

THE ECONOMIC FEASIBILITY OF AIR SHIPMENT OF PERISHABLE
FRUITS AND VEGETABLES INTO CANADA

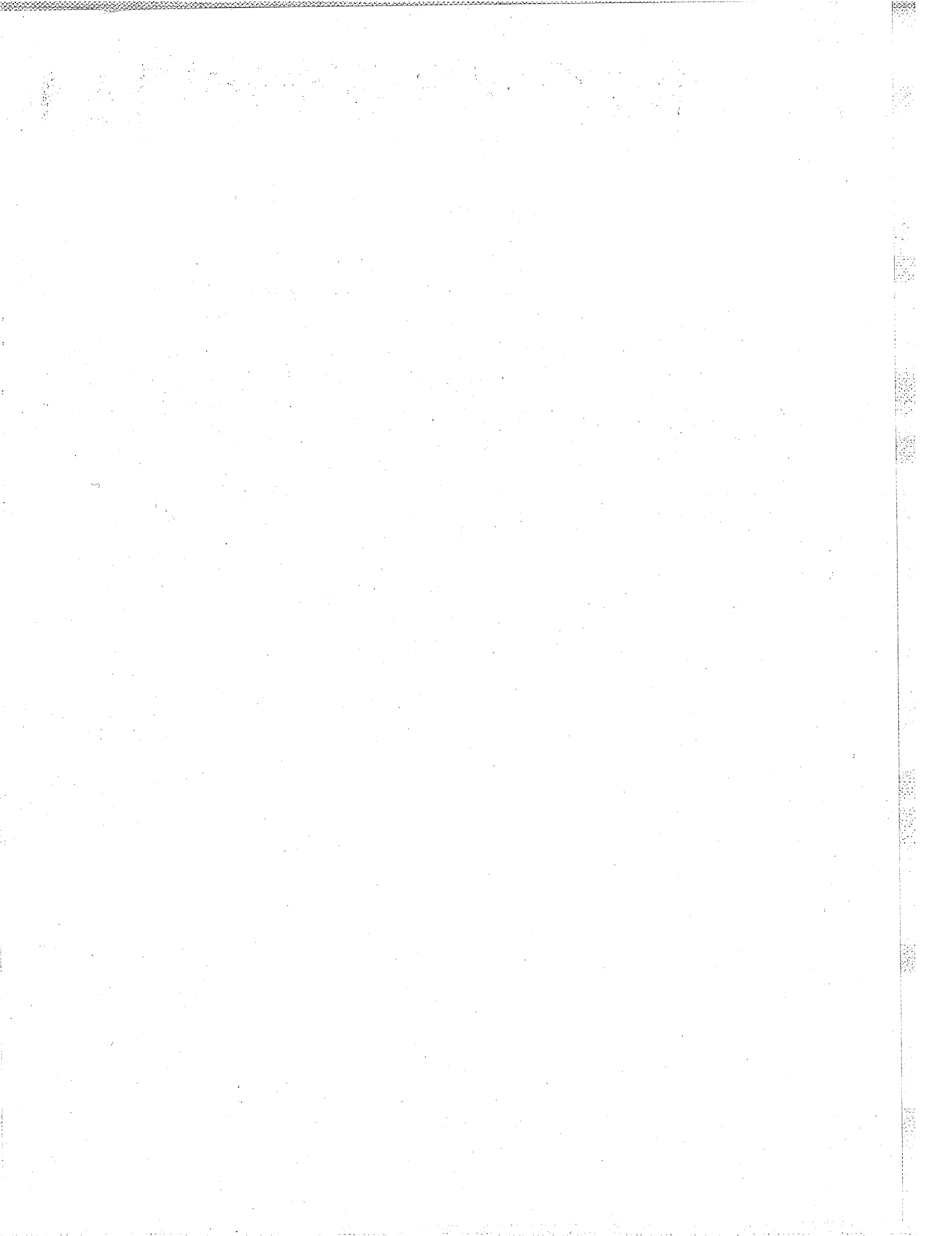
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by
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ABSTRACT

THE ECONOMIC FEASIBILITY OF AIR SHIPMENT OF PERISHABLE FRUITS AND VEGETABLES INTO CANADA

by

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In Canada there is an increasing per capita demand and total demand for fresh fruits and vegetables, with the demand for perishable fresh fruits and vegetables increasing even more rapidly. At the same time, Canadian perishable fruit and vegetable growers are unable to supply the amount of perishable fruits and vegetables that consumers demand. The difference between domestic supply and consumer demand is being increasingly filled by imported perishables.

The principal goal of this thesis was to determine the present and probably future role of air transportation in moving such perishables into Canada. Four main objectives were set out as guide lines for the study. These were:

(1) to determine transportation's role in distributing imported perishables from the producer to specific consumer centers as well as determining each mode's inherent advantages in carrying perishables.

(2) to determine current trends in utilization of the three basic transportation modes in the carrying of imported perishable fruits and vegetables.

(3) to analyze, using the Total Cost Concept, the ability of each transportation mode to compete effectively in the distribution of

perishable fruits and vegetables from producer source to destination.

(4) to identify the present and future role of air transportation in the distribution of perishable fruits and vegetables, and the problems that may be involved.

Analysis of the transportation needs for perishable fruits and vegetables showed that fresh fruit and vegetable shippers require aspects of service other than low rates. Characteristics of service such as flexibility, reliability and speed of service appear to be of particular interest. It is apparent that they are willing to trade-off (to a certain but yet unquantifiable degree) between less cost and better quality of service. This was made apparent from studying the increasing trend of trucking of perishables into Canada.

Groenewege and Heitmeyer's Total Cost Concept for analysing all costs of distribution of a commodity was chosen as the model for analysis. The Total Cost Concept is designed to take into account both quality and cost of service that a carrier provides on the particular route studied.

Six individual perishable fruits and vegetables (peaches, strawberries, grapes, cherries, tomatoes and lettuce) were chosen for specific analysis. California was designated the major import source of these perishables while Montreal, Toronto, Winnipeg and Vancouver were chosen as destination centers for the imports. On these chosen routes between California and Canada, road, rail and air carriers were compared using the Total Cost Concept. Results of the analysis showed that rail provided least-cost service to the shipper. Air provided the best quality of service to the shipper. However, motor carriers were com-

petitive with rail on rates while providing many of the quality of service aspects that air freighting can provide. This conclusion is substantiated by the fact that the quantity of the six perishables moving by truck into Canada has been increasing (both relatively and absolutely).

There are three basic limitations that presently restrict air freight's competitive position in hauling perishable fruits and vegetables into Canada. The technical limitations prevent rate reductions at the present time, and institutional limitation such as air franchises and dissimilar rate regulation among modes favoring trucks and the backhaul limitation must also be overcome for air freight to become competitive in shipping perishables from California into Canada.

While air freight is not presently a contender in shipping perishables into Canada, a promising area for air freight is that of exporting Canadian perishables to countries overseas. The only competition is from ocean-going ships. Such routes are in the area of market development and expansion in contrast to the established North America routes studied here.

Finally, a further area of study would be to analyse consumer demand for perishable fruits and vegetables. This analysis could include consumer reaction to such things as availability of vine-ripened fruit. Such a study could also indicate the amount of customer education that would be required to make consumers aware of the benefits of better transportation service such as shipping by air. Information of this type would enable one to develop more quantifiable results as to how much trade-off potential exists between cost and quality of service in best serving consumer wants.

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CHAPTER I

INTRODUCTION

A. STATEMENT OF PROBLEM

The fresh fruit and vegetable sector of agriculture in Canada is one that is characteristically different from other sectors of agriculture in Canada. While surplus conditions generally exist in other sectors of agriculture, there continues to be a deficit in fruits and vegetables which is increasing yearly. Additionally, a larger and larger portion of domestic demand for fruits and vegetables in the fresh form must be filled by import sources.

There are two reasons for this deficit. First, as consumers' relative income position increases, they are more able to pay for fresh fruits and vegetables. Therefore, there is an increase in per capita demand. The increase in demand is also augmented by the increase in population. The overall result is more people wanting more fresh fruits and vegetables. Secondly, on the supply side, actual production of most fresh fruits and vegetables is struggling to maintain a relatively constant proportion of the amount demanded. In some cases, production levels of various fresh fruits and vegetables are decreasing relatively.

The Federal Task Force on Agriculture prepared a paper on fruits and vegetables which stated the position of the fresh fruit and vegetable industry in Canada as follows:

Located close to the large Canadian centres of population producing commodities which are usually bulky and often highly perishable and therefore expensive to transport, the Canadian industry would seem to

have a ready-made opportunity for expansion. Furthermore, there is an expanding per capita and total demand for fruits and vegetables on the home market. On the other hand, climate is unfavourably cutting down the growing season, interfering with the much-wanted continuity of supply, causing highly seasonal and therefore high cost processing operations. Throughout every group of the fruit and vegetable industry, there runs the major question of international competitiveness particularly with the United States.¹

Seasonality of Canadian production, as mentioned above, affects the output stream of fresh fruits and vegetables. Perishable fruits and vegetables are especially affected since they must be distributed from the producer to the consumer immediately after harvest. There is no long-run storage potential for perishables and in the case of grapes and lettuce there is no comparable processed form. Consequently, out-of-season perishables must be obtained from import sources.

The quality of perishable fruits and vegetables at the retail level is affected by two conditions: (1) the condition of the perishables when they are picked, and (2) the length of time and type of handling that takes place in moving from production to consumption. Since perishable fruits and vegetables deteriorate quickly, fast distribution is essential if the perishables are to remain in good condition. The role of transportation is of prime importance in the distribution of imported perishables. The more quickly that transportation of the good is completed, the less chance there is for quality deterioration.

¹Federal Task Force on Agriculture, "Fruits and Vegetables", paper presented to the Canadian Agriculture Congress (Ottawa, 1969), p. 7.

Generally, the quality of perishables received at the retail level in Canada during the off-season is relatively poor compared to the quality of in-season perishables. Part of this poorer quality may be attributed to the poorer quality of produce coming from the import source during the fall and winter months. However, a great quantity of imported produce has to be shipped to Canadian cities from the states of California, Arizona, and Florida which can be a trip of 1,000 to 3,000 miles depending on the destination. Using surface transport to carry the produce, it would take 2 to 10 days depending on the destination and mode used. To keep the produce fresh, refrigeration must be used while the goods are in transit.

Another method of slowing deterioration is to pick the produce while it is less than fully ripe and allowing it to ripen while being distributed. However, it is of general knowledge that "vine-ripened" fruit is of better quality than "ripened in shipment" fruit. Therefore, even if the latter arrives relatively non-deteriorated, better quality could be expected if "vine-ripened" produce were imported.

One way that "vine-ripened" fruits and vegetables could be made available is to ship fresh perishables by air. Shipments from California to Eastern Canada would take only a number of hours instead of a number of days. Shippers realize that for extremely perishable produce such as strawberries, speed of distribution is very important. "Shipments of agricultural commodities no longer move by air, only when the commodity is in short supply."² Air shipments of fresh fruits and

²Mildred R. DeWolfe, "Recent Trends and Prospective Developments in Shipments of Agricultural Commodities", Marketing and Transportation Situation, Economic Research Service, U.S.D.A. (February, 1966), p. 18.

vegetables in the U. S. are increasing every year.

A recent survey by some of the major U. S. airlines shows that the volume of fresh fruits and vegetables shipped by air during July-June 1964-65 was between 4 and 5 times that during 1961. These airlines expect a similar increase by 1970.³

The increasing air shipments of fresh produce as predicted by the airlines has generally come true, as indicated by the following statement:

This (air shipments of California fresh fruits and vegetables in 1968) was an increase of 32.8 per cent over the volume in 1967 and was more than double the total of 1966.⁴

The pattern of air shipments of fresh produce from California showed that strawberries were by far the major commodity moved by air, accounting for 75 per cent of the total shipments. Geographically, 36.5 per cent of air shipments of all fresh fruits and vegetables from California went to New York, 18.5 per cent to Chicago and 20 per cent went to the four cities of Detroit, Philadelphia, Boston and Cleveland. Europe and the South Pacific accounted for approximately 10 per cent of the total air shipments of California fresh produce.⁵ In total volume carried, "air shipments of California fresh fruits and vegetables during the calendar year 1968 totalled 60,172,762 pounds billing weight, and 53,077,000 pounds net or product weight."⁶ Shipments to Canada amounted to 80,770 pounds billing weight or 3.5 carlot equivalents with 2.8 car-

³Ibid., p. 18.

⁴Air Shipments of California Fruits and Vegetables, 1968, Federal-State Market News Service. (San Francisco, California, 1968), p. 3.

⁵Ibid., p. 3.

⁶Ibid., pp. 5-6.

lot equivalents going to Toronto and .7 going to Vancouver.⁷

It would seem that there is a potential for air shipment of fresh produce into the Canadian market from an import source such as the U. S. A. Shipment time could be reduced from several days to effectively no more than one day of business. Quicker distribution would bring "vine-ripened" produce on the market, thus increasing the quality of the produce received by the Canadian consumer. Finally, consumption areas especially in Eastern Canada are situated with good airport facilities, thus enabling high density marketing in carload lots.

B. OBJECTIVES AND SCOPE OF THE STUDY

The overall objective of this study is to determine what role, if any, air shipment can play in transporting fresh fruits and vegetables into Canada. This will be done within the context of determining the most efficient method of distributing the present (and potential) volume of imported fresh fruits and vegetables into Canada while maintaining a high quality of product to the consumer.

The specific objectives of this thesis are:

- (1) to determine transportation's role in distributing imported perishables from the producer to specific consumer centers as well as determining each mode's inherent advantages in carrying perishables.
- (2) to determine current trends in utilization of the three basic transportation modes in the carrying of imported perishable fruits and vegetables.
- (3) to analyze, using the Total Cost Concept, the ability of each transportation mode to compete effectively in the distribution of perishable fruits and vegetables from producer to destination.

⁷Ibid., p. 6.

(4) to identify the present and future role of air transportation in the distribution of perishable fruits and vegetables, and the problems that may be involved.

This study is a descriptive analysis comparing methods of distributing imported fresh fruits and vegetables into Canada. When determining what area to study in this thesis, it was decided that analysis of the entire import sector of the fresh fruit and vegetable market in Canada was too large. Two steps were taken in narrowing the scope of the analysis. These were:

(1) to establish perishables as the group within the total fresh fruit and vegetable sector, and

(2) to determine, for each commodity analyzed, the one major production area outside Canada providing Canada with imports and to choose major consumption areas within Canada receiving the imported produce. Given these specifications, actual routes of shipment could be established and analyzed.

It was felt that perishable fruits and vegetables best satisfy the product characteristics of goods that are most suited for air transport, i.e. high value per pound relative to other types of fresh fruits and vegetables, wide market spread, and relatively fast deterioration over time. The three modes of transportation included in the comparative analysis were rail, road and air. Inter-modal combinations such as piggy-back service were excluded.

C. ORGANIZATION OF THE STUDY

The model used for comparative analysis in describing the distribution system for fresh fruits and vegetables was the Total Cost

Concept as articulated by Groenewege and Heitmeyer.⁸ This concept was selected because it accounts for both cost of the service to the shipper as well as quality of the service received.

This study consists of two main sections. The first section is a general descriptive analysis of the fresh fruit and vegetable industry within Canada providing a background for the remainder of the study. Particular emphasis is placed on the perishables sector of the industry. The trend in the balance of trade with respect to imported perishables is of major importance. This trend was found by determining the surplus or deficit domestic production compared to domestic consumption of perishables. It was assumed that the difference in consumption and production domestically will be made up by either importing or exporting the difference. The major production areas of perishables imported into Canada along with the major Canadian consumption areas are determined in this section.

The second section deals with transportation's role in distributing imported perishables to the Canadian market. The importance of transportation to the producer as well as the consumer is described. Inherent characteristics of each mode in hauling perishables are outlined and the resulting trends in use of each mode to ship perishables are noted. A comparative cost analysis utilizing the Total Cost Concept

⁸The expression "Total Cost Concept" as used by A.D. Groenewege and R. Heitmeyer in Air Freight: Key to Greater Profit, Middlesex, England: Aerad Printers and Publishers, 1964, describes a comparative model for taking account of the total costs involved in distributing a commodity.

is made to determine each mode's ability to compete both in cost and quality of service. Special mention is made of air shipment of perishables and the expected potential of this mode in distribution of perishables within Canada.

More specifically, the remainder of the study is organized as follows: Chapter II provides the background information. Chapter III describes transportation's aggregate and modal characteristics as they pertain to the shipment of perishables. It also shows the resulting roles of the modes in moving perishables from import to consumer source.

Chapter IV is a description of the Total Cost Concept. Chapter V is a comparative analysis, using the Total Cost Concept, of modal prices and quality of service characteristics to determine the most efficient mode in transporting perishables.

The feasibility of air shipment of perishables is discussed in Chapter VI in light of technical and institutional factors that effect its ability to compete with road.

Chapter VII concludes the study with a summary of the conclusions and implications. Areas of further research on the topic and problems encountered in the study are also mentioned.

CHAPTER II

THE FRUIT AND VEGETABLE SITUATION IN CANADA: PRESENT CONDITIONS AND FUTURE PROSPECTS

Chapter Two embodies section one of the study. The first part of this chapter looks at the fresh fruit and vegetable industry in Canada. From this general analysis of the fresh fruit and vegetable industry, emphasis is placed on a study of six specific perishables within the total industry. The six chosen perishables are used as the basic material for further analysis.

In Canada, fruit and vegetable consumption is an important part of total food consumption.

At the food distribution level, fresh and processed fruits and vegetables account for more than one-third of the quantity of all food consumed in Canada and one-sixth of the value of food consumed.¹

Although this study deals specifically with fresh fruits and vegetables, some element of importance of fresh fruits and vegetables in Canada may be assumed from the above quotation and justify a study of this type.

A. CONSUMPTION

Knowledge of the trend of fresh fruit and vegetable consumption in Canada is important to this thesis. The Canadian Agricultural Congress study on fruits and vegetables provides much needed, though by no

¹Federal Task Force on Agriculture, "Fruits and Vegetables" paper presented to the Canadian Agriculture Congress (Ottawa: 1969), p. 1.