Chapter-VI

Discourse on Knowledge Based International Trade - Pragmatic Analysis

6.1: Introduction

Production enterprises use inputs and convert them into output. In economic sense, inputs such as, capital, labour and other factors of production are being used as part of production process. Broadly speaking, inputs can be divided into labour, materials and capital which again might have different segmentations. Labour can be categorized into skilled labour and unskilled labour. Carpenters and engineers are examples of skilled labour and agricultural workers are known as unskilled labour. Steel, plastics, electricity, water and any other goods that the firms buy, transform into final products. Land, building, machine and other factors as well as inventories fall under the category of capital. Firms transform these inputs in various combinations into outputs.

Technology is the core of every production function. Firms while producing a good learn from doing. Same combinations of inputs can produce more and more output. Firms may be more productive reorganizing the input combinations (i.e., reorganizing the production process, changing the organizational structures, reducing lost time and material, improving maintenance procedure and so on. We can represent the net effect of technology change with the help of a production function for same good X that depends on two factors capital (K) and Labour (L) at some point in time t as follows.

\[ X_t = A \times F(K_t, L_t) \]

The subscripts on X,K and L represent the time period (t) and the parameter A calibrates the value derived from F (K,L) into units of output. Technological change can augment the output that could be expected from any combination of capital and labour by g X 100 percent per year. The production function, then, would look like
Here technological change will show changes in isoquant and the marginal end average production of all inputs would increase by (\(g \times 100\) percent) per year. (Edwin Mansfield & Gary Yohe: Microeconomics, 2010. www. Newton & Company, Inc, NY.)

The shape of the production function of an economy can show the process of economic growth of that economy. In the real world, production takes place using many different inputs to production. This may in fact be summarized as – physical capital (\(K_t\)), Labour (\(L_t\)) and technology or knowledge (\(T_t\)). The production then can be expresses by

\[ Y(t) = F[K(t), L(t), T(t)] \]

Where \(y(t)\) is the flow of output produced at time \(t\).

In the modern world economy, knowledge is as important as other factors of production like land, labour and capital. This is truer especially in highly innovative/sophisticated industries where knowledge contributes as an input to augment production and productivity in larger quantity benefiting the producers, the consumers and the economy at large.

Companies acquire knowledge through technology. This new technology comes about due to spending on research and development (R&D) efforts. Companies also learn from competition by studying their products. Thus firms upgrade their know-how through R&D and through learning and doing. Thus apart from formal diffusion of knowledge a significant portion of knowledge diffusion takes place at a personal level and this kind of informal diffusion of knowledge takes place most effectively when an industry is concentrated in an area wherein employees of different firms/companies mix socially and exchange their views freely about technical issues relating to products.

This chapter deals with the impact of knowledge or research and development efforts as a key determinant of trade pattern in manufactured goods (Raymond Vernon, “International Investment and International Trade in the Product Life Cycle”, Quarterly Journal of Economics 80, 1966, pp. 190-207). It begins with the analysis of
new trade theories explaining the impact of R&D (knowledge) on international trade, ICT application in trade facilities, e-commerce and trade facilitation at global level.

6.2: New Trade Theories

In the discussion of international trade, we generally assume that the production possibilities for a country remain the same. But the fact is that changes in a country’s production possibilities frontiers are continually taking place and are often fostered by the country’s economic policies. Growth in output potential is represented by outward shifts in the production possibilities, which enables the country to reach to a higher level of real income and thus a higher level of well-being.

Trade theory developed by David Ricardo (1817) explains trade in terms of international differences in labour productivity and the alternative explanation offered by Eli. F. Heckscher and Bertil Ohlin (1933) links trade patterns to an interaction between the relative supplies of national resources such as land, labour and capital and the relative use of these factors in the production of different goods (Krugman, 2009). New trade theories developed after Leontief Paradox (1953) mainly focuses on the expansion of trade due to innovation. Almost all the newer trade theories developed especially since 1960s and later on, relax some of the assumptions such as market structure, production conditions, use of technology, etc. and explain the reasons for trade and the diverse effects of trade on the participating economies. We now examine the impact of R & D efforts to trade expansion and the changes in the pattern of trade with the help of some selected newer trade models.

The Imitation Lag Hypothesis (1961) introduced by Michael V. Posner contradicts the basic Heckscher-Ohlin model which states that for the production of a specific commodity the same technology is available everywhere. Posner categorically indicates that the same technology and know-how may not be always available in all the countries. This is because of delay in the transmission or diffusion of technology from one country to another. We consider a two-country world. We also suppose that a new product appears in the first country because of the successful efforts of research and development teams. The second country, according to this theory, will not be able to produce the same product at the same time. Incorporating a time dimension, the imitation lag is defined as the length of time that elapses between the new product’s introduction in the first country and the appearance of the version
produced by the firms in the second country. The imitation lag includes a learning period during which the firms in the second country must learn the know-how to produce the new product. It also takes time to buy inputs (raw materials), install equipments, process the inputs, place the final good to market, and so on. This is the first lag. The second lag is the demand lag. This is the length of time between the product’s appearance in the first country and its acceptance by the people in second country.

Another theory, the Product Life Cycle Theory (1966) developed by Raymond Vernon is concerned with the life cycle of a new product and its effects on trade. The new product (a manufactured good) caters to high-income demand and the good itself is labour-saving and capital – using in nature. This theory divides the life cycle of the new product into three stages – the new product stage, the maturing stage and standardized product stage. In the first stage, the product is produced and consumed only in the first manufacturing country. The producing firms stay close to the market place in order to quickly receive consumer response regarding the product. In the second stage, some general standards for the product and its characteristics begin to emerge and thus mass production techniques are adopted. In this stage, economies of scale are realized. In this stage, the first country also tries to assess the possibilities of producing abroad in addition to producing at home. If cost picture becomes favorable i.e. production abroad costs less than production at home plus the transportation cost. If this is done, then export displacement of the product occurs. As a result of this, other countries can be supplied from the new producing country selected by the first country as its production unit. Thus relocation of production aspect of this theory is a useful step because it recognizes that capital and management mobile internationally. In this stage, the product might now begin to flow from Western European nations to the US (for example). The final stage is the standardized product stage. In this stage, product’s life cycle, the characteristics of the product itself and of the production process are well known. The product is familiar to the consumers and the production process to the producers.

Vernon hypothesizes that production may shift to the developing countries. Labour costs again play a dominant part and the developed countries are busy introducing other products. Therefore, trade pattern shifts i.e. the first country
(obviously a developed country) instead of exporting the product imports it from the developing countries.

Figure-6.1 depicted below shows production, consumption and the pattern of trade of the typical ‘new product’. Figure-6.1 tells us that from time $t_0$ until time $t_1$, the country (here USA) is producing the new product for the home market only and thus there is no trade. From time $t_1$ until time $t_2$, the country exports the good to other developed countries ($\text{exports} = \text{production} - \text{consumption}$) and may even begin importing the good from those countries ($\text{imports} = \text{consumption} - \text{production}$). From time $t_2$ onward, imports arrive into the first country from other developed countries and increasingly, from developing countries. The product cycle theory postulates a dynamic comparative advantage because the country source of exports shifts throughout the life cycle of the product. Early on, the innovating country exports the good but then it is displaced by the other developed countries. For example, electronic products such as television receivers were for many years a prominent export of the United States, but Europe and especially Japan emerged as competitors, causing the U.S share of markets to diminish dramatically.

**Figure-6.1**

More recently, Japan has been threatened by South Korea, China and other Asian producers. The textile industry is another example where developing countries
especially China, Taiwan, South Korea, Singapore and recently Bangladesh and India have become major supplier on the world market, displacing in particular the United States and Japan. Automobile production and export location also shifted from the United States and Europe to Japan and later on to South Korea and Malaysia. This dynamic comparative advantage, together with factor mobility and economies of scale, makes the product cycle theory an appealing alternative to the Heckscher-Ohlin model.

There is no single all-inclusive test to verify empirically the product cycle theory. Instead, researchers have examined particular features of the PCT to see if they are consistent with real-world experience. Economists hypothesise that, in the US manufacturing sector, there should be a positive correlation between R&D expenditures and successful export performance by industry. A number of tests indicated this result, including those by Donald Keesing (1967), William Gruber, Dileep Mehta and Vernon (1967), Kravis and Lipsey (1992) found that high R & D intensity was positively associated with the direct-investment and export-displacement features of the PCT.

The Linder Theory is a dramatic departure from the Heckscher–Ohlin model because it is almost exclusively demand-oriented. The Heckscher-Ohlin approach was primarily supply-oriented because it focused on factor endowments and factor intensities. The Linder theory postulates that tastes of consumers are conditioned strongly by their income levels, the per capita income level of a country will yield a particular pattern of tastes. It is to note that Linder is concerned only with manufactured goods. He regards Heckscher-Ohlin as fully capable of explaining trade in primary products.

Now to illustrate the Linder theory we suppose that country 1 has a per capita income level that yields demands for goods A, B, C, D, and E. These goods are arrayed in ascending order of product quality or sophistication, with goods A and B, for example, being low-quality clothing while goods C, D and E are further up the quality scale. Now suppose that country 2 has a slightly higher per capita income. Because of its higher income, it may demand and therefore produce goods C, D, E, F and G. Goods F and G may be quality products (such as silk) not purchased by
country is therefore producing goods that cater to the demands and tastes of its own citizens.

Given these patterns of production, what happens if the two countries trade with each other? Which goods will be traded between them? Trade will occur in goods that have overlapping demand, meaning that consumers in both countries are demanding the particular items. In our example, goods C, D, and E will be traded between countries 1 and 2. Suppose that we introduce country 3, which has an even higher per capita income than country 2. Country 3’s consumer demand may be for E, F, G, H and J. Which goods country 3 will trade with the other two countries? Country 3 will trade goods E, F and G with country 2, but it will trade only good E with country 1. The following fig (fig 7.2) portrays the income-trade relationships, recognizing that there is a representative range of individual incomes around each country’s per capita income level.

**Figure-6.2**

![Income-Demand Graph](image)
Looking at the Linder model as a whole, the important implication is that international trade in manufactured goods will be more intense between countries with similar per capita income levels than countries with dissimilar per capita income levels. The Linder conclusion is consistent with aspects of the product cycle theory and fits with the observation that, most rapid growth in international trade in manufactured goods in the post-World War 2 period has been between developed countries.

The Linder theory is subject to a number of empirical tests. A common type of test is formulated as follows. Suppose that we have figures on the absolute value of the per capita income differences between a given country 1 and its trading partners. Then we get information on the intensity of trade between country 1 and each of its trading partners. The Linder theory would hypothesize that the relationship between these two series is negative, because the greater the difference between the per capita incomes of country 1 and a trading partner, the less intensity the two countries will trade with each other. Studies, such as that by Joel Sailors, Usman Qureshi, and Edward Cross (1973), have indeed found a negative correlation. However, a complication factor is that countries with similar per capita incomes often tend to be near one another geographically, so that the intense trade may also reflect low transportation costs and cultural similarity.

Nevertheless, after allowing for distance between countries and other determinants of trade, Jerry and Marie Thursby (1987, p. 493) found that support for Linder’s hypothesis was overwhelming in their study of the manufactured goods trade of 13 European developed countries, Canada, Japan the United States, and South Africa. Only Canada and South Africa failed to have a significantly negative regression coefficient for per capita income differences with trading partner on the volume of trade with that given partner.

In our example of countries 1, 2, and 3 the theory identified the goods that would be traded between any pair of countries. However, the Linder theory did not identify the direction in which any given good would flow. When we said that countries 1 and 2 would trade in goods C, D, and E we did not say which good or goods would be exported by which country. This was not a slip in the model; Linder made it clear that a good might be sent in both directions – both exported and imported by the same country. This phenomenon was not possible in our previous
models of trade; because how could a country have a comparative advantage and a comparative disadvantage in the same good?

This type of trade could clearly occur, for example, because of product differentiation. This term refers to products that are seemingly the same good but which are perceived by the consumer to have real or imagined differences. Clearly two different makes of automobiles are not the same in the consumer’s mind. Nor does the consumer regard as equivalent two different brands of beer, tennis rackets, or word processing programmes. Linder’s theory can incorporate this notion of product differentiation, because country 2 might be exporting a brand of automobile to country 3 and country 3 again might be exporting another more sophisticated automobile to country 2.

Another probable cause of this two-way flow of a product is that producers in any one country are producing for the mass market of consumers in their country. Consumers at income levels well above or below the per capita income level of the country may find their wants unsatisfied by home producers and will import their desired varieties of goods. Thus low-income consumers in higher-income country 2 may purchase the good from country 1, which has a lower per capita income and high-income consumers in country 1 may purchase the good from country 2.

The Linder theory tells us that international trade in manufactured goods will be more intense between countries with similar per capita income levels than between countries with dissimilar per capita income levels. Linder conclusion is consistent with aspects of product cycle theory and fits with the observation that the most rapid growth in international trade in manufactured goods in the post–World War 2 period has been between developed countries.

A trade theory known as **Intra-Industry Trade Theory** (Bela Balassa, Grubel and Lloyd and many others) was developed in the early seventies of the last century. This tells us that more than one-fourth of world today follows intra-industry trade in which trading countries export and import items in the same product classification. Intra-industry trade occurs because of product differentiation, transport and geographical location, dynamic economies of scale or what is known as ‘learning by doing’, degree of product aggregation, differing income distributions in countries and so on.
Krugman Model (1979) is another extension of trade model beautifully explaining the pattern and the gains from trade with the help of economies of scale and monopolistic competition. It explains trade of goods which are similar but differentiated in character. All the models explain that the expansion of world trade is due to the effect of research and development efforts of the trading countries of the world.

6.3: E-Commerce and Trade facilitation

In the knowledge economy the generation and exploitation of knowledge has come to play the predominant role in the creation of wealth. Knowledge based economy makes more effective use of and exploitation of all types of knowledge in all the spheres of economic affairs (production and service activities). Modern business is characterized by more and more demand for goods and services, more and more competition at the international level and the steady growth of customers’ expectations. In order to expand market access and overcome competition from all over the world, business organizations are in the full process of organizational and functional changes. E-commerce is a means that facilitates and supports all these changes globally. This process makes production and sales companies more efficient and also at the same time it becomes cost effective. E-commerce gives companies to be more flexible in their internal way of functioning. It also helps the production companies to work closer with their suppliers and to become more conscious about the choice of consumer. This scientific mechanism allows the companies to choose the best suppliers from any corner of the world at least possible cost. It narrows down the geographical obstacle and the companies are able to sell their products at the global market. E-Commerce along with the huge growth of information technology and the development of Internet place the companies in a better position to manage business activities than the competitors.

IT and the Internet transaction cost goes down abnormally which in turn eliminates the intermediaries in the business activities. E-Commerce becomes more effective in enhancing international trade and commerce if countries develop faster and bigger capacity of mobile and fixes communication such as phone, cable, radio and satellite network. Strong general as well as technical education base of a country widen the scope of E-Commerce. The assurance of education is thus a priority for the growth of learning and research process.
6.4: ICT Application in Trade Facilitation

Information and communication technology (ICT) application in trade facilitate trade transaction in customs formalities, trade documentation flow and trade security. ICT facilitates timely exchange of information. This reduces physical impediments. The volume of international trade has been increasing globally and this has become possible due to more participation of countries (irrespective of their economic status) to international trade. A study (SWEPRO, 2002) shows that world trade represents more than 30 percent of world GDP and it would grow to 50 percent by 2020. Under the circumstance, ICT-enabled trade facilitation can play a vital part in managing larger volume of trade transaction replacing paper-based trade facilitation system. Paper-based trade facilitation system is inefficient because this makes huge wastage of time. UNCTAD, 2006 mentions that saving a day through ICT-enabled trade facilitation is equivalent to ½ percent of trade tariff and 7 percent of value of international trade is the cost of administration of trade logistics. About 7 to 10 percent of value of international trade is spent on customs formalities (ESCAP, 2002). Huge wastage of time and money in paper-based trade facilitation increase government expenditure and this poses a burden to most of the developing countries. On the other hand ICT application in trade facilitation not only saves time and money but also these system changes the concept of trade-related government activities. ICT-enabled techniques and services make paper less trade documentation and real time information sharing among the trading countries. Three important factors, namely, technological advances, development of e-commerce and WTO accession and integration into the networked global economy, have in fact reduced cost and increased productivity.

International trade and commerce together involves a number of stakeholders and players such as exporters, importers, permit issuing authorities (PIAs), and also there are suppliers and intermediaries (including the transport or freight forwarders and shipping agents) this large number of stakeholders and players means that traders are to face with a huge number of regulations, and documental requirements. Moreover, trade transaction procedures are inadequate. Audit-based controls and risk-assessment techniques are also inadequate especially in the developing and the least developed countries. Unclear unspecified import and export
requirements are also a common phenomenon. Lack of coordination and cooperation among customs and other Government agencies disturbs the growth of trade flow.

Modern trading world is very much keen to achieve efficient trade facilitation. Single windows model facilitates trade in modern trading world benefiting both the producers and consumers of both the participating nations. Single windows create a single connection between all stakeholders in the trading community. It allows the stakeholders from a single point of entry to transmit and receive a specific data set, as well as in any data standard and format they need to fulfill requirements for export, import and transit regulations and clearance. Single windows, in short, expedite and simplify information flows between and the Government (United Nations, ESCAP, 2006). The entire single windows Trade facilitation system can be shown in figure-6.3 below.

**Figure-6.3: Single Windows Trade Facilitation System**

![Single Windows Trade Facilitation System Diagram](image)

It is possible to set up single window in the developing countries. It is as attempt to overhand the existing system into as integrated mechanism. Due to shortage of fund and lack of innovative technologies developing countries the set-up costs for implementing single window are higher than operating costs; but the long-term savings are larger than the operating cist if single window.

ICT application in trade facilitation reduces paper-based information and documentation. But the application of ICT or trade promotion largely depends on each country’s ICT capacities and ICT infrastructure. The successful operation of the simple window system depends on many factors like assigning lead agency, mapping stakeholders, influences and potential part hers, assessment of stakeholders’ ICT awareness level, simplification and standard desertion of documents and procedures, reviewing ICT – related legal and regulatory frameworks, mapping existing transaction process and documents , risk assessment and management , examining the system designing, adopting capacity building initiatives, building up monitoring mechanisms, creating seated cooperation and coordination with all interested parties.

The shifting two and single windows system of trade facilitation is a continuous system and it does not take place overnight. It takes longer period of time for shifting from one system to another. The evolution of trade facilitation systems are shown below in table-6.1.

Table-6.1: Evolution of Trade Facilitation System

<table>
<thead>
<tr>
<th>Stage</th>
<th>Geographic Scope</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-single window Portals</td>
<td>National</td>
<td>Eighty-five Plus Countries (World – wide) Have Adopted UNCTAD’s ASYCUDA platform</td>
</tr>
<tr>
<td>Single Window Portals</td>
<td>National</td>
<td>Australia (Trade gate) Hang Kung, China (DTTN) Japan (NACCS), Republic of Korea (KTNet), Malaysia (Dagong Net) Singapore (Trade Net) Thailand (Trade Siam)</td>
</tr>
<tr>
<td>Regional, Multinational Portals</td>
<td>Multinational Regional</td>
<td>ASEAN Single Window Initiative</td>
</tr>
<tr>
<td>Global Portal</td>
<td>Global</td>
<td>Bolero.net (a precursor)</td>
</tr>
</tbody>
</table>

The successful implementation of the ICT-enabled trade facilitation system (Single Windows System) depends on the political will and commitment of government. Gender and better coordination among different stakeholders such as Government capacities, private players in trade transactions and operations is also required. Trade procedures need to be more simplified. International conventions, standards, code and other instruments are also required. All the collaborations among various stakeholders should be transparent for better implementation of the single windows system. The existence of a basic ICT infrastructure and spending in R & D and adoption of legal and regulatory frame workers for electronic processing are also needed for successful operation of ICT – enabled trade facilitation.
Chapter VI: Discourse on Knowledge Based International Trade-Pragmatic Analysis

References


