of Stress

There are innumerable numbers of stressors and those can broadly be categorized into the following three general classes on the basis of the external nature of the stressor, i.e. upon the fundamental basis or cause of the stress reaction.

Negative stress

Even though scientific advancement had solved many problems, in turn it had also created its own problems. At present mankind is confronted by multitude of crises like over population, environmental pollution, food shortage, raw material shortage, continuing inflation, increased terrorism etc. The struggle to survive involves trying to maintain good health, emotional stability, a sense of identity and harmonious inter-personal relations. The sources of pressure are on account of social, economical, technological and psychological forces. Loneliness in big cities, frequent changes in employees, marital conflicts, feelings of rejection by group, a complex job with too many things to do every day are some of the examples. In fact, the potential danger arises from the accelerated changes that have taken place within the past 25 years is during the life span of single generation. Recent survey conducted by New York University covering more than 1000 men and women of ages between 18 to 80 years revealed that the greatest source of stress was on account of changing attitndes of society towards sex including sexual permissiveness and the new social roles of sex.

1. Psychological causes

These stressors are a function of the complex interaction between social behavior and the way or senses and our minds interpret those behaviors. In other words, such of our societal stress is determined by the meanings that we assign to the events in our lives. Different individuals are likely to interpret differently, or to assign different meanings to the same situation. This explains why each person's pattern of societal stress is unique.

2. Bio-ecological causes

These stressors basically are biologically related and may arise out of our relationship with our environment. This group includes biological rhythms, nutrition and noise as bio-ecological stimuli which are capable of contributing to the distress that a person experiences in day to day existence.

3. Personality cause

These reflect the dynamics of an individual's self perception and characteristic attitudes and behaviors which may somehow contribute to excessive stress.

Personality traits and stress

Distinct personality traits distinguish executives on the basis of their ability to handle their own stress. Psychologists have identified the executives with the following traits as 'A' type.

1. They have a tendency to do many things in too little time.
2. They have free floating hostility

3. They are irritated by trivial things
4. They exhibit signs of struggle against time.
5. They work longer hours and aim at perfection.
6. They drive hard and strive to gain the respect rather than appreciation of others.
7. They are always on time to keep up appointments
8. They frequently respond as if they are in an emergency or in a threatening situation.
9. They will be releasing more fat into their blood stream which is likely to be deposited around the heart leading to heart attacks.

The traits leading to high health risk of 'A' type are indicated below:

- More fear of self expression
- An intensive sense of time urgency
- Dissatisfaction with the environment
- Lack of coordination with self
- Lack of cordial relations with others
- Expression of more boredom frequently
- Lack of clarity of goals
- *More suspicion that they are not receiving their due for their efforts*
- Lack of single mindedness of purpose
- More job insecurity
- A tendency to get involved in multiple and diverse type of talks at the same time
- More dissatisfaction with the process of job
- More dislike towards colleagues
- Aggressive in interpersonal behaviour
- Frequently taking more alcoholic drinks or tranquilizers to reduce their anxiety.
- Using sleeping pills regularly
- Heavy smoking
- Tendency to nag subordinates frequently

In contract to the above, 'B' type will have the following traits:

1. They are not driven by the clock.
2. They are not preoccupied by social achievement.
3. They are patient
4. They are able to take time to appreciate leisure and beauty
5. They are in peace with themselves
6. They understand the environment and live in harmony with the environment

7. They are people – oriented leaders
8. They have clear goals.
9. They have cordial relationship with subordinates, poors and superiors.
10. They have a peaceful atmosphere in home front also. T
11. They believe in the growth potentiality of self and others.

'B' type is more suited to hold highest positions in the organization which require broader and more sensitive thinking.

Sources of occupational stress

Among life situations, the workplace stands out as a potentially important source of stress purely because of the amount of time that is spent in this setting.

Common organizational and individual stressors could be classified into five groups: (1) organizational practices (performance reward systems, supervisory practices, promotion opportunities), (2) job/task features (workload, work pace, autonomy), (3) organizational culture/climate (employee value, personal growth, integrity), (4) interpersonal relationships (supervisors, co workers, customers), and (5) employee personal characteristics (personality traits, family relationships, coping skills).

Consequences of negative stress

An executive under the influence of negative stress will be frustrated and de motivated. He tries to protect himself from the effects of negative stress by refusing to meet the challenge of work situation as he is over taken by the distortions in his perception. There are serious consequences on account of his above defensive behaviour as listed below:

Reduced productivity, Increased errors, High rate of turnover, Increased absenteeism, More number of accidents, Increased sick leave, Increased union activity, High rate of rejects in the production, Complaining of high standards set, Indiscipline, Heavy criticism about the management, Complaining of inadequate facilities, Complaining of improper tools, Complaining of much pressure from top, Complaining of improper leadership qualities of boss, In group formation, Feeling that the job does not provide stimulation and Carving for external stimulants to reduce his fear and anxiety.

Consequences of occupational stress can be grouped into those on individual and those on organizational level. On the individual level, there are three main subgroups of strains

1) Unwanted feelings and behaviours – such as job dissatisfaction, lower motivation, low employee morale, less organizational commitment, lowered overall quality of work life, absenteeism, turnover, intention to leave the job, lower productivity, decreased quantity and quality of work, inability to make sound decisions, more theft, sabotage and work stoppage, occupational burnout, alienation, and increased smoking and alcohol intake.
2) Physiological diseases (poor physical health) – such as increased blood pressure and pulse rate, cardiovascular diseases, high cholesterol, high blood sugar, insomnia, headaches, infections, skin problems, suppressed immune system, injuries, and fatigue.
3) Psychological diseases (poor emotional (mental) health) – psychological distress, depression, anxiousness, passiveness/aggressiveness, boredom, lose of self-confidence and self-esteem, lose of concentration, feelings of futility, impulsiveness and disregarding of social norms and values, dissatisfaction with job and live, losing of contact with reality, and emotional fatigue.

On the organizational level, consequences of occupational stress can be grouped into two major subgroups

1) Organizational symptoms – such as discontent and poor morale among the workforce, performance/productivity losses, low quality products and services, poorer relationships with clients, suppliers, partners and regulatory authorities, losing customers, bad publicity, damage to the corporate image and reputation, missed opportunities, disruption to production, high accident and mistakes rates, high labour turnover, loss of valuable staff, increased sick-leave, permanent vacancies, premature retirement, diminished cooperation, poor internal communications, more internal conflicts, and dysfunctional workplace climate.

2) Organizational costs – such as costs of reduced performance/productivity (lack of added value to product and/ or service), high replacement costs in connection with labour turnover (increase in recruitment, training and retraining costs), increased sick pay, increased health-care costs and disability payments, higher grievance and litigation/compensation costs, and costs of equipment damage.

Management of stress

1. Adapting positive strategies
2. Having net asset of friends
3. Understanding stress and personal make-up
4. Map their own stress profiles
5. Aware the degree of stress
6. Efficient organizational management

Action plan for coping with stress

Action plan for coping with strategy is indicated below:

a) Identify the behavior pattern requiring the change

b) Prepare an action plan to overcome the defect.

c) Aim for success

d) Monitor the progress.

e) Master the art of good interpersonal relations

f) Recognize that other people too have feelings.

g) You have a right to maintain your dignity by being assertive even if it hurts someone as long as you are not aggressive.

h) You always have a right to make a request to other person as long as you recognize that the other person has a right to say 'No'.

i) You must realize that there are certain border line classes in interpersonal situation where rights are not clear. But you always have the right to discuss the problem with other person and clarify it.

Stress clinics

Stress management clinics are helping many executives, who are victims of stress. Most of the advice offered to patients in stress management clinics is just plain common sense, such as quit smoking, reduce your weight, cut down your salt in take, change of place, reduce sugar in take, take physical exercises, etc. Transcendental meditation also helps to reduce stress level as it produces relaxation response. The technique helps one to become passively unaware

of outside world through alertful relaxation and rest. Other techniques like big-feed back, self-hypnosis, rhythmic breathing exercises and muscles relaxation can also reduce relaxation required for stress management.

Other methods

While the above techniques used for producing 'relaxation response' are not a cure by themselves, they help the patients to gain positive feeling of being in control of themselves and increase their self-confidence which is mainly required for stress management. For example, if a cancer patient is made to imagine that the cancer cells in his body are being devoured by white cells in the fight between cancer cells and white cells and he is being cured in this manner through drugs which produce the required white cells, the chances of his recovery are much more than allowing him to image in his own way. However, no single technique can be suitable for a person suffering from peptic ulcers. Similarly one person may need psychotherapy to get at the root of his 'A' type behavior while another may need nothing more than regular exercise and vacation. Just as responses to stress vary widely according to age, sex, temperament and other personal factors, so do the requirement for treatment for curing the stress – related illness.

Relaxation training

Along with various other techniques meditation, biofeedback – aided relaxation neuromuscular and autogenic relaxation – helps reduce emotional reactivity. Not only does relaxation training promote voluntary control over some central nervous system activities associated with arousal, it promotes a quiet sense of control which eventually influences attitudes, perception and behavior. Relaxation training will foster interaction with your inner self and you will learn by actual feeling (Visceral learning) that what you are thinking influences your body processes and that your processes influence your thought processes. You will come to know you feelings and emotions as a part of your thinking experience. Your behavior will come more from what is within you. rather than merely be responses triggered by the people and the environment around your.

Conclusion

Physical arousal may be considered a symptom of potential malfunction, but is remains hidden, because most people do not know enough about new disease develops and are not sufficiently aware of their bodies. It is not until they have over symptoms of pain and dysfunction, our society's convention of disease, that they seek treatment our health care system is in reality a disease care system. The lease desirable altemative is treatment with surgery and drugs; unfortunately, that is where our society places most of its energies and resources. The emphasis is on treatment because of the fixed concept that disease is treatable only after symptoms of malfunction or damage are observed. Having these points in mind that individual Vets and also organization should give importance for stress management. If we change the basic concept from psychosomatic illness to psychosomatic health, we can take positive intervention steps and formulate educational experiences which bring us closer to optimal health. With good health only we can explore Vets full potential and better utilize for their development and also organizations.

DEVELOPING CUSTOMER RELATIONSHIP FOR PROMOTING BUSINESS

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Any business enterprise need to keep pace with innovation, technology, client, best service and affordable cost. No longer customers are willing to remain customers unless you provide them with actual value and get to know them personally or atleast know what they want. "Happy customers tell 4 to 5 others of their positive experience. Dissatisfied customers tell 9 to 12 how bad it was." Quotes Mark Steven. It clearly says how important it is to to satisfy and delight a customer in order to grow in business. It's a well known fact that no business can exist without customers. In the business, it's important to work closely with your customers to make sure your business is for them and is as close to their requirements as you can manage. Because it's critical that you form a close working relationship with your client, customer service is of vital importance. Make your customers feel valued, wanted and loved. Customer satisfaction is a measure of how products and services supplied by a company meet or surpass customer expectation. It is seen as a key performance indicator within business and is part of the four perspectives of a balanced scorecard.

Customer satisfaction behaviour curve - world class is defined by customers at 9.24. Customer Satisfaction ratings higher than this fall into the category of 'Known as the Best' with the highest possible return and recommend rates and scores for customer loyalty and preference. Customer delight brings customers coming back for more. It causes new customers to come. It takes to out of the realm of being the same as all the others and places you clearly at the top. It distinguishes you from the rest. It allows you to sell your product or service for more money than the competition. It allows you to make more return on your investment. It allows you to reward your employees.

Customer delight means more than just feeling great about a product or service. Customer delight means the customer demonstrates high return and recommend rate behavior. Using Bart Allen Berrys Customer Satisfaction Behavior Curve (1 to 10 scale) customer delight correlates with an overall satisfaction rating of approximately 8.75 or higher. Return and Recommend rate percentages range from 65% to 90%, meaning that delighted customers will tell six to nine people out of ten about their satisfaction experience, and it is guaranteed that some of these folks will also tell others. Every December 24th is treated as customer's day. Today every organization is aiming at utmost customer satisfaction. In a way many companies are doing well to satisfy customer by improving the quality of products and services. But is that the all the customer wants? One should aim beyond this in order to retain their cutomers.Customer needs are growing day by day. They want quality products and services with reducing costs. The outlook of customers is changing day by day and simply satisfying them is not enough but an organization should work for the customer delight. This is what the present day customer aims at.

Customer Relationship Management (CRM) is a process or methodology used to learn more about customers' needs and behaviors in order to develop stronger relationships with them. There are many technological components to CRM, but thinking about CRM in primarily technological terms is a mistake. The more useful way to think about CRM is as a process that will help bring together lots of pieces of information about customers, sales, marketing effectiveness, responsiveness and market trends. CRM helps businesses use technology and human resources to gain insight into the behavior of customers and the value of those customers.

CRM is all about managing the relationships you have with your customers, including potential customers. CRM combines business processes, people, and technology to achieve this single goal: getting and keeping

satisfied customers. It's an overall strategy to help you learn more about your customers and their behavior so you can develop stronger, lasting relationships that will benefit both you and your customers. It's very hard to run a successful business without a strong focus on CRM.

Industry view of CRM

- Helping an enterprise to enable its marketing departments to identify and target their best customers, manage marketing campaigns and generate quality leads for the sales team.
- Assisting the organization to improve telesales, account, and sales management by optimizing information shared by multiple employees, and streamlining existing processes (for example, taking orders using mobile devices)
- Allowing the formation of individualized relationships with customers, with the aim of improving customer satisfaction and maximizing profits; identifying the most profitable customers and providing them the highest level of service.
- Providing employees with the information and processes necessary to know their customers, understand and identify customer needs and effectively build relationships between the company, its customer base, and distribution partners

Key Business Process areas of CRM

Marketing : CRM aligns marketing processes and drive customer demand using functionality to enhance management of marketing resources, segments and lists, campaigns, leads, trade promotions, and marketing analytics.

Sales : CRM enables you to acquire, grow, and retain profitable relationships with functionality for sales planning and forecasting and the management of territories, accounts, contacts, activities, opportunities, quotations, orders, product configuration, pricing, billing, and contracts.

Service : CRM can drive service revenue and profitability with support for service sales and marketing. More effectively manage service orders, contracts, complaints and returns, in-house and depot repairs, warranties, resource planning, e-service, and service analytics. Functionality to support call centers, field service, and e-service provides flexible delivery options.

<table>
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Partner channel management

With CRM you can attain a more profitable and loyal indirect channel by managing partner relationships and empowering channel partners. Improve processes for partner recruitment and management, communications, channel marketing and forecasting, collaborative selling, partner order management, channel service, and analytics for partners and channel managers.

Running an interaction center

Customer interaction centers are places where you meet your customer face to face. With CRM, you can maximize customer loyalty, cut costs, and boost revenue by transforming your interaction center into a strategic delivery channel for marketing, sales, and service efforts across all touch points. Effectively handle activities such as telemarketing, telesales, customer service, human resources, IT support, and interaction center management.

Web channel enablement

Increase sales and reduce transaction costs by turning the Internet into a valuable sales, marketing, and service channel for businesses and consumers. Increase profitability and reach new markets with a fully integrated web channel, including support for e-marketing, e-commerce, e-service, and web channel analytics.

Business communications management

Manage inbound and outbound contacts across multiple locations and channels. Integrate multichannel communications with customer-facing business processes to provide customers and partners with seamless, consistent experiences across all channels, including voice, text messaging, web and e-mail.

Real-time offer management

Turn all customer interactions into opportunities to build customer relationships and generate revenue. Plan, develop, and execute cross-selling, up-selling, and retention offers; service-level agreements; and more. Take appropriate subsequent actions to enhance customer relationships and ensure relevant and personalized customer interactions.

Trade promotion management

CRM will boost a company's brand presence and profits with visibility into and control of all trade related processes. Increase accounting accuracy of trade and financial results with back-office integration. Gain key business insights to help you optimize trade activities. Increase your trade promotion success with analytics and enhanced management of trade funds, promotions, claims, and retail execution.

CRM Software

Sales force automation

- Contact management: Contact management software stores, tracks and manages contacts, leads of an enterprise.
- Lead management: Enterprise lead management software enables an organization to manage, track and forecast sales leads. Also helps understand and improve conversion rates.

e-CRM or Web based CRM

- Self Service CRM: Self service CRM (eCRM) software enables web based customer interaction, automation of email, call logs, web site analytics, campaign management.
- Survey Management Software: Survey Software automates an enterprise's electronic surveys, polls, questionnaires and enables understand customer preferences.

Customer Service

- Call Center Software
- Help Desk Software

Partner Relationship Management

- Contract Management Software: Contract management software enables an enterprise to create, track and manage partnerships, contracts, agreements. Example: Upside Software, Accruent Software, diCarta, I-Many.
- Distribution Management Software

The Ten Domains of Customer Satisfaction

Hundreds of thousands of data points and hundreds of satisfaction surveys were studied to determine the common factors which describe and determine satisfaction in any customer supplier relationship for any product or service. These ten factors are measured individually during the entire customer experience and with a total score plotted on the Customer Satisfaction Behavior Curve. This overall satisfaction score (consisting of the overall impact of each of the ten factors) correlates with return and recommend rate percentages and prediction of customer behavior.

Quality

- Compared with the best available or the best the customer is familiar with
- Error Free / Defect Free
- Supplier personnel are subject matter experts and have general systems knowledge

Value

- Value is compared with the best price the customer has experience with or knowledge of
- If prices are higher, negatives must be offset by strong positive features or benefits value is calculated after the sale when product/service continues to serve customer well over time

Timeliness

- Product or service delivered early or at the agreed upon time
- Personnel take all the time required to meet customer needs
- Product or service is delivered as fast as possible with minimum wait times

Environment

- The supplier's plant / offices / store are safe, clean and well organized
- Customer's fees psychologically welcome and valued as customers

Ease of access

- There are no barriers or inconveniences between the customer and accessing product or service (hours open, location easy to find, get to right person with information etc.)
- Pathway signage is clear and adequate staffing and interface resources are provided for customer's convenience

Efficiency

- Supplier offers a single point of access with the minimum number of steps possible for fulfilment of customer needs without repeat or redundancy.

Self-management- (front line service behaviors)

- Front line personnel are dressed appropriate with the benchmark of their trade and make good first impression.
- Front line personnel are courteous and attentive with subservient / serviceful attitude
- Front line personnel give customers their full attention

Teamwork

- Employees facilitate smooth customer hand offs between departments
- Employees in different departments and throughout the suppliers company **work well together** to meet the needs of the customer

Commitment

- Supplier is honest and up front with customer about all terms and conditions
- Supplier treats customer as most important customer
- Supplier takes responsibility when things go wrong

Innovation

- Supplier continuously introduces innovations and **improvements to their product line**

Five steps to achieve customer delight

Tucker recommended the following five steps that organizations can use to pursue customer delight:

1. Focus – Who owns the customer experience? Is everyone travelling down the same road? The companies that really stand out have a very clear understanding of who in their organization owns the customer experience. The companies that perform best have engrained that sense of ownership in everyone across the organization.
2. Quantify – What is most important to your customers? (It varies by company and brand). Companies often spend a lot of money in areas that don't pay back. What are the drivers of customer satisfaction in your industry? Look at it through the lense of the people, presentation, price, product quality, and the process that a customer goes through. Each one of those five Ps represents an area of opportunity for your company to improve. Know what your drivers are so that you can focus your improvement on things that are going to have the most value to your customers and the greatest payback for your company.
3. Prioritize actions based on benchmarks – Who what are my target customers comparing me to? Why are they defecting? Why are they shopping for an alternative solution? Knowing this information will help you understand and forecast your customers' expectations and needs.
4. Define the business case upfront – What's it worth to me in lower defection rates? Lower costs? Increased share? Connect customer satisfaction activity with the same discipline and scrutiny is critical to getting the equation right.
5. Monitor and make course corrections – Getting good at delighting your customers is not an event. You've got to have a continuous customer feedback loop. Make sure that customers are feeling the changes that you're making. If not, make course corrections.

Factors between success and failure of CRM - Change Management

Change management is often the defining factor between success and failure in CRM projects. While the business of change management continues to grow through books, seminars, and consultants, managers are as confused as ever when asked to implement appropriate change management as part of the CRM initiative. CRM strives to make the entire organization customer-centric and this new orientation mandates systemic changes throughout the orgauization. Successful change management comprises of five key initiatives: selling change internally, creating an appropriate infrastructure for change management, CRM-relevant training, a reconfiguration of the organization structure and performance assessment criteria, and a re-molding of the existing incentive systems. The role of the HR department in facilitating change should never be underestimated.

What Change management is about?

Change management is a systematic approach to dealing with change, both from the perspective of an organization and on the individual level. A somewhat ambiguous term, change management has at least three different aspects, including: adapting to change, controlling change, and effecting change. A proactive approach to dealing with change is at the core of all three aspects. For an organization, change management means defining and implementing procedures and or technologies to deal with changes in the business environment and to profit from changing opportunities.

Successful adaptation to change is as crucial within an organization as it is in the natural world. Just like plants and animals, organizations and the individuals in them inevitably encounter changing conditions that they are powerless to control. The more effectively you deal with change, the more likely you are to thrive. Adaptation might involve establishing a structured methodology for responding to changes in the business environment (such as a fluctuation in the economy, or a threat from a competitor) or establishing coping mechanisms for responding to changes in the workplace (such as new policies, or technologies).

Change management principles

1. At all times involve and agree support from people within system (system = environment, processes, *culture, relationships, behaviours, etc., whether personal or organisational).*
2. Understand where you the organisation is at the moment.
3. Understand where you want to be, when, why, and what the measures will be for having got there.
4. Plan development towards (Principle 3) in appropriate achievable measurable stages.
5. Communicate, involve, enable and facilitate involvement from people, as early and openly and as fully as is possible.

Advantages of CRM

Using CRM, a business can:

- Provide better customer service
- Discover new customers
- Help sales staff close deals faster
- Simplify marketing and sales processes
- Increase customer revenues
- Cross sell / Up Sell products more **effectively**
- Make call centers more efficient

The advantages can be summarized according to the feature

Marketing

- Make intelligent business decisions with enhanced customer insights
- Increase marketing velocity and speed to market
- Maximize visibility into and control of your entire marketing process
- Drive customer demand
- Increase returns on your marketing investments

Sales

- Grow profitable relationships
- Eliminate barriers to productivity
- Maintain focus on productive activity
- Improve sales efficiency service

- Transform service into a profitable line of business
- Drive revenue
- Reduce costs of customer service and field service
- Increase customer loyalty
- Decrease service giveaways

Web channel enablement

- Drive revenue and extend market reach
- Build lasting customer loyalty
- Increase customer convenience and satisfaction
- Reduce the cost of sales and suppor
- Improve sales and service profitabilit

Running an interaction center

- Increase customer satisfaction
- Improve credibility with your customers
- Increase revenue and productivity
- Manage the customer interaction life cycle

Partner channel management

- Boost revenue through channel collaboration
- Reduce indirect channel support costs
- Increase partner satisfaction and ease of doing business
- Maximize value to your customers by enabling your partners

The types of data CRM projects collect

- Responses to campaigns
- Sales and purchase data
- Web registration data
- Demographic data
- Shipping and fulfillment dates
- Account information
- Service and support records
- Web sales data

Conclusion

Customer Relationship Management is essential for business today. If there is no specific strategy for customer management you are likely to be in the losing end. Customer service, like any aspect of business, is a practised art that takes time and effort to master. All you need to do to achieve this is to stop and switch roles with the customer. What would you want from your business if you were the client? How would you want to be treated? Treat your customers like your friends and they'll always come back. Have a concern for your client.

Delighted customers are those where you anticipate their needs; provide solutions to them before they ask and where you are observing to see if new and / or additional expectations are ready to be provided. This is all "easy to say and difficult to do"; but, through commitment and practise you will soon achieve positive results.

A satisfied customer is the best advertisement. All business enterprise should work to keep their customers at ease inorder to achieve success. It is essential to retain their existing customers and provide best product and service to attract more customers.

References

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