CHAPTER – 2

REVIEW OF LITERATURE AND RESEARCH METHODOLOGY

2.1 Review of Literature Available on the Subject Under Study

A review of the existing literature on commercial agriculture in India must start with the writings of B.B. Chaudhuri on Bengal. Central to Chaudhuri's analysis is a distinction between the old and the new credit agencies in the Bengal countryside.[1]

To digress briefly into the historiography of agriculture in colonial U.P., Sulekh Gupta and Imtiaz Hussain concentrated in 1960s on 'Landlords' and 'Tenants' as legal categories created by British revenue policy in the early years of the nineteenth centre and Walter Neale highlighted the incomplete articulation of the two in an imperfectly developed market for land and tenurial rights for the whole

[1] B. B. Chaudhari, 'Growth Commercial Agriculture in Bengal, 1859 – 1885, I.E.S.H.R., 7: 1-2 (May-June, 1970)

span of colonial rule.[2] Concerned primarily with the intricacies of tenurial rights, these studies by and large ignored the actual conditions of agricultural production.

Analyzing the effects of early nineteenth century review settlements, Asiya Siddiqi has commented that the subsistence element in (the peasant) economy was undermined and monetization was induced, not because (the peasant) had a surplus to exchange but because of the necessity of paying his installment of revenue forced him to sell even his food and stock[3] Siddiqi and Bayly have highlighted the linkage of regional production of indigo, cotton and sugar to the overseas and a growing home market in the first half of the nineteenth century.[4]

Elizabeth Whitcombe has painted a rich picture of the late nineteenth century U.P. countryside, based on the voluminous records of the Revenue and Irrigation Department and on district settlement reports.[5]

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[2] S.S. Gupta, *Agrarian Relations and Early British Rule: A Case Study of Ceded and Conquered Provinces* (Uttar Pradesh) (Bombay, 1963), Imtiaz Hussain, Land Review Policy in North India: The Ceded and Conquered Provinces (Calcutta, 1967); W. C. Neale, Economic Change in Rural India; Land and Reform in Uttar Pradesh, 1800 – 1955 (Yale, 1862)

[3] Asiya Siddiqui, *Agrarian Change in a Northern Indian State: Uttar Pradesh*, 1819 – 1833 (Oxford, 1973), pp. 132ff.

[4] C. A. Bayly, *The Age of Hiatus: The North Indian Economy and Society*, 1830-50.

[5] Elizabets Whitecombe, *Agrarian Conditions in Northern India*, Vol. I: The United Provinces under British Rule, 1860 – 1900 (California, 1971), pp. 173-77.

According to Mintz,[6] he feels that sugar, whether its origin is from cane or beet, is today regarded as a mass consumption item and it also accounts for a large share of the total calorie intake of an average household. This universality of sugar is of recent origin and is closely related to the global expansion of European power. The author attempts to review the link between the increasing European, especially English, household sugar consumption and the English economic power.

According to Mintz, sugarcane was first domesticated in New Guinea around 8000 B.C. and was carried to India about 2000 years later, though it is evident from Atharvaveda and Charaka Samhita that India was the home of sugarcane since ancient times. However, it was only around the eleventh century that evidence of European knowledge is available (Southern Europe from Italy) and Asian or Arab sugar in significant quantity arrived in Europe. During the 10th to 12th century, knowledge about sugar spread throughout Europe. Till the 16th century, sugar was used as medicine rather than as sweetener in Europe leave alone as a food item. From medicine to a luxury sugar became a necessity only in the 19th century.

Mintz uses both historical and anthropological skills in exploring the importance of sugar in the consumption

[6] W.S. Mintz, *Sweetness and Power*, The place of Sugar in Modern History, Penguin Book, 1986, pp 274.

basket of European households, both because it is so recent and so obviously linked to the outward expansion of Europe.

Finally, Mintz discusses how questions of power, social status and hierarchy are inevitably intermeshed with questions of how people live their lives, how they organize their livelihood, the habits associated with consumption, production and so on. Sugar contributed not only to the enrichment of the imperial ruling class, but also helped in winning over to the latter side the growing proletarian class by making it a product whose increasing consumption visibly symbolized their upward social visibility. This was also strengthened by the arguments that the readiness of working people to work harder in order to be able to earn and thus consume more was a crucial feature of the evolution of modern patterns of eating.

The story of sugar and slaves has been told differently by Mintz. According to him, there are two types of slaves: those who work on plantations and those in the working class home - craving for sweetness.

The research done by 'Sanjaya Baru'[7] on 'Structural Changes in the International Sugar Economy' is also in similar vein. It supports the argument those two hundred

[7] Baru, Sanjaya, *Structural Changes in the International Sugar Economy*, Social Scientists, April – May, 1987, No. 167-168, pp. 58-76.

years after enslaving people to work on sugar plantations, rich countries are enslaving them again by ruining their plantations and for any of the poor countries to rely on them.

According to Galloway[8], the history of sugar is linked with a trio of institutions which were anything but sweet. These are plantation, slavery and slave trade.

Amin[9] focuses attention on the cultivation of sugarcane by small farmers in Gorakhpur region. He analyses the socio-economic and cultural conditions, under which these small farmers became dependent upon traders, landlords and other intermediaries for marketing sugarcane for the production of crystal sugar.

The most significant contribution on sugar making in ancient period is by Lallanji Gopal.[10] This is a well researched piece of work giving the origin of sugarcane and its cultivation and the art of sugar making using as sources ancient documents like Atharvaveda, Charaka Samhita and Susruta Samhita and the subsequent sutras. It elaborates

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[8] Galloway, J. H., *The Sugarcane Industry: An Historical Geography from its Origins to 1914*, Cambridge, Cambridge University Press, 1989, pp. 266.

[9] Amin, S., Sugarcane and Sugar in Gorakhpur: An Inquiry into Peasant Production for Capitalist Enterprises in Colonial India, Delhi, OUP, 1984, pp. XXII, 336.

[10] Gopal, Lallan Ji, Sugar Marketing In Ancient India, Journal of Economics Social History of the Orient, 1964, Vol. VII, No. 13, pp. 55 – 72.

on various forms of sugar which were made from cane juice and its uses. The paper also lists various fruits used as a source of sugar.

Naquvi[11] describes various centres of sugar production in upper India during 16th to 18th centuries. She dwells upon methods of sugar manufacturing, practices of sugarcane cultivation and the regional variations. She elaborates upon the trade in sugar covering various centres from where sugar was being exported and places to which it was being exported on account of the East India Company.

Attwood Donald[12] has studied another dimension "Capital and the Transformation of Agrarian Class System. “A Case Study of Sugar Production in India". In this paper the author has raised two issues: (i) Why do some agrarian systems generate more economic growth than others" and (ii) Why do some undergo structural transformation leading to further growth, while others stagnate? These issues have been discussed in terms of different kinds of agrarian class systems which either promote or inhibit economic innovations, and economic forces in terms of different levels of capital investment and managerial skills required for different levels of production and distribution systems. His

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[11] Naquvi, R. K., Urban Centres and Industries in Upper India: 1556 – 1803, Bombay, 1968.

[12] Attwood, Donald W., *Capital and the Transformation of Agrarian Class Systems: Sugar Production*, Agrarian Power and Agricultural Productivity in South Asia, OUP, 1984, 20 – 50.

conclusion is that ownership control of land is not relevant to the productivity of sugarcane farm in Maharashtra while R.K. Gupta[13] feels that it is the landed interest which could increase sugarcane cultivation and in turn sugar production in Birbhoom district of West Bengal.

In 1973, S.L. Saxena is his book "*Labour Problem in Sugar Factories in Eastern U.P.*" has studied deep about problems of sugar industry in India. In 1950, M.S. Veshen in his book "*Labour Problem in the Sugar Industry of Gorakhpur and Deoria*" has narrated in detail about the labour problems of sugar industry in Gorakhpur and Deoria districts of Uttar Pradesh (India). In his book "*Problems of Sugar Industry in Eastern U.P.*", Bhagwati Prasad Khetan has narrated about labour problem of sugar industries. In 1965, D.U. Artha Vijnana Sasthy described the various aspects of location of Sugar Industry in his book "*Location of the Sugar Industry in India*". Dr. Jitendra Kr. Jain in 1992 has described the development of Sugar Industry in his book "*The Sugar Industry in India*". In 1992 Dr. D.K. Grover and S.S. Singh studied about different aspects of labour, finance, raw materials in his book "*Problem of Sugar Industry in India*". In 1992 Shri Satya Prakash has worked on Working Performance of the U.P. Sugar Corporation. In

[13] Gupta, R. K. The Sugar Industry in a Bengal District Birbhoom from the last decade of the Eighteen Century to Mid-Nineteenth Century, Ph.D. Thesis, 1963.

his study he has studied about various aspects working of sugar mills.

Survey of literature reveals that there is a need to undertake a systematic study of progress of sugar industry in India, understand its problems and challenges in context of ongoing liberalization process.

Many authors have addressed inventory management in the context of product recovery and remanufacturing. In this section we summaries the main findings presented in the literature. The selected references highlight significant contributions but are not meant to be exclusive.[14]

Although related models have been proposed as early as the 1960s, inventory control for product recovery and remanufacturing has been receiving growing attention in the past decade with the rise of environmental concern. In addition to numerous theoretical contributions, case studies have been reported on, e.g. for single use cameras[15], medical devices[16], automotive exchange parts[17] and electronic equipment. The underlying inventory control models share two main distinctive characteristics, namely

a. An autonomous inbound item flow and,

[14] Silver et. Al. (1998), Chapter 12 and Fleischmann (2001)
[15] Toktay, et. al., (2000)
[16] Rudi and Pyke, (2000)
[17] Van der Lann, (1997)

b. Two alternative supply options, i.e. product recovery versus 'virgin' procurement.

While both of these elements as such are not new in inventory theory it is there specific interrelation that gives rise to novel issues as we discuss below.

Well-established models in the inventory control literature that may help understand the impact of the above characteristics include repairable-item-models[18] and two supplier models[19]. Yet, neither model class fully captures the setting of product recovery. Repair models, such as the classical METRIC model[20], especially rely on a closed-loop system structure, where each (defective) item return triggers an immediate demand for a replacement item. In a product recovery setting the correlation between the two item floes tends to be much weaker and mainly reflects the dependence of returns on previous demand. Since the time lag between both processes may be large, many authors claim that, for inventory control purposes, one may even assume independence. Two-supplier models address the trade-off between procurement costs and lead times. Typically, the models include a slow yet cheap supplier and a faster but also more expensive one. In a product recovery context the reasoning is different. Rather than lead time

[18] Nahmias (1981)
[19] Moinzadeh and Schmidt (1988) and Moinzadeh and Schmidt (1991).
[20] Sherbrooke, (1968)

reduction it is restricted availability of the recovery channel that calls for an alternative supply source.

Current literature comprises both deterministic and stochastic inventory control models for product recovery environments. Deterministic models can be further subdivided into stationary versus dynamic models. The former correspond to the mindset of the classical economic order quantity. As early as in 1967 Schrady proposed an extension to this model that includes item returns (Schrady, 1967). His analysis seeks optimal lot sizes for the recovery channel and virgin procurement, both of which involve fixed costs. More recently, variants to this model have been discussed e.g. by Richter (1996) and Teunter (2001). For the dynamic case, extensions to the classical Wagner–Whitin model have been presented. Beltran and Krass (2002) show that return flows increase the combinatorial complexity of this model. In particular the fundamental zero-inventory-property is lost.

Related stochastic models provide the basis for our investigation. Within this class one may distinguish between periodic review and continuous review approaches. Another important differentiation concerns single versus two-echelon models. In the single echelon case, the analysis is limited to end-item stock, while the two-echelon case involves a more detailed picture of the recovery channel, distinguishing end item and recoverable stock.

A first stream of research dates back to Whisler (1967) who analyzes the control of a single stock point facing stochastic demand and returns. He shows the optimality of a two-parameter policy that keeps the inventory level within a fixed bandwidth in each period by means of disposal and new supply. Both actions are immediate and the costs are purely linear. Simpson (1978) extends this model to a two-echelon situation. The optimal policy then relies on three critical numbers that control the disposal, remanufacturing, and new supply decision, respectively. Inderfurth (1997) shows that both of the previous results still hold if both supply channels involve the same lead time. For different lead times, though, the growing dimensionality of the underlying Markov model inhibits simple optimal policy structures. Fleischmann and Kuik (1998) provide another optimality result for a single stock point. They show that a traditional (s, S) policy is optimal if demand and returns are independent, recovery has the shortest lead time of both channels, and there is no disposal option. Related models have also been analyzed by Kelle and Silver (1989) and Cohen et al. (1980).

A parallel stream of research has evolved for continuous review models. Muckstadt and Isaac (1981) consider a single echelon model where the recovery process is modeled as a multi-server queue. They propose a heuristic (s, Q) policy for the virgin supply channel and approximate the optimal control parameter values. Van der

Laan et al. (1996) present an alternative approximation for this model and extend it with a disposal option. Finally, van der Laan et al. (1999) provide a detailed analysis of the corresponding two-echelon model. The authors develop Markovian formulations for several alternative heuristic policies, and compare their performance numerically. In particular, push and pull rules for the recovery channels are contrasted. In line with Inderfurth's results the authors emphasize that lead time differences between both supply channels may severely complicate inventory management in this setting.

In summary, most of the literature on product recovery focuses on the structure of optimal policies for specific cases, while computation of these policies is very time consuming as they involve evaluating large-scale Markov chains. This highlights the fact that practical implementation calls for more efficient evaluation of policy alternatives, and therefore for approximations to the optimal policy. Our paper answers this call. We provide accurate heuristics that can be evaluated almost instantaneously on a spreadsheet.

The quality of information pertaining to the characteristics of products is one of the biggest problems currently faced by supply chain management. For example, according to, an average of 30% of information in retailer systems is incorrect, and other studies show that as much

as 63% of product descriptions can diverge in supplier and wholesaler systems. In a study conducted for the Grocery Manufacturers of America, A.T. Kearney Inc. estimates that retailers and manufacturers each lose $2 million for every $1 billion in sales due to bad data. They predict that eliminating bad data could save $10 billion per year.

The literature in the field of inventory management is vast. However, the common assumption underlying most research is that data gathered from physical transactions are accurate so that the physical flow is perfectly aligned with data stored in inventory information systems. Based on recent empirical observations, this implicit assumption has proven to be wrong. In fact, based on a study done with a leading retailer, report that out of close to 370,000 SKUs investigated, more than 65% of the inventory records did not match the physical inventory at the store-SKU level. Moreover, 20% of the inventory records differed from the physical stock by six or more items.

In practice, inventory inaccuracies can be introduced by several factors generating a misalignment between the physical flow and the associated information flow:

Theft: this factor affects the physical inventory level and let the Information System inventory records unchanged.

Misplacement type errors: this type of errors affects temporally the physical available for sales inventory and let the IS inventory unchanged.

- Transaction type errors: transaction errors affect the IS inventory and let the physical inventory unchanged.

Supplier unreliability (i.e. under-ages /over-ages in products shipped by supplier): those errors may affect both the IS and the physical inventory if no control is performed when receiving the order.

Among existing works that investigate the impact of such inventory inaccuracies, focuses on how inaccurate work in process counts can distort the effectiveness of an MRP system. He explains reasons why to maintain accurate work in process inventory system records and develops a framework to describe the different sources of inaccuracies: errors usually stem from system structure problems, system discipline problems, process variability problems, measurement problems and quality related problems.

Among the other examples illustrating the magnitude of the problem is that reports that the Naval Supply Depot using the Master Stock Record history of a sample of 714 items from the 20 000 line item types stocked there, found

that 25% of the item types had accumulated discrepancies that exceeded 24 units after one year. It also found the distribution of accumulated errors to be closely approximated by a normal distribution.

As presented earlier, the study of also reveals that a large retailer with annual sales of roughly $ 11 billion from more than 1500 stores worldwide estimates a profit loss of $ 32 million annually due to its inventory record inaccuracy problem. According to a store level analysis, 65% of nearly 370 000 inventory records from 37 stores of a large retail chain are inaccurate at the time of the physical inventory audit. Moreover, for 15% of these records, the absolute difference between system inventory and actual inventory quantity per SKU was eight or greater. This study identifies the magnitude and drivers of poor inventory records and provides an empirical study of inaccurate inventory records in a retail store at both record and store levels. It is reported that the probability of an inventory record being accurate can be predicted by product's characteristics such as item cost or whether the item is risky or not, annual units sold, the entity delivering this item or material flow characteristics such as the complexity of pallets received / to be prepared (multiple product pallets or homogeneous pallets), etc.

2.2 Research Methodology

Research methodology adopted for completion of research work has its great importance, because the quality of results / findings of research work depend upon it. The following research methodology is adopted for the research purposes-

SELECTION OF AREA

Uttar Pradesh is one of the largest states of India and is developing by leaps and bounds day-by-day. Various projects are in the pipeline and many others have already taken a proper shape for the overall development & progress of this historical state. And, western U.P. is playing an important role in its overall development as integral part of Northern India. This part is famous world-wide for the production of sugar and spreading sweetness throughout the world.

In order to start his research work, the researcher adopted the **lottery system** of selecting two sugar mills from northern India. It consisted of two phases. In first phase, out of total districts of northern India, two districts were selected by lottery system. This resulted into two districts; one was **Meerut** & another **Ghaziabad**. Then in the next phase, out of total number of sugar mills running in these two districts respectively, one sugar mill each from Meerut & Ghaziabad districts were selected, again by the

same lottery system. It resulted into the names of **Mawana Sugars Limited** and **Simbhaoli Sugars Limited** respectively.

One of the oldest, established and famous sugar mills i.e. "**Simbhaoli Sugar Ltd.**" has already marked its presence in the world market and the other upcoming name of "**Mawana Sugars Ltd.**" is also speedily paving its way at the world forum. Thus, the universe of the present study is about the management of inventories of these two sugar mills of Northern India.

PERIOD OF STUDY

This research work is primarily based on secondary data. Hence, it was conducted on macro level (i.e. from the financial year 2004-2005 to 2008-2009) and micro level (i.e. financial year 2008-2009).

COLLECTION OF DATA

The strong unwillingness on the part of the management of these two renowned and reputed sugar mills (to participate and aid the research work), made it difficult for the researcher to move in the desired direction most of the times. As a result, this study was turned towards the secondary data collection and is mainly based upon the information collected from various annual reports of both the sugar mills, data available on the internet etc. and that

too for a time period from **2004-2005** to **2008-2009**. Thus, our research work is mainly based upon secondary data.

TABULATION, ANALYSIS AND INTERPRETATION OF DATA AND INFORMATION

Data and information collected from different sources were tabulated chapter-wise so as to make the study systematic and scientific. Different tables and charts were prepared for the purpose to concentrate on each and every aspect of this study.

After tabulation of data or information, an analysis of each table was made using different statistical tools so that relevancy of data collected with the present study might be traced and the reliable conclusions might be drawn.

STATISTICAL TOOLS APPLIED

During the research work, different statistical tools like t-test, mean, least square method, ratios, graphic presentation, chart development etc. were used for the purpose of analyzing the data collected.

2.3 Hypotheses of the Study

A hypothesis refers to “a conjectural statement of the relation between two or more variables”. It is in the form of declarative sentence and always indicates relation of one or

more variables with other variables in a general or specific way.

There exist two criteria for a good hypothesis. First, it is a statement about the relations between variables. Second, it clearly implies possibilities of empirical testing of the stated relationship. Thus, hypothesis is a statement involving two or more variables which are measurable or at least potentially measurable and specifies the way in which these variables are related. A statement which does not meet these criteria does not form a scientific hypothesis.

A hypothesis forms a significant device of scientific research for at least three reasons:

First, it is an operating tool of theory. It can be deduced from other hypotheses and theories.

Second, the hypothesis can be tested and shown either to be true or false. It is only possible to test relations and not the isolated facts. Since a hypothesis forms a relational proposition, it is used in scientific research. Indeed, it involves predictions such as: “if Y, then X” which facilitate testing of relation between Y and X. This enables the facts themselves to establish the probable truth or falsity of the hypothesis.

Third, the hypothesis is significant because it facilitates advancement of knowledge beyond one’s values

and opinions. Indeed, there is no complete science without hypotheses.

Like hypothesis, problems behind them are also significant. Research is frequently initiated with a problem or a problematic situation. At the very outset, there exists an indeterminate situation involving doubts and vague ideas with which the researcher is perplexed. Explicitly, without an exposure of such a perplexing situation, the problem cannot be formulated. In course of time, the indeterminacy is overcome and the researcher tends to have a clear idea of the problem rather than a general and diffuse notion.

Although it may appear a spontaneous process, a clear and complete statement of a problem is very complicated.

The researcher needs to understand what he is attempting to discover. As soon as he understands it, he travels a long way towards the solution of the problem.

Problems and hypotheses have some common characteristics. Both direct research work by indicating what is to be done. As both form generalized rational statements, the researcher can deduce specific empirical manifestations implied by them.

However, the problems differ from hypotheses in many ways. The hypotheses, if properly formulated, can be tested. On the other hand, a problem is usually a broad question and cannot be directly tested. Problems can be scientifically solved after being converted into the form of hypotheses.

The researcher has tried his best to test the hypotheses formulated by him in the present study. He felt certain inconveniences in this regard. However, the researcher was bound by certain limitations due to paucity of co-operation on the part of the officials of the sugar mills. As such, certain classified information could not be exactly known. The researcher was compelled to make assumptions.*

(* *Rao, K.V.: Research Methodology in Commerce & Management, Sterling Publishers, New Delhi,2002*.)

Thus, the **hypotheses** which are to be tested later on in the chapter no.07, can be summarized as under –

1. *The stock of stores & spares of Mawana Sugars Ltd. and Simbhaoli Sugars Ltd. are of the same values.*

2. *The stocks of raw materials, components etc. of both sugar mills are having same values.*

3. *The Process stocks / stock of Work in progress of Mawana Sugars Ltd. and Simbhaoli Sugars Ltd. are of the same type.*

4. *Simbhaoli Sugars Ltd. & Mawana Sugars Ltd. is having the same value of stock of finished goods.*

5. *The production quantity of Mawana Sugars Ltd. and Simbhaoli Sugars Ltd. is almost the same.*

6. *The sales quantity of both sugar mills is of the same amount.*

7. *The finished goods stock of both sugar mills is not different.*

8. *The raw materials consumption of Mawana Sugars Ltd. and Simbhaoli Sugars Ltd. is almost same.*

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