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Offshoring and reshoring policies: an optimal control approach

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Introduction

By definition, offshoring is the practice of obtaining products or services from another country or relocating production to another country. Current study examines the general model for production; however, a great deal of attention will also be given to the offshoring of services as a lot of the characteristics of the model can be applied to describe the functioning of services as well. When the costs of running a company are cheaper in another country, the company may choose to move their activities or offices abroad in order to reduce expenses. As opposite to outsourcing, offshoring requires that the third party being hired to complete a job, will be located in another country. [41] In this thesis we will describe the phenomena of offshoring and all aspects related to its organization, positive and negative effects as well as customers' attitude towards it. Offshoring is not just common in big developed economies like the United States, as some people would think. The measure could be either direct or indirect while attempting to provide offshore with a quantifiable measure, or so-called proxy for offshoring. Services industries are significantly less active than manufacturing ones when comparing offshore. Offshoring and outsourcing are two different phenomena, however some literature interchanges the terms. Offshoring falls under the category of outsourcing in general. While not offshored, tasks could be outsourced. While offshoring only refers to foreign relocations, outsourcing may also encompass employment transfers within and between nations. Chapter 1 ponders upon main motivations for offshoring.

Chapter 2 describes drawbacks of offshoring, including the potential exposure of private data and/or information, calibration and synchronization, delayed or extended delivery times, output of poor quality, and improper responsibility classification. Chapter 3 starts by pointing out that customers' satisfaction with offshoring services can vary. Based on the resources that are available in a foreign country, offshoring production might be a short-term decision. Such a choice can be made internally by the business or in response to outside influences. We examine the reasons why customers' willingness to buy and attitudes toward offshored products may change. It may be influenced by generational preferences, migration, the "made-in" impact becoming more significant, or sudden hostility. The "made-in" effect and its significance in how consumers assess products, as well as its connection to business location decisions, have been well documented. Other consumer attitudes could also be the cause of the declining demand. Customers may be concerned about the high unemployment rate in their own nation and disapprove of the fact that offshore provides employment possibilities to people from other countries rather than their own. Numerous research have been conducted to examine the impact of the made-in and country-of-origin influence on consumer behavior and product evaluation.

Today, animosity is a very related to made-in effect idea and a significant one. It is, by definition, an intense dislike, or hostile attitude. Such anger comes in a variety of forms. In fact, anger influences people's intentions to buy things since it negatively correlates with their prejudiced views of a nation and/or its people. Additionally, some research suggest that psychosocial influences and product beliefs work together to influence consumer behavior. Besides, customers may desire to avoid purchasing goods from a particular nation because of that nation's use of child labor in its manufacturing processes. Children who must work for survival are frequently forced or coerced into doing so. In addition to the risks they encounter at work, this social injustice prevents them from participating in extracurricular activities, going to school, spending time with their family and friends, and sometimes it even causes them to engage in substance abuse.

Furthermore, customers may be turned off by poor working conditions at the offshoring facility just as much as by the idea of hiring children. Any offshoring site should prioritize occupational health services, and leaders of offshoring businesses should emphasize the value of the best work settings and circumstances for the promotion and preservation of employee satisfaction. Today's consumers are growing more environmentally conscious and concerned with sustainability and the environment, as can be shown. Therefore, the more expensive transportation is, the more pollution and harm to the environment there is. The customers' potential anxiety over so-called "offshoring pollution" may also have a negative impact on demand. The main worry is that some businesses are shifting operations to more developing, less regulated nations in an effort to reduce emissions in their more industrialized, home nations. Companies must abide by both international laws and informal institutional standards in their locality. Additionally,

strong local news outlets and activists can have a significant impact on offshoring businesses. Therefore, occasionally a nation or a local offshoring manufacturing location may see a sudden shift in laws and regulations. Consumers may have the general impression that offshore takes away employment that could be provided to the local workforce. On the other hand, some writers contend that there may be economic gains from reemployment of those who lose their job to offshoring, as these people may eventually move into more satisfying occupations.

After engaging in offshoring production for a while, businesses may find that they are unable to overcome the challenges and hardships caused by the high levels of internationalization or that doing so is not advantageous to their business. The causes could include changes in the firm's strategic priorities or unpredictably high risks. Additionally, while operating offshore, businesses may have problems related to distance, such as freight, delivery, inventory, etc. In Chapter 4 we analyze a model which is constructed on the assumption that the company is already active in performing offshoring activities and show solutions for models that describe offshoring and reshoring processes.

Chapter 1

Motivation

In principal, a company can move all or some of its activities to another country. In the following research we focus of the latter case using both paying special attention to the offshore effort production intensity function $u(t)$ in the model presented in the paper. In fact, we put a limitation on the activities in another country, meaning that offshoring production has some limitation and we give the reasons for that.

The main reason why companies decide to go offshore is the possibility to receive a higher profit margin if they have an opportunity to access a lower cost labour market by relocating their business process from one country to another. In addition, companies can take advantage not only of the low labour cost, but also of cheaper raw materials, equipment, parts, and supplies available in offshore locations.

While some companies may just be reaching for additional skilled and knowledgeable labour or for establishing a business presence in a foreign country, others cannot merely maintain the cost of local activities. That is why the latter, due to the unpredictable and excessive fluctuations in the economy, turn to offshoring as a viable strategy. Anne Stringfellowa, Mary B. Teagarden , Winter Nie in their article on “Invisible costs in offshoring services work” give an example of Milan, Italy. They claim that it is certainly not known for its low production costs, yet most fashion houses have a design office there to take advantage of the knowledge and skills at the hub of the fashion world. Being there allows them to gauge fashion trends and profit from the world-class talent pool.[26] An organization might also merely struggle with handling all aspects of a business process internally and might not be able to access all the necessary resources internally.

The salary the company has to pay in an offshore location might be substantially lower than in a home country. For instance, the report by McKinsey Company on “Offshoring: Is It a Win-Win Game?” highlights that the economic benefit of offshoring is that there are very large differences in the wages paid for equivalent skills between the U.S. and developing countries such as India and the Philippines. For example, the equivalent of a software developer who costs \$60 an hour in the U.S. costs only \$6 an hour in India. Similarly, a data entry agent who costs \$20 an hour in the U.S. costs only \$2 an hour in India. In addition, it is very expensive to hire engineers, for example, in Western countries and cities because their knowledge and skills are incredibly in demand.

The total cost of doing business in another location (including premises, administrative staff, legal work, payroll, developer salaries, insurance – the works) might also be much lower. If handled correctly by the dedicated offshore partner, those factors could be of the same or even higher quality as in a home country, but for a much lower cost.

As mentioned before, companies might decide to offshore in order to find more skilled and experienced workers. However, it is not relevant for the current study as it does not necessarily lead to saving costs of production. Nevertheless, it is a very important aspect prevalent in many companies around the globe. Various industries are also struggling with how to overcome the rising number of skill shortage or by the lack of qualified staff to do the job. Through offshoring, companies discovered that they could hire a team of highly qualified staff in low-cost countries (such as Philippines, India, China, and Malaysia) who are ready to take on tasks that are frequently rejected by local employees.

Some people argue that the quality of Indian workers has improved, especially in Information Technologies. Engineers from India are becoming increasingly attractive to foreign companies as they have an ability to cope with a lot of work requiring high skills, good training and experience. Considering the fact that in the United States and Europe, engineers are hard to find and very costly, the demand for the ones from India is increasing.

Also, sometimes there are restrictive local regulations that hinder companies from reaching long term business goals. There could be some extra costs on operational expenses caused by complex laws and regulations or less attractive taxes and tariffs that companies are trying to avoid.

A further offshoring advantage is a location where taxes are lower than at home, better still, are flat rate, like the 10% flat rate in Bulgaria, for instance. This makes offshoring to such destinations markedly beneficial, especially if coupled with a low tariffs and charges regime introduced by the country's government with the specific aim to attract foreign investment. This definitely allows companies to generate greater profit. [38]

Other tax incentives that are attractive for an offshoring company are tax benefits consisting of tax holidays, lower corporate taxes, and tax and duty-free importation for a certain period. Many countries offer tax holidays to fully or partially exempt a company from paying corporate income taxes. This is in exchange for establishing a new business or expanding their current business.

The various tax incentives provide cost-saving benefits, increase revenues, and retain financial resources. Additionally, the savings aid to continually grow and expand the businesses in the countries where they are located. [43]

However, in the U.S. there has been increasing regulatory scrutiny. In recent years, the U.S. government has become increasingly aware of the tax revenue lost to offshore investing and has created more defined and restrictive laws that close tax loopholes. Investment revenue earned offshore is now a focus of both regulators and tax laws. As a result, U.S. companies need to carefully investigate all the pros and cons of offshoring, taking into account rules and laws of both countries where production is taking place. With the new regulations being introduced over time, it might be more problematic to maintain offshoring production.

Another reason for offshoring that is unrelated to decreasing the cost of production is a need for an organization to stay competitive. In this interconnected world, businesses are now competing in a global stage wherein innovation is becoming a significant factor in determining the success of a company. [32]

Quality of offshored products and services is a sensitive topic and is a debate in the literature. Lower cost of production might sometimes be associated with a lower quality. More on that will be discussed in the section about reshoring. Nevertheless, with the help of modern technology, the majority of companies now have full control over their offshore team thus enabling them to ensure quality in what they offer by making sure that offshored inputs meet their own quality standards.

Among other reasons to establish offshoring is that especially helps companies mitigate business risks, enables companies to realize the benefits of re-engineering and helps companies expand and gain access to new market areas.

Businesses around the world choose to offshore in order to meet the needs of the market and the multinational corporation. Thus, among other advantages of offshoring could be possible focus on business development. Lower cost of production allows companies to invest in other things such as create or expand services and offerings. Another attractive factor in flexibility, that is normally more typical for service offshoring. Time zone differentials make way for greater flexibility and allow a possibility to manage business up to 24 hours. Most offshored services are IT services and call centers. Offshoring can enable a business to provide constant coverage for consumers who need round-the-clock support (Siems and Rather, 2003). Anne Stringfellowa, Mary B. Teagarden , Winter Nie in their article on "Invisible costs in offshoring services work" mention that while the call center in the U.S. can handle calls between 7 a.m. and 7 p.m., the call center in Bangalore, India (12.5 h difference) can handle 7 p.m. to 7 a.m. Combining the domestic operations with offshoring operations allows the firm to offer 24 h service, a much needed convenience to customers. With their hectic schedules, customers appreciate service accessibility. Among other pros of offshoring there is the fact that risks of work lags, insufficient customer engagement and communication, and similar challenges could be reduced for some companies. Certain organizations are also able to sophisticate the processes by establishing control on all aspects of every business particulars.

Some authors also argue that offshoring has positive productivity effects, which is an important driver of economic growth. For example, Grossman and Rossi-Hansberg (2008) say that "the wages of unskilled workers may rise despite their vulnerability to offshoring if the productivity effect induced by offshoring is sufficiently large." Mitra and Ranjan (2010) are claiming that because of offshoring productivity effects unemployment may be brought down and wages may be increased. Kohler and Wrona (2010) are also analyzing the fact that more jobs could be created than eliminated due to the existing productivity effects. For instance, "Gorg and Hanley (2005) find that material offshoring has contributed to an increase in the productivity of firms with low export intensities in the Irish electronics sector." "Amiti and Wei (2009) find that offshoring increases productivity, with service offshoring accounting for 10% and material offshoring accounting for 5% of the productivity growth in the United States." Winkler (2010) and Wagner (2011) also show some positive productivity effects using the example of German firms. Tillmann Schworer in "Offshoring, domestic outsourcing and productivity: evidence for a number of European countries" showed that service offshoring and offshoring of non-core manufacturing activities were positively affecting productivity, but no effect for core manufacturing activities and domestic outsourcing.

Chapter 2

Statistics on offshoring

It is of a great interest to look at the statistics related to offshoring to see how it is perceived in different countries as well as how it affects labour markets. Pablo Agnese and Joan Enric Ricart in their research on “Offshoring: facts and figures at the country level” noted that offshoring is not only typical for large developed economies, such as the United States, as some might believe. The authors are trying to produce “several measures using different known indices at the country level for a significant group of countries, and for a recent period (1995-2005).” In general, results show that service offshoring is much less common than manufacturing offshoring, although growth rates of the former are much bigger for the analyzed period.

While trying to give offshoring a quantitative measure, or so-called proxy for offshoring, the authors are highlighting that the measure could be either direct or indirect. However, the issue here is that the official data on this topic are rather scarce. Pablo Agnese and Joan Enric Ricart are trying to examine different levels of data, from country to even individual worker.

By looking at direct indicators of offshoring. First of all, it is what consulting companies estimate and project: “These reports (Forrester, 2004, and McKinsey, 2003, for instance) seek to set up new trends thanks to their continuous feedback with the private sector, yet turn out wanting in their methodology and of limited scope most of times. Selection bias in the interviews conducted, and thus lack of representation of the small samples produced, are commonplace in these studies.” In fact, Forrester is one of the first resources to find reports on the growth, development and intensity of offshoring.

Second, there are press estimates (such as report presented by the European Foundation for the Improvement of Living and Working Conditions (2004)). Companies themselves may announce data available for public as a marketing technique. However, here there is a certain doubt that it would be positively perceived by consumers. The idea here is that the function of variation of sales, the demand function of the model, declines as offshoring intensity rises. One of the reasons for this functional form is precisely the customers’ concern about companies shifting jobs to foreign countries and, thus, negative perception of offshoring.

Even though the task of finding proxies for offshoring is tough as recognized by many authors, Organization for Economic Co-operation and Development exhaustive report (2007) lists most of the direct and indirect measures.

Direct indicators of both materials and service offshoring “deal chiefly with data on production, number of employees, FDI, exports, and imports. The point is to make out the changes in any of these variables due to relocation of workers.” Since offshoring measures are non-homogeneous across countries and industries, it is complicated to compare them on an international level. It could be easier to look at industry level measures first. Feenstra and Hanson (1996a, 1996b, 1997, and 1999) had an idea for the formula that is suitable for both materials and services offshoring. They define offshoring “as the share of imported intermediate inputs in the total purchase of non energy inputs. They combine US import data from the four-digit SIC (Standard Industrial Classification) with data on material purchases from the Census of Manufactures. The census data crisscross the trade between industries of the same level and provides the base for estimating the share of intermediate inputs in every industry. For a given industry, multiplying its input purchases from each supplier industry times the ratio of imports to total consumption in the supplier industry, and then adding over, turns out in their offshoring measure. More formally, it can be written as follows:

$$OI_{it} = \sum_j^n \left(\frac{I_{jt}}{Q_t} \right)^i \left(\frac{M_{jt}}{D_{jt}} \right)$$

where I_j is purchases of (material) inputs j by industry i , Q is total inputs (excluding energy) used by i ,

M_j is total imports of good j , and D_j their domestic demands.

Here, domestic demand (or the consumption of goods and services j) can be measured as shipments plus imports minus exports, removing the trouble of developing a deflator for the value added.

This formula provides an index of the offshoring intensity at the industry level. It proxies the import content of intermediate trade of industries which, in turn, proxies their offshoring intensity.”

Campa and Goldberg (1997) define an index of “vertical specialization” for several countries, underpinning the share of imported inputs embodied in production, but now remarking the increasing verticality in international trade. Through this they try to assess the extent to which multiple stages are traded for different products, using input-output tables that include sector-level data:

$$VS_{it}^1 = \sum_j^n \left(\frac{m_{jt}^* (p_{jt} q_{jt})^i}{Y_t^i} \right)$$

where m_j^* being equal to the share of imports in consumption of industry j , $p_j q_j$ the value of inputs from industry j used in the production of industry i , and Y the value of total production of industry i .

Egger and Egger (2003) came up with the measure, “which includes only intermediate goods imported from abroad and produced by the same industry classification back in the home country. They construct a measure of offshoring or “foreign outsourcing” from Austria to Eastern Europe, employing Austrian input-output matrices:”

$$OI_{it} = \underbrace{(Z_t^i)}_A \underbrace{\left(\frac{M_t^{world}}{Y_t} \right)^i}_B \underbrace{\left(\frac{M_t^{EE}}{M_t^{world}} \right)^i}_C$$

“where A is the total volume of national and international outsourcing of industry i , and both B and C appear as weighting terms for A. More precisely, A is the intraindustry trade in intermediate goods and services either from domestic or foreign suppliers. Meanwhile, B represents the imports openness of industry i while C stands for the share of imports from Easter European countries in overall imports. The “cross-border outsourcing” variable is then expressed as a ratio to the gross production of industry i , and not to total inputs purchased by industry as in Feenstra and Hanson.”

Furthermore, when comparing offshoring intensity of more industrialized economies and less industrialized ones, the results do not show a significant difference. When looking at offshoring intensity by country size the authors are using a sample of any countries, on which input-output tables from the OECD are available and using three previously mentioned indices. “Countries like Luxemburg, Ireland, Hungary, Taiwan, Austria, Slovak Republic, Czech Republic, Estonia and Slovenia are some fine examples. On the other hand, some of the larger economies perform consistently at the bottom; namely, the US, Japan, China, India, and Brazil. Right in the middle of this ladder we find a varied group of large countries among which Germany, Canada and Spain stand out. It is also possible to identify Italy and the UK swinging around the average for all three indices”.

When comparing offshoring indices in economic sectors, as noted before, services industries are engaged much less than manufacturing ones (figure 2.1 and 2.2).

Looking at the data, we can draw a conclusion that for such countries Argentina, China, Greece and the US the index for service offshoring is significantly lower (especially considering the narrow measure). Nevertheless, such counties as Canada, Belgium, Austria, the Netherlands, Germany and the Nordics tend to bring services abroad a lot. Small economies display to have the highest index for both sectors for both measures. Judging by the weighed mean we notice that all indices across all sectors grow from year 1995 to year 2005. [1]

2.1 How offshoring is different from outsourcing?

Outsourcing became popular among manufacturing firms in the late 1950s, however, it was not well-researched until 20 years later. While at first outsourcing was more of a local phenomenon, later on with the process of globalization and digitization firms do a much broader outsourcing.

In fact, it the decision to offshore does not in general lead to a decision to outsource and vice versa. In many literature authors view the decision about location as the process of strategy making, therefore, bringing activities back could also be a part of strategic planning. However, some research still link outsourcing and offshoring decisions and Graf and Mudambi (2005, p. 254; emphasis added) suggest that: “For each business process, companies first decide how to source, that is, whether to manage the business process in-house, or to outsource it. Once the firm decides to outsource a business process, it must select its business partner, and set the terms and nature of this business relationship. The firm must

	Manufacturing Industries									Services Industries								
	Year 1995			Year 2000			Year 2005			Year 1995			Year 2000			Year 2005		
	Mil	MIO	VS	Mil	MIO	VS	Mil	MIO	VS	Mil	MIO	VS	Mil	MIO	VS	Mil	MIO	VS
Argentina	8.88	5.42	6.01	na	na	na	na	na	na	0.35	0.13	0.19	na	na	na	na	na	na
Australia	na	na	na	9.37	6.12	5.28	7.51	4.83	3.62	na	na	na	0.73	0.36	0.75	0.44	0.21	0.34
Austria	17.11	10.66	14.07	21.49	13.99	17.32	19.02	12.39	14.62	4.11	1.33	2.39	4.34	1.75	2.74	2.34	1.03	1.06
Belgium	26.94	19.08	21.73	30.44	22.54	24.82	21.10	15.51	18.07	3.12	1.71	2.73	3.53	2.02	3.15	2.83	1.51	1.90
Brazil	4.26	2.68	2.54	3.83	2.33	3.91	5.00	3.50	4.14	0.61	0.25	1.18	0.32	0.10	0.16	0.46	0.12	0.04
Canada	21.25	14.35	18.51	20.97	14.46	17.89	na	na	na	2.97	2.53	0.48	1.82	0.78	1.02	na	na	na
China	4.20	3.00	4.17	4.83	3.42	3.99	7.15	5.54	9.91	0.13	0.07	0.10	0.10	0.03	0.04	0.41	0.23	0.29
Czech Republic	na	na	na	22.88	16.41	18.53	23.88	17.92	21.26	na	na	na	2.81	1.48	1.77	1.58	0.88	1.84
Denmark	12.42	7.72	7.50	13.47	8.49	8.37	13.55	8.49	9.31	1.94	0.76	0.98	1.87	0.78	0.98	2.07	0.85	0.77
Estonia	23.35	16.79	19.92	31.02	24.81	33.32	28.85	22.47	27.28	2.87	1.21	1.92	2.49	1.29	1.88	2.74	1.41	1.92
Finland	11.14	7.48	8.32	12.21	8.46	9.28	14.73	10.12	12.24	1.10	0.49	0.35	0.99	0.48	0.55	1.27	0.56	0.49
France	9.90	6.58	8.10	9.12	6.29	7.29	9.83	6.92	8.39	1.27	0.52	1.34	0.78	0.33	0.57	0.92	0.43	1.03
Germany	10.18	6.43	7.53	12.24	8.08	9.28	12.93	8.50	9.45	2.99	0.99	0.84	4.06	1.50	1.31	4.33	1.56	1.27
Greece	10.22	6.17	6.88	9.78	5.79	6.83	9.84	5.85	8.62	0.16	0.03	0.02	0.79	0.20	0.10	0.73	0.22	0.14
Hungary	25.82	18.42	24.47	28.99	21.11	26.03	30.68	23.35	27.48	2.99	1.11	1.17	2.88	1.10	1.36	3.25	1.23	1.56
India	3.92	2.54	2.10	3.38	2.13	1.99	na	na	na	0.54	0.18	0.21	0.14	0.05	0.09	na	na	na
Indonesia	9.67	6.22	7.71	8.88	5.72	7.33	8.37	5.47	5.40	1.25	0.46	0.73	1.31	0.49	0.74	1.09	0.45	0.54
Ireland	23.38	16.55	18.42	24.10	17.05	18.72	na	na	na	5.49	2.10	3.83	11.96	5.42	10.32	na	na	na
Israel	9.99	6.53	6.41	na	na	na	na	na	na	4.25	1.89	7.17	na	na	na	na	na	na
Italy	9.89	6.47	6.36	10.07	6.99	7.53	7.34	5.03	5.76	0.64	0.36	0.39	0.96	0.42	0.50	0.77	0.36	0.54
Japan	3.79	2.38	2.28	4.06	2.86	3.01	4.45	2.99	3.98	1.11	0.44	0.21	0.90	0.43	0.62	0.40	0.30	0.58
Luxemburg	14.31	9.39	9.71	16.83	11.37	11.53	17.08	11.83	11.48	26.09	15.77	25.07	36.51	27.92	36.88	36.21	27.46	35.31
Mexico	na	na	na	na	na	na	27.19	20.61	20.98	na	na	na	na	na	na	0.91	0.31	0.13
Netherlands	17.03	11.50	12.10	16.81	11.78	12.55	18.32	12.94	14.01	3.47	1.46	2.68	3.92	1.80	2.96	6.39	2.83	4.05
New Zealand	8.42	5.41	4.85	7.34	4.73	4.46	na	na	na	1.88	0.73	1.13	1.04	0.53	1.16	na	na	na
Norway	11.47	7.67	11.50	12.65	8.47	12.42	na	na	na	0.76	0.36	0.34	0.01	0.51	0.85	na	na	na
Poland	4.90	2.96	2.91	12.43	8.02	10.01	12.13	8.55	11.27	1.35	0.20	0.84	0.84	0.44	0.92	0.64	0.28	0.47
Portugal	14.05	9.55	12.45	16.46	11.24	15.38	15.88	11.01	15.74	1.05	0.46	1.31	0.97	0.48	0.84	1.05	0.47	0.52
Russia	10.42	6.11	5.15	10.17	5.90	5.42	na	na	na	1.49	0.39	0.62	0.87	0.27	0.30	na	na	na
Slovak Republic	15.95	10.66	12.10	26.83	18.85	22.03	na	na	na	4.86	1.91	2.99	2.58	1.36	1.53	na	na	na
Slovenia	na	na	na	25.81	17.04	19.37	24.88	16.92	18.45	na	na	na	1.21	0.59	0.36	1.97	0.95	2.72
South Africa	4.81	3.21	3.00	7.87	5.42	5.11	na	na	na	0.31	0.10	0.13	0.88	0.24	0.25	na	na	na
South Korea	na	na	na	12.86	9.08	10.73	na	na	na	na	na	na	1.89	0.63	1.34	na	na	na
Spain	11.21	7.81	11.54	14.35	10.43	14.78	10.08	7.08	10.90	1.64	0.59	1.04	2.45	1.00	1.59	1.35	0.56	0.96
Sweden	13.07	8.87	10.04	12.94	9.05	10.43	13.83	9.62	10.73	1.20	0.66	4.31	1.77	0.89	3.19	1.86	0.83	1.87
Switzerland	na	na	na	10.10	6.98	7.24	na	na	na	na	na	na	4.11	1.83	3.48	na	na	na
Taiwan	14.47	10.24	10.28	14.42	10.42	11.48	na	na	na	3.14	1.00	4.78	2.17	0.97	4.39	na	na	na
Turkey	9.07	5.65	5.67	10.08	6.09	7.70	na	na	na	0.53	0.16	0.20	1.88	0.71	1.31	na	na	na
UK	12.35	7.89	9.08	11.23	7.08	10.12	11.50	7.13	9.85	1.00	0.47	0.89	1.10	0.53	1.08	1.24	0.58	1.08
US	14.44	8.87	8.88	16.22	10.88	10.61	16.44	10.88	10.61	2.44	0.88	0.88	2.44	0.88	0.88	2.44	0.88	0.88

Figure 2.1: Offshoring intensity and economic sector. All three indices, narrow measure (%)

	Manufacturing Industries									Services Industries								
	Year 1995			Year 2000			Year 2005			Year 1995			Year 2000			Year 2005		
	Mil	MIO	VS	Mil	MIO	VS	Mil	MIO	VS	Mil	MIO	VS	Mil	MIO	VS	Mil	MIO	VS
Argentina	16.97	10.55	10.82	na	na	na	na	na	na	3.50	1.11	1.97	na	na	na	na	na	na
Australia	37.35	23.21	26.92	45.76	29.27	32.36	43.91	28.29	30.45	16.34	5.73	8.35	16.76	6.94	9.15	19.84	8.00	9.83
Austria	48.77	34.44	36.99	53.75	40.25	42.24	49.79	36.95	38.30	17.08	8.22	12.85	19.58	10.31	15.66	22.63	10.30	12.94
Brazil	10.27	6.53	6.18	10.56	6.79	7.94	14.05	9.70	9.89	4.76	1.88	5.03	7.89	2.87	3.63	5.21	1.68	1.57
Canada	35.01	23.46	27.49	39.51	27.27	31.01	na	na	na	13.66	8.13	4.31	13.93	5.40	6.75	na	na	na
China	10.20	7.22	8.24	12.65	8.07	11.01	16.23	12.23	16.28	6.89	3.26	3.80	6.01	2.92	2.40	11.26	5.76	5.37
Czech Republic	na	na	na	52.16	35.11	41.47	48.07	36.38	39.97	na	na	na	16.36	7.86	8.59	17.70	8.19	10.48
Denmark	35.97	22.19	22.36	38.09	23.88	24.31	38.38	24.28	25.09	12.99	4.48	5.05	13.11	4.93	4.96	21.33	10.62	34.00
Estonia	53.76	36.49	44.74	60.22	46.80	58.07	61.72	46.98	53.14	29.21	14.95	21.45	27.43	13.68	22.68	27.46	13.26	19.29
Finland	29.43	19.73	20.44	32.09	22.52	18.86	37.39	25.90	27.89	9.26	3.44	8.54	15.00	5.80	13.09	15.89	6.08	12.22
France	22.34	14.73	15.92	21.44	14.68	14.94	27.50	19.49	20.32	9.40	3.15	4.29	7.19	2.50	3.17	10.18	3.75	5.90
Germany	23.22	14.75	15.39	28.52	18.85	16.99	30.61	20.54	20.96	8.30	2.88	7.05	11.83	4.38	8.39	11.83	4.45	8.63
Greece	26.27	16.81	17.86	27.98	17.87	19.15	36.51	24.04	26.77	14.83	4.80	5.08	21.68	6.01	8.00	21.21	7.05	22.99
Hungary	53.87	37.45	46.39	62.81	48.78	57.43	63.80	47.68	55.69	17.52	6.80	8.78	19.08	7.96	10.87	18.73	7.85	13.25
India	11.65	7.97	7.14	15.30	10.09	10.67	na	na	na	11.24	3.35	4.63	9.15	2.68	3.51	na	na	na
Indonesia	21.01	13.42	16.07	24.63	15.86	20.04	26.27	15.72	17.23	16.58	5.36	5.64	16.64	7.18	8.89	14.59	6.34	7.98
Ireland	62.66	41.81	43.59	75.82	50.63	53.84	na	na	na	37.97	13.03	16.77	35.74	14.87	23.24	na	na	na
Israel	19.34	12.59	12.66	na	na	na	na	na	na	10.00	5.46	29.50	na	na	na	na	na	na
Italy	25.06	16.82	18.35	27.32	19.05	18.79	21.74	15.13	15.24	8.52	3.27	4.51	8.70	3.84	5.08	9.24	3.95	5.04
Japan	9.52	5.69	4.40	10.18	7.19	5.30	15.43	10.39	8.85	3.55	1.32	7.14	3.21	1.30	7.61	4.27	1.83	8.13
Luxemburg	48.19	30.24	31.35	50.05	32.46	32.90	56.40	38.20	38.15	46.83	23.02	31.49	54.41	35.60	43.97	57.78	37.60	45.22
Mexico	na	na	na	na	na	na	55.47	40.87	42.26	na	na	na	na	na	na	17.06	5.38	5.51
Netherlands	44.32	30.43	31.71	46.13	33.72	35.98	45.40	33.11	35.95	17.97	7.07	13.09	18.41	7.79	13.33	20.22	8.57	13.87
New Zealand	20.48	13.87	11.07	18.59	12.17	11.73	na	na	na	12.53	5.71	9.33	13.91	6.59	9.17	na	na	na
Norway	29.93	19.97	24.06	29.12	19.60	23.19	na	na	na	20.75	9.33	25.70	19.32	9.28	25.37	na	na	na
Poland	16.83	10.32	10.83	30.35	19.98	22.05	30.86	21.29	24.25	9.42	4.03	5.25	9.64	3.95	6.49	13.96	5.38	6.79
Portugal	30.44	21.49	23.23	36.55	25.93	27.78	38.75	27.88	29.90	14.43	5.46	8.74	14.05	5.44	6.92	14.14	5.37	7.03
Russia	16.47	9.49	8.14	18.08	10.40	9.35	na	na	na	14.83	4.54	3.77	13.45	4.55	3.19	na	na	na
Slovak Republic	40.40	26.91	28.95	60.36	43.70	48.99	na	na	na	18.06	7							

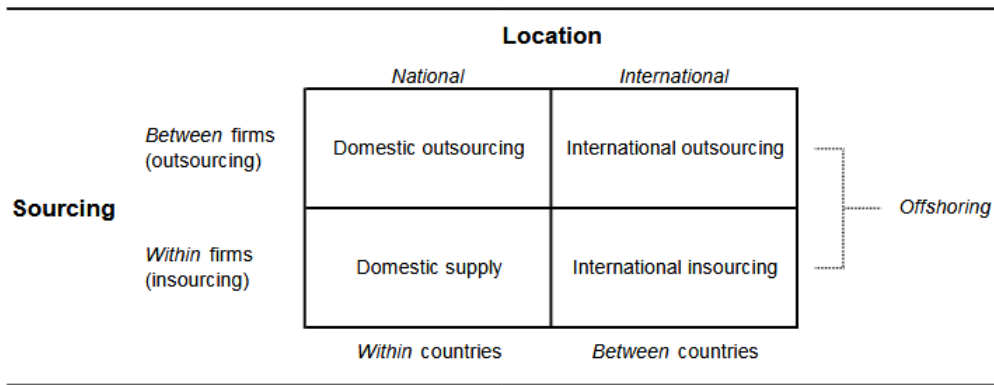


Figure 2.3: An illustrative matrix of insourcing, outsourcing and offshoring

also decide the location of the business process operations. The location and business partner selection decisions are closely related”, [19]

Some literature uses the terms offshoring and outsourcing interchangeably, but the terms do describe two distinct phenomena. Broadly speaking, offshoring can be categorized as a form of outsourcing. Outsourcing could be defined as “the process of contracting a third-party provider to perform the tasks that companies will assign to them”. Offshoring, if particular, refers to bringing business activities that businesses and corporations use to obtain services and products to a different country, no matter whether provider affiliates to an organization or is external.

Therefore, tasks could be outsourced but not offshored. By outsourcing companies can contract works out to external individuals or organizations regardless of their location. For instance, it is possible to have some services done by a third party, such as lawyer service. The reverse is also true, see [35]

The first reason why it is beneficial for businesses to outsource is that “some products and services are usually offered at lower prices while maintaining the same quality level as if the job was done internally.” Second, some companies are seeking another provider to have an access to specialized results that require more knowledge and skills than what could be obtained internally. Third point is that “outsourcing offers them the flexibility to only pay for what they actually need and will use.” [25] “Outsourcing may include job relocations both within and between countries, whereas offshoring refers only to international relocations.”

Figure 2.3 describes the main features and differences between insourcing, outsourcing and offshoring. Karsten Bjerring Olsen in OECD Science, Technology and Industry Working Papers 2006/01, Productivity Impacts of Offshoring and Outsourcing: A Review is saying that “The impact of outsourcing on productivity is commonly analyzed by estimating labour productivity through a production function framework. Other, but less frequently used approaches include the estimation of total factor productivity (TFP), TFP growth breakdowns and ANOVA analysis.

The standard approach used to study outsourcing’s impact on productivity, especially at the level of the firm, is to estimate a production function given by

$$Y_{i,t} = A_{i,t}F(K_{i,t}, L_{i,t})$$

where Y refers either to output or value added, A is the technology factor, K is capital, and L is labour. The subscript i refers to either industry or firm depending on the type of data used, whereas t refers to time. The functional form is usually assumed to be a Cobb-Douglas function. [20]

2.2 Disadvantages of offshoring

In the model that will be presented in Chapter 4 it is assumed that the company is already operating offshore, meaning that it must have recognized that the pros of doing so outweighed the cons. In any case, it is worth mentioning main disadvantages of offshoring.

The first one is the risk of exposing confidential data and/or information. When work is outsourced or offshored, especially human resource and related services, there is always the risk of exposing confidential and sensitive information to a third party service provider, besides the already obvious disadvantages of outsourcing payroll and human resources. Companies have to be sure to only contract with a trusted third party firm and be certain about the extent of the company information they are willing to share.

Second one is calibration and synchronization. Companies should select the most trustworthy and competent outsourcing and/or offshoring partner. This is because when the third party service provider does not deliver, company may encounter delivery lags or stretched delivery time schedules, sub-standard quality output, and inappropriate responsibility categorization, which may prove more costly in the end. [25]

In addition, there exist some visible and invisible costs of offshoring. Consider service offshoring. While offshoring services and knowledge can help a company gain a competitive advantage using cheap labour, tariff reduction, tax breaks and other economic incentives offered by the foreign government, access to knowledge and skills, and constant service coverage, service offshoring is not without its challenges. In some cases the cost of recruiting and training as well as time and effort devoted to those activities cannot be ignored. In some countries among some problems related to service offshoring could be infrastructure issues, such as power blackouts and telecommunications weaknesses may interrupt operations. This is lowering productivity and incurring additional operational expenses. On top of that, foreign employees often do not have a full understanding of the home country business environment and customer expectations for high service quality. Since sometimes customers may be unsatisfied with offshoring services, the “invisible” cost is the cost of acquiring new customers to replace those who have either defected to other providers or reduced their business with the firm.

Another issue could be that unlike manufacturing that does not need customer presence during production, some services require customer involvement, from being physically present during the service process to actively involved in co-production of services. [26]

Chapter 3

Offshoring and reshoring

The process of offshoring is reversible, meaning that an organization can decide not to offshore its production or services anymore at any point in time. In our model, we denote that time as switching time. The reasons could be numerous and there also exist several terms describing the phenomenon of bringing business activities back to the home country. The latter include such terms as reshoring, backshoring, back-reshoring, inshoring, back-sourcing and onshoring. In the current study we mostly use the most common one, which is reshoring.

Interesting fact is that companies can decide to stop offshoring independent of their governance mode, whether it is insourcing or outsourcing.

Here we suppose that if there is a change, suggesting that a company changed their mind about maintaining offshoring activities, then the switch is happening at some time τ . There could be no change at all, so the model stays the same.

3.1 Deterministic change

The change could be deterministic. If it is so then when the company made a decision to offshore, it already planned to repatriate activities at some point in time. Here we analyze the reasons for such a mindset that a company might possess.

We look at both reshoring of manufacturing and services. However, the two concepts are rather different as manufacturing reshoring has stricter exit barriers and is typically more costly than that of services (we look at the case of a call center).

Offshoring could be a temporary decision based on the availability of resources in a foreign country. Such a decision could be related to external factors or could be internal to the company. The latter is more probable in the case of a deterministic change as it could refer to a company that is considering reshoring as a deliberate strategy rather than a correction of a prior misjudged decision to offshore. For instance, Grandinetti and Tabacco (2015) specifically referred to changes in a firm's business strategy consistent with the idea that reshoring is "more than just a geographical shift of operations. It is also a reconfiguration of systems" (Mugurusi and de Boer, 2014, p. 275). [2] Backshoring decision could be seen as a responsiveness to customer demand and it is one of the most important aspects in this study as we explore the demand function and its variation in the mathematical model we will analyse at chapter on an optimal control model with switching time. As mentioned earlier the deterministic decision of repatriation of company activities, in other words its strategic decision, could be divided into internal and external environment, following the suggestion of Fratocchi et al. (2016).

First factor causing reshoring decision to be deterministic that can be categorized as external could be access to skill and knowledge. At the time of starting business in a foreign country, the host country could have a substantial lack of skilled workers.

However, the organization could be aware that, for example, the government has invested a lot of monetary resources into providing quality engineering education in the country several years ago. Then the company knows that in the following years the labour market will be abundant of newly graduated well-educated engineers seeking for jobs in a home country. Thus, the unavailability of the supply of those worked will be eliminated in, let's say five years and, therefore, the company plans to bring back business earlier offshored in five years.

Second deterministic factor could be reduction of labour cost gap between the host and home country. Nowadays there are a lot of experts that are trying to predict country's economic trends. As a result, the company might trust the analysis of experts predicting economic boost of a host country. This means that it would not be as profitable and reasonable anymore to continue offshoring manufacturing or services.

The costs of offshoring would substantially increase, later in the study we will see that in mathematical terms it means κ_0 would get too close to κ_d .

Another deterministic factor could be customers' gratitude and willingness to buy. Later in the paper we analyze why customer's willingness to buy and attitude towards offshored products might change. It may depend on the generational tastes, migration, "made-in" effect gaining a larger importance, sudden animosity towards host country and other effects. As an organization anticipates lower willingness to buy, decreasing consumer demand, it can settle for a certain time to repatriate a production or services.

3.2 Made-in effect

Although most of the companies try to maintain the same standard of goods and services domestically and at an offshore sight, both the quality and the perception of quality by the consumers may vary across countries. The latter describes "made-in effect", meaning that consumers might be skeptical to buy products of, for instance, Gucci, but with "made in India" or "made in China" label and are not willing to pay the same price for them.

"Made-in" effect – the importance of this effect in the consumer's evaluation of product has been reported many times as well as the importance of the relation between this element and the companies' location decision.

The reshoring strategies were seen as a way to preserve a certain country's excellence quality production. Some studies showed that there is the common idea that products made abroad, especially in not fully developed countries, are not able to completely satisfy their needs compared to those made in the home countries. This aspect leads to the consequence that most participants believed that reshored products are superior to offshored ones in satisfying their needs.

Country of origin of a product has always played one of the key roles in global marketing. According to the research certain countries are famous for their quality of certain products, such as Germany in cars, Japan in consumer electronics, and France in wines. Nowadays some consumers do not mind any "made-in" label because of widespread outsourcing and offshoring processes. "The German car might be made in South Carolina, the patriotic American buyer of a Samsonite suitcase might find that the luggage was made in India". However, a great portion of consumers care a lot about the made-in effect, or it can be also called country-of-origin effect.

It is especially true for luxury brands customers. Take Gucci as an example. People might not be happy to buy Gucci having a label that says made in other place. First of all, that is the reason why offshoring production must be limited. There are some customers that would be satisfied with buying products with that label but others would be not, therefore, companies try to satisfy as many people as possible while still maximizing the profit with the possibility of having lower costs with the help of offshoring.

Some people feel cheated when they discover that their, say, Louis Vuitton bag is not made in France, but made in China, etc. Thus, country-of-origin effect is especially vital for luxury brands, so they normally reject any outsourcing and offshoring ideas. The brand identity suggests the country identity. As a result, multinational companies ensure that their production sites follow strict quality controls of the brand's origin.

The demand for certain products, in particular for luxury goods, can alter due to income effect. As such, it might happen that everyone who was previously willing to buy offshored products have now decided that they would rather buy more expensive products but with "made-in" their home country label and, therefore, the demand for offshored products would go down or almost decay.

In the mathematical model presented in the last chapter the linear differential equation is telling us that the sales, which means the demand for the product, gets lower with the increase of offshoring. It signals that customers are not as satisfied with the product that is produced non-domestically as opposed to the same brand produced in the home country.

The reason for decreasing demand might be also due to other beliefs of the consumers. The customers might be concerned that the unemployment rate in the country of origin is high and dislike the fact that offshoring gives job opportunities to citizens of another country rather than their home country. It especially might be true for luxury products because, by making an assumption that the demand is inelastic to price, the customers are willing to pay a higher price if needed. As a result, they might be motivated to promote creating more jobs in their country of origin and cause negative relationship between the demand and the offshoring production.

The country of origin could form positive or negative stereotype for products among consumers. Speaking about the former, German brand is associated with good quality beer, Japan with good quality microelectronics and so on. In turn, negative ones can threaten firms' attempts to place goods within a

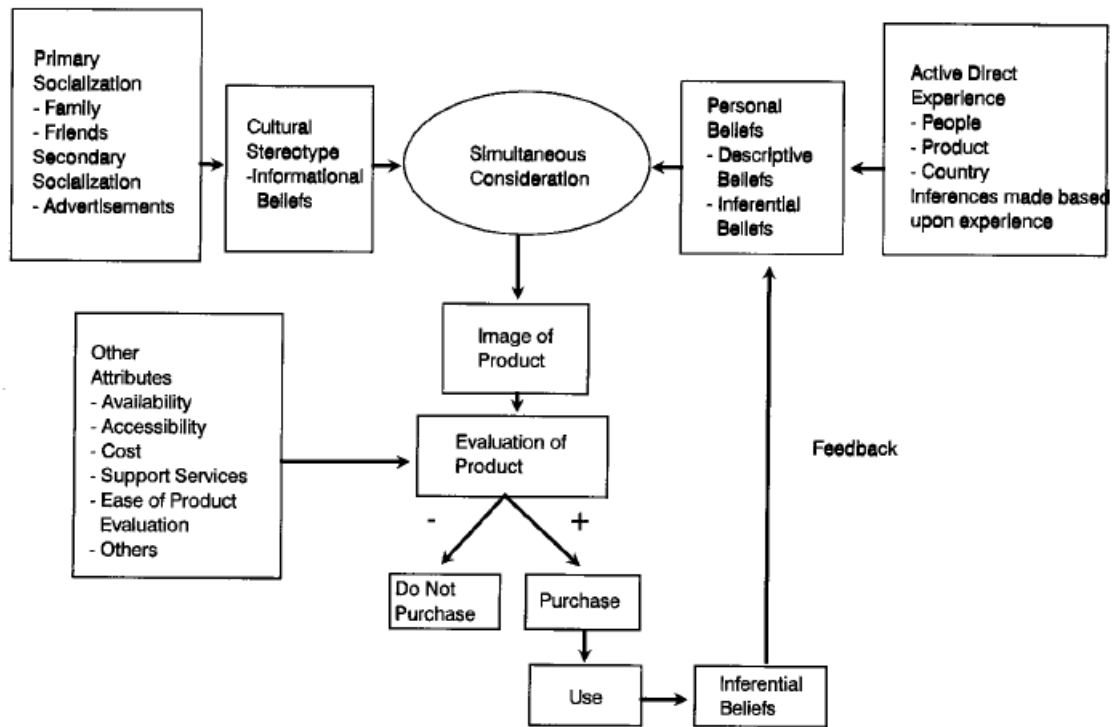


Figure 3.1: Conceptual diagram for country-of-origin effect

foreign market. Therefore, “made-in” reflects how much the place of manufacture influences consumers’ product evaluations.

Some researchers suppose that cultural characteristics affect the weight given by consumers to the made-in effect as an attribute in their evaluations of foreign brand names. For instance, Papadoupoulos et al. (1993) underlined that consumer attitude towards made-in concept is related to “three components associated with the standard attitude model namely their “cognitions” which include knowledge about specific products and brands, consumer “affect” or favorable/unfavorable attitude towards the country of origin, and their “conative” behavior which is related to actual purchase of a foreign brand.”

Stereotypes that people attribute to certain countries affect customers’ buying behaviour. Hong and Yi (1992) have studied country-of-origin effects and their results exhibit that those effects are different according to nationalities. They further elaborate that consumers who are used to utilizing foreign products made in developing countries such as China or Mexico (Americans) did not consider the negative image linked to products made in these countries, while people who are not used to such products (Koreans) tend to place a lower value to those products and act according to stereotypical country-of-origin image. An explanation to this phenomena could be that Koreans do not have sufficient direct experience with the Chinese or Mexican offshored products. Thus, they could not develop their personal viewpoints related to those countries and its offshored products, so their evaluation of products from these countries was based on stereotypical images of those places. “The Americans, on the other hand, had well-developed cognitive structures with respect to their personal beliefs about these countries. This was due to their active direct experience with products from these countries. As a result, their personal beliefs about the country took precedence over the cultural stereotype about the country during product evaluation (see Figure 3.1).”

A lot of studies have been done on made-in and country-of-origin effect and how it affects consumer behaviour and product evaluation. “An approach considering country image as arising out of stereotypical beliefs is taken to arrive at several research propositions, the empirical testing of which would provide an opportunity for further research.” [10]

3.3 Animosity

“Made-in effect” is the top factor influencing the decision of consumers to buy products. A very similar and very important concept nowadays is animosity. By definition it is a strong feeling of dislike or hatred or an antagonistic attitude.

Theory of animosity toward another nation is meaningful for predicting consumers’ behavior towards

foreign products, even when this enmity is not linked to ideas about the products quality produced in that country.

The decision making of consumers and their attitude towards nations are related and the Klein et al. (1998) first analyzed the tensions that may arise in this situation. If consumers disapprove of certain country's current actions, politics, views, there is a high possibility that they would not consider purchasing a product made in that country. When describing animosity Klein et al. (1998) as well as Harmeling et al. (2014) in their studies refer to animosity as consumers' strong feelings of dislike or even hatred toward a country due to its political, military, or economic behaviour. As a result, it has a significant effect on customers' buying behavior and Nijssen and Douglas, 2004 showed that this effect is direct and negative. Animosity could be caused by consumers not supporting particular territorial, economic, political, religious disputes and issues caused by a country that is offering an offshored product. Also some authors underline that animosity could be war-based or economic-based. Researchers mostly analyze economic reasons, however, nowadays with the ongoing military tensions in different places of the world, other source of animosity is given attention as well. Animosity related to economics could be caused by consumers' negative opinion about some unjust trading policies imposed by the country where offshoring takes place or in general current weak and unreliable economic situation of the host country.

Animosity that is linked to the war is related to behaviour perceived by customers as inappropriate, unfair and maybe even inhuman. Some articles mention such influencing examples as Japan's occupation of China or Korea and Japan's bombing of Pearl Harbour. "Ettenson and Klein (2005) have studied an interesting case that can be used to make a point on this matter. They studied the reality of Australian consumers toward France during two different points in time: during France's nuclear testing in the South Pacific (leading to severe diplomatic tensions between the two countries), and then one year later (when the testing had already been stopped and relations had partially recovered). The findings show how the level of animosity detected over the second period was lower, and so decreased, in confront of the level measured during the first period."

With ongoing tension between Russia and Ukraine, many companies have curtailed operation in Russia, including the offshoring ones. The US, EU and UK have all imposed economic sanctions on Russia and even regular consumers of various countries in the world, who do not support the actions of Russia, have developed animosity towards using its products and services. In general more than 1000 companies have stopped their businesses in Russia including such big names as McDonald's, Coca-Cola, Starbucks, Heineken, Netflix, Sony. Gelbrich, 2010, Lazarus and Folkman, 1984 as well as Roseman, 1996 described "well-affirmed cognitive-affective theories which suggest that individuals develop beliefs about an event that are incongruent with their expectations and these beliefs guide the emotional response, which consequently prompt coping processes, or efforts to alleviate distress caused by the event. The result is that different negative emotions motivate unique coping processes (Roseman, 1996; Wright, 1995)." Some studies highlight that without a doubt, consumers' feelings about certain events and reality can be not in accordance. It means that their attitude towards potential threat, damage and future of the host country could be exaggerated and not in line with the real situation. Lazarus, 1991 mentioned that when such biased expectations are developed, they cause particular cognitive and behavioral responses as well as negative emotions and the situation is considered as misdeed or threat. Cannon's (1939) makes a distinction between two types of negative emotions: agonistic (anger), which is approach-oriented and retreat (fear) emotions which is avoidance-oriented. Nesse (1990) says that anger triggers fighting behavior from people. In this case they tend to cause harm or try to punish their source of distress and they want to prove others that the actions they are judging are improper and offensive. Bougie et al., 2003 suggests that this agony leads to kind of penalty to the offender both by declining or withdrawing completely from their own consumption of products produced in that nation and by convincing other customers to do the same.

Speaking about the second type, consumers merely tend to have surviving behaviour by avoiding existing or potential damage. Retreat roots from uncertainty and risk, that is why the coping mechanism for people in this case is to try to eliminate it as fast as possible. Therefore, customers do not care as much about persuading others, they are only concerned about immediately altering their consumer behavior by switching to product avoidance. This type of people might have favoured the product in the past, but have drastically changed their mind towards escaping due to growing and ongoing tension, conflicts, etc. Shoham et al., 2006 claims that "consumers will attempt to achieve to reduce the tension and justify product avoidance by devaluing product quality judgments". "Harmeling et al. (2014) provide a frame considering three potential coping processes.

- NWOM (negative word-of-mouth) – this frame predict a specific customer's behaviour to actively spread negative information about a given country in order to discourage other people from buying products from that country (Bougie et al., 2003);
- Product avoidance – this frame considers a customer's rejection of products from the offending nation. Differently from NWOM, it is a passive process and it consists in the adjustment of the individual's

behaviour without influencing the others;

- Product quality adjustment – this frame is the only cognitive one and it reflects the adjustment of the initial assessment of the quality of products from the offending country”.

On top of that, Jung et al. (2002) and Ang et al. (2004) introduce a model that has four types of animosities. The first one is stable, based on a general historical perspective; second is situational, based on a situation-specific perspective and of a temporary nature. The other two dimensions of the model include national, that is generated on a macro level, it stems from actions which generated harm to the nation; and personal, that is generated from the person’s personal experiences. There is much more research that is related to national type of animosity rather than personal, however, the latter is still investigated by Jung et al. (2002) and Ang et al. (2004). Personal one is undoubtedly related with unpleasant personal experiences either in the country in question or with the people from that country. These two authors also showed that stable animosities are strongly linked to warlike incidents and other rebellious events. “They are based on historic events from World War II (Klein et al., 1998; Nijssen and Douglas, 2004) back to the US civil war in the nineteenth century (Shimp et al.,2004).” Situational animosities, in turn, are considered to be more related to economic reasons. Klein, (1998,2002) and Nes et al. (2012) constructed a model of animosity in People’s Republic of China. The assumption was that Chinese consumers have bias towards items from Japan that includes animosity caused by both warlike events and economic issues. This is an evident example because of “long history of battle and military clashes between the two nations and in particular, the horrific slaughter of 300,000 civilians committed by the Japanese in December 1937, and January 1938 in Nanjing.”

Another explanation in this case is that “several foreign investors, including the Japanese, are “buying and burying” Chinese brands to champion their own products (Liu 1996). Thus, the hypothesis made were:

- H_1 : Animosity and consumer ethnocentrism (as measured by the CETSCALE) will emerge as separate and distinct constructs in the model; “Consumer ethnocentrism is defined as “the beliefs held by consumers about the appropriateness, indeed morality of purchasing foreign-made products” (Shimp Sharma, 1987, p. 280). The high ethnocentric tendencies lead to unfavorable attitude toward purchasing imported products. According to Shimp and Sharma (1987) consumers refuse to buy foreign products because it is harmful to the national economy and can also be a direct or indirect cause for unemployment. Similarly, Wetzels, De Ruyter, and Van Birgelen (1998) reinforce the factor of allegiance to one’s country, which leads the consumers to refuse buying foreign-made products. Thus, consumers exhibiting a strong sense of ethnocentrism are less, if not at all, interested in the consumption of foreign objects and services mainly due to a shared belief of the immorality of such a behavior and its harmful consequences on the local economy (Strizhakova, Coulter, Price, 2008).” [12]

- H_2 : The construct of animosity will be indicated by two first order constructs: war animosity and economic animosity;

- H_3 : Animosity will have a direct, negative impact on willingness to buy if product judgments and consumer ethnocentrism are held constant;

- H_4 : Animosity will influence willingness to buy independently of product judgments; that is, animosity will have no effect on product judgment.

Here are some results of the model. In the model Klein found that animosity and customer ethnocentrism are two distinct concepts and generate different output. Then, the more animosity Chinese consumers possess towards Japan and its people, the less is willingness to buy products from that country. This output is shown to be independent from the judgments of Japanese goods.

The conclusion that could be made here is that customers start to avoid buying Japanese products because of the origin of the products and not because of their perception of the quality of considered goods. Klein et al., 1998 asserts that “apparently, consumers are able to acknowledge the quality of goods from a target country while expressing hostility toward and a marketplace aversion to products from that country.” “Four years later, Klein (2002) (Figure 3.2) has provided a revised version of the previous model. A professional market research firm collected the data through nationwide panel of 500,000 households. This new version considered two new constructs that measure preferences for buying Japanese products over South Korean products and preferences for buying Japanese products over U.S. products. This methodology has been used for a precise motivation; such as Japan represents an high developed Asian country and it has not antecedents of animosity with United States.”

“ H_1 : Consumer ethnocentrism will be (inversely) related to preferences for a Japanese over a U.S. product, but will not be related to the choice between a Japanese and South Korean product; H_2 : Animosity will be (inversely) related to preferences for a Japanese product over a South Korean product, but will not be related to the choice between a Japanese and a U.S. product.

Based on previous findings that animosity is not associated with product denigration, while consumer ethnocentrism is (Klein et al., 1998; Netemeyer et al., 1991; Shimp and Sharma, 1987), the following is hypothesized: H_3 : Animosity will be not be related to Japanese product judgments, while consumer

Structural Equation Model Results

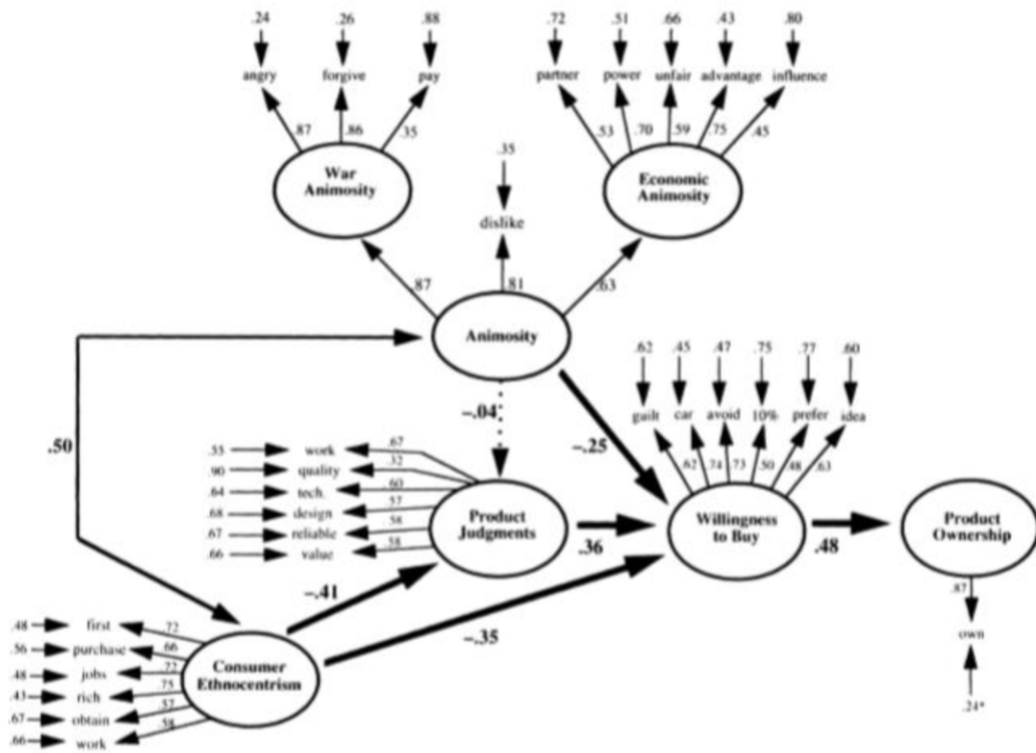


Figure 3.2: Klein's model (1998)

HYPOTHESIZED ANIMOSITY MODEL

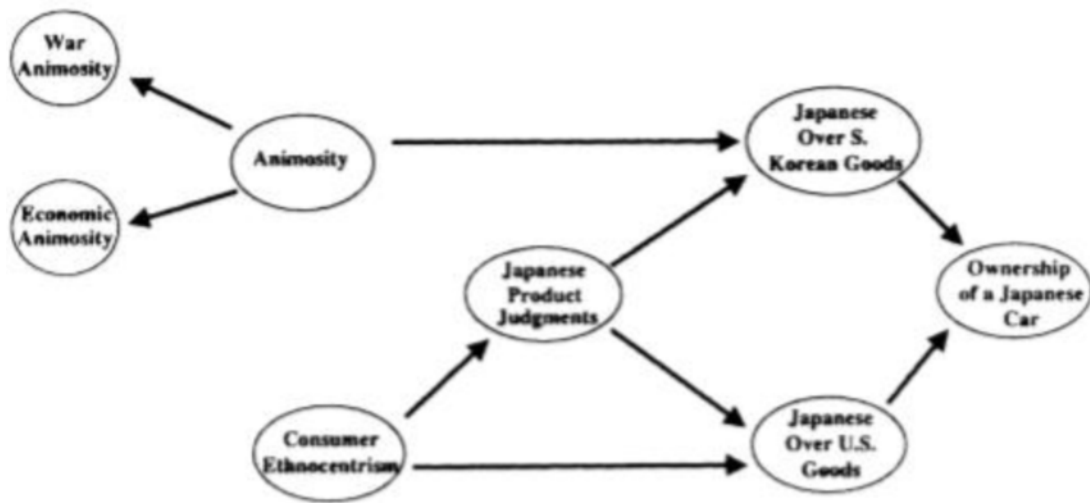


Figure 3.3: Klien's model (2002)

ethnocentrism will be (inversely) related to Japanese product judgments.

As a result of this research, it can be concluded that animosity and consumer ethnocentrism may have a great influence in the international marketplace, making the country of production be of a significant importance. A customer who has high level of ethnocentrism is more likely to make a choice toward domestic good or service rather than a foreign one.

If the customer has to choose between two products produced outside their own country, then animosity comes into play and does not allow the customer to choose a good from the country of conflict. Moreover, animosity and customer ethnocentrism are not the same when it comes to goods evaluation and choice.

However, two phenomena do not have the same characteristics of consumer behaviour in different countries. In fact, in the United States, consumer ethnocentrism was prevalent in determining the choice between US and Japanese goods, while in other markets, where animosity is more dominant than consumer ethnocentrism, the former has a greater impact on a choice between a domestic and a foreign product (Klein, 2002) (Figure 3.3).

Furthermore, it might be important to also distinguish between different groups of customers by such features as age, for instance. As such, research has shown that “older consumers tended to be more likely to show animosity toward Japan, and men held more economic animosity than women while younger consumers are more emotionally distant from these historical events and so less engaged with them.” It is similar to the previous discussion about “made-in effect” on different age groups. Nes et al.’s study (2012) on animosity provides additional types to the war and economic ones.

Thus, the author also highlights political animosity, that “refers to the internal politics of the animosity target and the most frequently indicated reasons are authoritarian government, government regulations and policies, censorship imposed on the people, lack of freedom, oppression, human rights violation, undemocratic, woman’s rights, male dominated.” The studies talk about political animosity as animosity caused by not supporting the way a certain country’s power is used. Consumers in this case base their attitude on their personal norms and morals when judging the use of political power within a foreign country. Another addition by Nes is people animosity, that implies a strong antagonism for the mentality and maybe of the recognized ill will of the sample country. “It has been observed that several respondents expressed animosity feelings toward foreign country due to negative impressions of immigrants from the animosity country who live in the country.”

To conclude, animosity indeed affects peoples’ intention to purchase products as it has a negative correlation with their biased opinion towards a country and/or its citizens. Furthermore, some studies show that both product beliefs and psychosocial effect determine buying behavior. [21]

3.4 Child labour

Among the reasons why customers might want to abstain from buying products from a certain country is the exploitation of child labour by that country. Many humanitarian groups have been focused on eradicating child labour in modern world, however, a great number of big companies around the globe employ children in order to gain profits.

Some companies still actively use child labour even though they are always attempting to reject it. Such companies as Mars, Nestlé and Hershey with their farms that form world’s most essential source of cocoa still utilize cocoa harvested by children. The issue is still a heated topic regardless the fact those leaders promised to eliminate it around 20 years ago. The companies have been trying to find out whether children were exploited to produce their goods and services because sometimes they do not even know from which farms all their cocoa comes from. “About two-thirds of the world’s cocoa supply comes from West Africa where, according to a 2015 U.S. labour Department report, more than 2 million children were engaged in dangerous labour in cocoa-growing regions.” “Industry promises began in 2001 when, under pressure from the U.S. Congress, chiefs of some of the biggest chocolate companies signed a pledge to eradicate “the worst forms of child labour” from their West African cocoa suppliers.” [28]

Some call it modern slavery to hire children for farms, factories and other, for the purposes of global supply. Global risks advisory firm Maplecroft in its study mentions the largest abusers of child labour, namely Bangladesh, China, India, Nigeria and Pakistan. Firm’s research highlights that this exploitation stems from country’s poverty and trouble accessing education as well as vulnerability to the effect of climate change.

Figure 3.4 shows the percentage of adolescents aged 15-17 years in hazardous work, by sex and country. Source: UCW calculations based on national household surveys. “The estimates indicate that there are substantial shares of adolescents in hazardous work in most countries where data are available, although there is large variation across countries and regions. The incidence of hazardous work among 15-17 year-olds is highest in Nicaragua (34 percent), Cambodia (30 percent) Honduras (27 percent) and Lao PDR

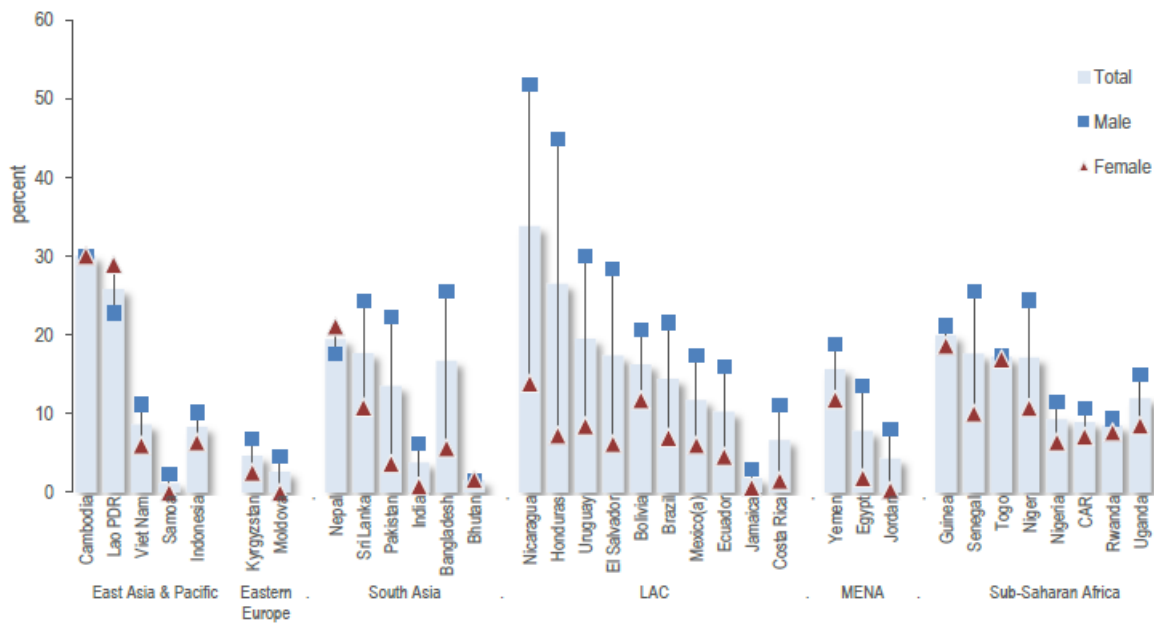


Figure 3.4: Percentage of adolescents aged 15-17 years in hazardous work, by sex and country

(26 percent). The number of adolescents in hazardous work is greatest in populous India (2.4 million), Pakistan (1.3 million) and Indonesia (1.2 million).”

“UNICEF’s standard indicator for child labour includes the following:

- Age 5 to 11 years: At least 1 hour of economic work or 21 hours of unpaid household services per week.
- Age 12 to 14 years: At least 14 hours of economic work or 21 hours of unpaid household services per week.

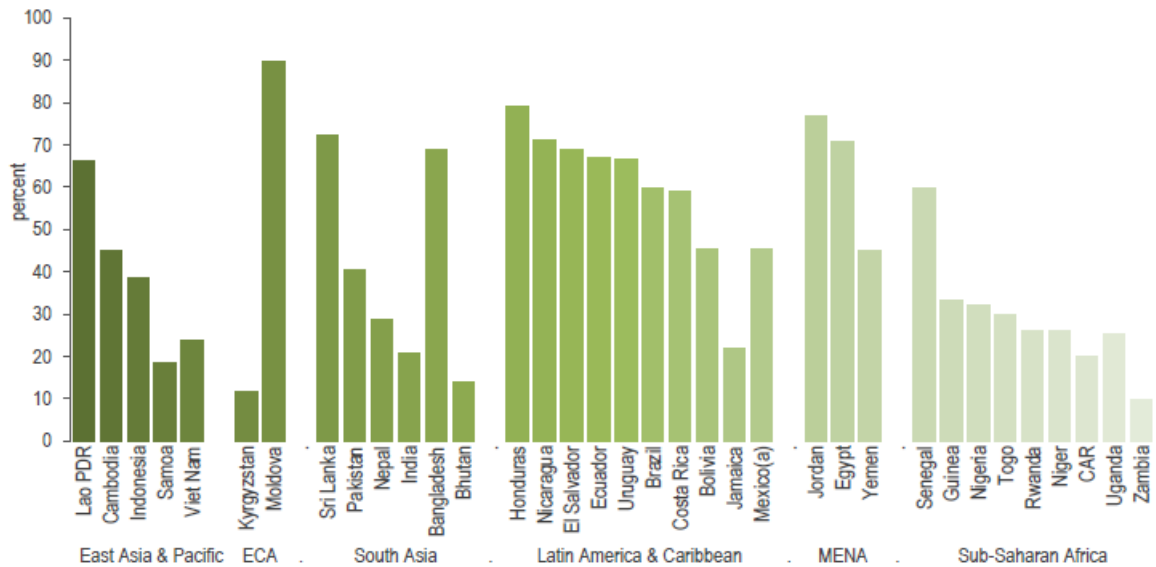
• Age 15 to 17 years: At least 43 hours of economic work per week.” Understanding Children’s Work (UCW) Programme was launched in 2000 by the International Labour Organization (ILO), the United Nations Children’s Fund (UNICEF), and the World Bank to understand the situation of child labour in the world. The data says that for the year 2012 47.5 million adolescents aged 15 to 17 years are in hazardous work, which is a huge number. There is a high probability that such work jeopardizes safety, health conditions of working children and deprives of a number of integral things necessary for their normal development. Such things include education, recreation, socialization with peers at educational institutions, company, love and care of parents and siblings at home, and overall striving towards dreams and bright future. Being deprived of such vital components of childhood and life in general certainly affect children while the outcomes of this might be evident and measurable only some time later. As a result, children are bound to have future personal and social aftereffects.

The policy efforts suggested in the study are that nations should try to eradicate adolescents from dangerous job conditions and, in general, prevent any underage working attempts. As mental and social factors are linked to physical health overall, it is crucial to understand the social, economic, psychological, and cultural background factors when considering health conditions of the child labourers.

Understanding Children’s Work (UCW) Programme exposes information on how adolescents face their job’s hazardous conditions, what kind of danger they are put into, and most common sectors and occupations posing health and other threats. “Hazardous work among adolescents who are above the general minimum working age but not yet adults (i.e. those aged 15 to 17 years) constitutes a worst form of child labour and a violation of international labour standards.”

Statistics in the report are showing that males predominate in the share of people under hazardous work conditions. In fact, manufacturing, electricity, gas, water, mining and construction (industry in other words) are the sectors with the most dangerous jobs. Nevertheless, there is crucial variation across countries. Authors highlight that European data on adolescents’ job accident rates imply that adolescent hazardous work is not only a feature of developing countries.

Figure 3.5 is showing percentage of employed adolescents aged 15-17 years in hazardous work, by country. On a global scale, people having hazardous job constitute 40 percent of all employed adolescents. It is worth noting from the figure that in a great number of countries this share goes up to over one-half or two-thirds (e.g., Moldova, Honduras, Lao PDR, Sri Lanka, Nicaragua, El Salvador, Ecuador, Uruguay, Jordan and Egypt). The study supposes that this important issue is related to the lack of decent job



Source: UCW calculations based on national household surveys (for details see Appendix Table A1).

Figure 3.5: Percentage of employed adolescents aged 15-17 years in hazardous work, by country

opportunities for youth.

The report highlights that not only child labour problem should be well investigated and dealt with, but also enhancing occupational safety and health (OSH) in general. New policies and strategies need to be implemented in order to eliminate young people from hazardous work as well as to improve any dangerous work conditions. “These efforts should be framed within a broader emphasis on ensuring young persons’ rights at work, in order that they receive equal treatment and are protected from abuse and exposure to hazards.”

Among occupations that ILO mentions as hazardous are optical and electrical equipment operators, health associated professionals, nursing midwife, protective services, forestry and related workers, fishery, hunters and trappers, miners, shot fires, stone cutters and carvers and others.

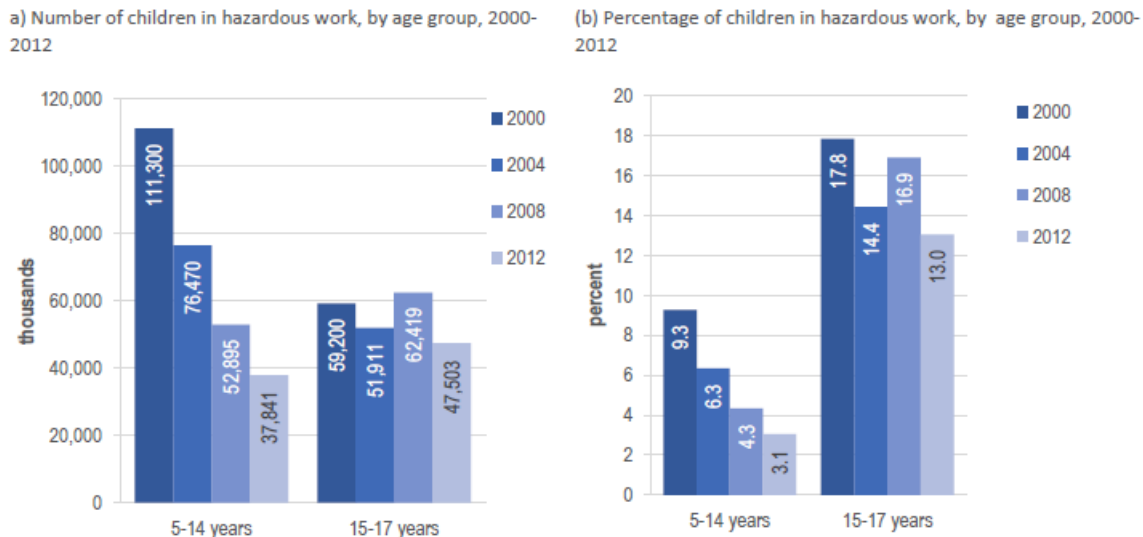
Figure 3.6 (a) is showing the number of children in hazardous work, by age group, 2000-2012 and (b) is showing the percentage of children in hazardous work, by age group, 2000-2012. The decline in incidence of hazardous work has been much slower among older, 15-17 year-old, children.

Data also implies that the issue of adolescent work is the most acute when it comes to child labour because youth of age 15-17 accounted for 24 percent of the total child labour population in 2000 while in 2012 the figure grew to 28 percent. This is due to the fact that the fall in child labour among 5-14 year-olds was more substantial than the decline in child labour among 15-17 year-olds. Therefore, when taking actions against child labour, nations should address this matter among adolescent population with a great scrutiny.

From Preamble to Worst Forms of Child Labour Convention, 1999 (No. 182): “Hazardous work cannot be acceptable for children because of basic biology. Children are not simply smaller adults, they are physically and mentally different; and regardless of cultural perceptions or social construct, the transition to biological adulthood extends past puberty well into the late teen years. This is the foundation for the argument against hazardous work of children . . . the rationale for why it is classed as a “worst form of child labour [that] requires immediate and comprehensive action.” [8]

For instance, “a complaint has been filed against Rihanna’s cosmetics brand, Fenty Beauty, for its alleged use of mica derived from child labour in India. Vinya Joshi, of the activist organization Legal Rights Observatory, filed the complaint to seek an investigation from the National Commission for Protection of Child Rights (NCPCR) on the source of Fenty Beauty’s mica. Joshi’s statement alleges Rihanna’s company uses child labour to extract ‘blood mica’ from mines in Jharkhand, one of India’s poorest regions.” [34]

Shein, a Chinese online fast fashion retailer, also has several child labour accusations. Nevertheless, Shein denies and its “social responsibility page states that it “never, ever” engages in child or forced labour, but does not provide the full supply chain disclosures required by British law.” [40] Even though it claims that it is ethical and sustainable, in fact, it lacks disclosures. Another example is Swedish



Source: IPEC, *Global child labour trends 2008 to 2012* / International Labour Office, International Programme on the Elimination of Child Labour (IPEC) - Geneva: ILO, 2013.

Figure 3.6: The number of children in hazardous work, by age group, 2000-2012 and the percentage of children in hazardous work, by age group, 2000-2012

fashion chain HM. It had clothing factories in Myanmar where children as young as 14 toiled for more than 12 hours a day. One girl that started to work at the age of 14, told the authors of *Modeslavar*, or *Fashion Slaves* in English, that the company employed everyone who wanted to work. As a matter of fact, “Writers Moa Kärnstrand and Tobias Andersson Akerblom met with 15-year-old girls who were working until 10pm in breach of Myanmar’s laws and the international labour convention. The girls were working for two factories, Myanmar Century Liaoyuan Knitted Wear and Myanmar Garment Wedge, both near the capital, Yangon.” [29] Zara, a Spanish fashion chain, also was at the center of accusations regarding child labour and employing workers as young as 14 in ‘slave labour’ factories in Brazil, in two factories of San Paolo.

Made In Brazil says that an investigation exposed foreign workers labouring under ‘slave-like conditions.’ The 15 labourers, from Bolivia and Peru, included a 14-year-old girl and were ‘set free’ from two factories in São Paolo, where they worked for more than 16 hours a day in the ‘unsanitary and hazardous work environment’ and were prohibited to go out the factories with no windows. “They were reportedly paid between R274(171) and R460(288) a month, less than Brazil’s legal minimum wage of R545(341). The Ministry of labour and Employment in Brazil has charged Zara with 52 infractions, says Made in Brazil.” [44] Mitra S. has “A study of the health conditions of child workers in a small scale leather industry in Calcutta.” This study was carried out in order to provide more information on health conditions of working children, especially linked to their specific occupations and workplaces. It also compares the health conditions of the working children with non-working ones that are in the same environment and belong to the same socioeconomic class; and examines any particular health risks to the child labourers in this industry.

The study was undertaken in the city of Calcutta where there were a number of small scale leather working establishments with child employees. Treatment group was forty working children in the age range seven to 14 years. Control group was forty nonworking children of the identical living environment as it was in the same locality, in the same age range, and belonging to the same social group. Children workers were interviewed one by one.

“Most of the child workers were considered as trainees, popularly nicknamed by the owners and adult colleagues as “tenia”. Their usual work was to paint adhesive glue on pieces of leather supplied to them. Some also had to perform the cutting and sizing of leather. They also had to carry out odd jobs like bringing tea, calling someone, carrying loads of finished products to the sellers’ agent etc. The common working posture of the child workers was to sit cross legged on the floor, stooping forward.”

Table 3.7 shows the distribution of the working children by total working hours per day. It is worth noting that a huge portion (55%) of the children worked for 13-14 hours a day and in all 85% worked for more than 10 hours a day. On top of that, children who worked there were normally considered as trainee workers and, therefore, their wages were much lower than those of the adult workers. What is more, 15% of them received no wages at all.

<i>Working hours per day</i>	<i>No of children (%)</i>
5-7 +	2 (5)
8-10 +	4 (10)
11-12 +	9 (22.5)
13-14 +	22 (55)
15-17 +	3 (7.5)

Figure 3.7: The distribution of the working children by total working hours per day

<i>Slum</i>	<i>Nature of health problem</i>	<i>Study group</i>		<i>Control group</i>		χ^2	<i>p Value</i>
		<i>No</i>	<i>%</i>	<i>No</i>	<i>%</i>	<i>Test</i>	
1	Affecting the skeletal system	12	30	0	0	14.1	p < 0.001
2	Affecting the nervous system:						
	Dizziness	16	40	4	10	9.6	p < 0.005
	Tingling in palm and fingers	10	25	0	0	11.42	p < 0.001

Figure 3.8: Health problems of working children

Table 3.8 reveals health problems of working children. As a result of the study, “no statistically significant difference was found between the two groups regarding the liver and alimentary system, respiratory system, cardiovascular system, and skin, although the overall prevalence of morbidity was of a higher order in the working children. Interestingly, a few specific health problems involving the skeletal and the nervous system were found in the working children in a proportion that was statistically significant, even within such a small sample size. Symptoms and signs relating to the skeletal system like low back pain, pain in the ankles, pain and tenderness over the lower thoracic vertebrae, etc. were found in 30% of the working children and none of the non-working group. Among the neurological manifestations, frequent attacks of dizziness were found in 40% of the working and 10% of the non-working children. Tingling sensations in fingers and palms, occurring more in the evening, were reported by 25% of the working and none of the non-working children.

There is a probability that these particular affections of the skeletal system and of the central and peripheral nervous system found in the working children may have an aetiological relation to their participation in the particular industry. Whereas the skeletal effects may be due to their prolonged sitting in a typical posture and lack of play, the neurological affections may be causally related to their particular occupation. It has been reported that cheap glue, commonly used by the small scale shoe factories, contains some preservatives that are known to be neurotoxic. It has been noted also that glue solvents share common metabolites which are neurotoxic. A survey of publications on specific occupational diseases among child workers engaged in similar work elsewhere in the world produced similar findings by other investigators.”

Table 3.9 also shows distribution of children in the study (n = 40) and control (n = 40) groups by levels of education and there is an evident difference between the education of the study and control groups. To be precise, “85% of the working children were not going to school, whereas 85% of the non-working children were going to school regularly although they belonged to the same sociocultural group and had the same living environment.” It is probably the worst part of this issue.

Nevertheless, 15% of the working children (those employed on a part time basis) went to school. It must be noted that the actual reason for 41% of non-attendance at school by children employees is that their families oblige them to work for additional financial support. Table 3.10 depicts reasons for economic activity by the 40 child, 50% again constitute financial reason. At the same time 30% of the working children claimed that their purpose was to gain occupational skills.

<i>Levels of education</i>	<i>Study of child workers (n (%))</i>		<i>Controls (n (%))</i>	
Illiterate (no schooling)	27	(67.5)	6	(15)
Received some schooling but discontinued	7	(17.5)	—	—
Continuing study in school	6	(15)	34	(85)

Figure 3.9: Distribution of children in the study and control groups

<i>Reasons</i>	<i>Children n (%)</i>
Financial reason	20 (50)
To learn a particular vocational skill	12 (30)
No reply	8 (20)

Figure 3.10: Reasons for economic activity by the 40 child

Age in years	Types of Addiction								Total	
	Smoking		Tobacco Chewing		Pan and Pan Masala		Betel chewing/ whitener Smelling		No.	%
	No.	%	No.	%	No.	%	No.	%		
9	3	75.00	-	-	1	25.00	-	-	4	4.30
10	7	43.75	1	6.25	3	18.75	5	31.25	16	17.20
11	4	36.36	3	27.28	2	18.18	2	18.18	11	11.83
12	9	37.50	1	4.17	9	37.50	5	20.83	24	25.81
13	22	57.89	1	2.64	9	23.68	6	15.79	38	40.86
Total	45	48.39	6	6.45	24	25.81	18	19.35	93	100.00

Figure 3.11: Different types of addiction and their relationship with age of child labourers

“It was found that about 30% of the child workers had no other aspirations than to continue in the same work of making leather goods throughout their lives. It might be that this group of working children (30%) who showed blunting of aspirations, had either attained an early mental maturity, or had their imaginative minds crippled by their routine work in the workshops that was dull, monotonous, and extended over long hours. It might be that interaction of the prolonged, monotonous work in the leather workshops, combined with lack of education and proper childhood recreations had begun to affect their mental faculties of hope and imagination that come naturally to a child. A survey of publications on the effect on the mental faculties of children engaged in uninterrupted, stereotyped occupational work showed similar findings by other authors, such as Dogramaci I. In: Shah PM ed. Child labour: an overview. child labour: a threat to health and development. Geneva: Defense for Children International, 1985:10 and Mendelievich E, ed. Children at work. Geneva: International Labour Organisation 1980:48.” [16] All in all, employing 4.35 million people of age 5 and 14 in 2011 (Kim et al., 2020), India might be losing people who could become “great scientists, educationists, technocrats and bureaucrats, philosophers and so on.” (Mohanty and Jena, 1991).

Besides all the above mentioned problems caused by children at work, there also exists a correlation between child labourers and substance addiction, according to Dr. Nisha Shukla (2022). The author is concerned that if those working kids are given some sort of economic freedom, they are more likely to be involved in crimes and develop addictions and other bad habits. “The unsuitable, unhygienic surroundings where children work for long hours have injurious effect on their health. Child workers are exposed to social evils, even crime, such as addiction of drugs and prostitution (Mehta, 1985)”.

Table 3.11 tabulates different types of addiction and their relationship with age of child labourers. The statistics are telling us that “highest number of child labourers (48.39%) were found to be addicted to smoking in the 9-13 age group. Smoking was followed by pan and pan Masala (25.81%), betel chewing/whitener smelling (19.35%), and tobacco chewing (6.45%). Among the 12-year-old children, there were equal number addicted to smoking and those to pan and pan masala (37.5%).

Number of addicts increased with age which was to be expected. It is also noteworthy that none of the child labourers among studied population were found addicted to alcohol, bhang, drugs and ganja.”

Age in years	Friends		Environment of family		Excessive work		Others		Total	Percentage
	No.	%	No.	%	No.	%	No.	%		
	9	1	25.00	2	50.00	1	25.00	-		
10	8	50.00	3	18.75	5	31.25	-	-	16	18.28
11	8	72.73	1	9.09	-	-	2	18.18	11	10.75
12	15	62.50	5	20.83	4	16.67	-	-	24	25.81
13	29	76.32	5	13.16	4	10.53	-	-	38	40.86
Total	61	65.60	16	17.20	14	15.05	2	2.15	93	100.00

Figure 3.12: Main causes of addiction

Occupation	Number (millions)	Percent
Factories	7.2	2.9
Mines	0.8	0.3
Plantations	0.9	0.4
Artisan industries	8.0	3.2
Agriculture	148.0	59.9
Other	82.1	33.2
Total	247.0	100.0

Source: Labour Bureau, Government of India 1984.

Figure 3.13: Distribution of working population in India, by occupation (1981)

Table 3.12 depicts that “among all ages between 10 to 13, influence of friends was the main cause of addiction. Group of 9-year-olds was an exception with family environment being the main cause of addiction. Psychologically speaking, imitations and suggestions are effective mechanisms of socialization as far as the children are concerned. When children work with adults or with their peer group, they imitate them and sometimes become addicts. Preset investigation reveals that 26.27% (93 out of 354) working children were addicted to some form of substance. Friends, among males and family environment among females was the main reason for addiction. Phillips (1994) in his study “Street Children in India” [5] reported that 48% of child labourers in their study indulged in different types of addictions. Phillips (1994) also reported that maximum number of subjects in their study were addicted to smoking and in 32% of the cases, friends were responsible for the addiction. It is noteworthy that in the presented study area, considerably less percentage of child labourers indulged in some form of addiction. However, influence of friends being the primary cause of addiction holds true to the present study as well.” [24]

To conclude, children are often forced to engage or engage in labour work out of need of survival. On top of hazards they face at their jobs, such social injustice makes them lose the experience of school education, extra-curricular activities, spending time with their families and friends, as well as sometimes engage into substance addictions.[15]

3.5 Bad labour conditions

Poor working conditions at the offshoring sight could push away customers as much as the possibility of having children employed at the offshoring company. This type of ethical concept is, undoubtedly, related to the previous topic.

Some firms that are performing offshoring have a bad reputation due to providing bad conditions to their workers and treating them like robots. Overall, poor working conditions may include things such as environment that is physically dangerous, improper use of space, bad lighting, non-ergonomic facilities for employees, poor workplace hygiene, unreasonable workloads with additional stress and fatigue and, lastly, all the things that represent treat or harm for the health and safety of employees, customers or visitors. Especially common characteristics in developing countries that might lead to injuries are unsafe design of machines, inadequate working hours, inappropriate rest periods and wrong machines maintenance.

Injuries at work are prevalent at such occupations as miners (Asogwa,1980), industrial (Weller 1980, Jinadu 1980) and agricultural workers (Bull 1982, Gordon et al. 1962). It is believed that developing countries have less industrialization and there is a higher probability of them having decentralized production which usually has a less efficient control. Thus, developing countries pose a greater threat for workers to be injured, there is a bigger likelihood of having disabling injuries and in those places rehabilitation services could be less accessible. Moreover, the social status of workers there makes it more difficult for them to fight for change and improvements. In response to the question of why workers in developing countries accept such conditions they say: “If we work we die in the future, if we don’t, we starve now” (Mohan 1982).

Let us consider employment by various sectors in India, 1981, the location where many of the companies find it the most suitable to do offshoring (according to the Census of India). Table 3.13 shows distribution of working population in India, by occupation (1981).

Occupation	Fatal injury		Non-fatal injury	
	No.	Rate*	No.	Rate*
Factories	687	0.05	332 885	26.65
Mines	239	0.32	2853	3.85
Railways	311	0.20	24 320	15.31
Ports	28	—	1312	—
Total	1265	—	361 100	—

* Per 100 000 man days worked.

Source: Labour Bureau, Government of India 1983.

Figure 3.14: Industrial injuries in India

Table 3.14 shows industrial injuries in India. Annual statistics on injuries, including fatal ones and making people disabled as well as people injured in factories, mines, railways and docks and ports were collected under legislation covering the respective occupations. These data represents injuries which make the injured unable to perform work for a period of 48 hours or more.

Furthermore, going back to the child labour matter, evidence proves that “7% of all children could be classified as workers in 1971 and they comprised 6% of the total work force” (Naidu and Kapadia 1985). The statistics nowadays are likely to be similar, the authors suggest. “There are no data available for death and injuries among children, though cases of occupational disease and disability, are well documented for children working in carpet weaving, match factories, glass industry, and so on.” Gordon et al. (1962) in his study does not examine much data but provides some qualitative analysis of rural accidents in India. Still, the data available from this research states “that in the rural Punjab of 1959 there were 115.6 disabling injuries per 100 farm residents, not counting motor vehicle injuries”. Some newspapers and orthopaedists of India highlight numerous crushing and amputation of hands incidents after every harvesting season as well cases of chemical poisoning through the use of pesticides due to misuse (Mohan 1986).

The statistics in the study show that the rates of injuries in the ‘organized sector’ in India are higher than those reported in Europe. Nevertheless, the information is scarce and it makes it hard to infer about the entire working population. It is a very likely that the number of workplace fatalities could go up to tens of thousands, and disabling injuries up to hundreds of thousands per annum in India.

Tables 3.15 , 3.16 , 3.17 show conditions in developing and highly industrialized states, focusing on underlining differences which increase possibility of harm for employees in developing countries. They make it more difficult to implement measure of injury control and it is worsened by the fact that many developing countries are quickly industrializing.

“Very often a new technology will be introduced and widely disseminated before appropriate safety measures have been developed.” Once this has occurred, the (usually) immediate increase in productivity which the new technology has brought about ensures that it will remain in place, whether hazardous or not. For example, grain threshers were introduced in northern India a few years ago. Though a large number of workers get their hands crushed every year and the newspapers have given prominent space to reports on the subject, the situation has not greatly improved. “ As a result, governments must implement policies addressing injury control that take those physical differences into account and should be adjusted according to particular local conditions. ”

“In a detailed study of the sheet metal industry in India, it was discovered that almost 50% of the machines which were considered safe were not maintained properly, and that 70% of the machines considered unsafe, were mostly imported. Moreover, greater than 60% of the injuries were sustained in activities other than working on machines.”

Some sources talk about earlier offshoring leaders treating their employees like robots and “building offices on cramped up spaces with employees who barely got up of their seats.” Nevertheless, nowadays the picture is changing due to competition in all the sectors and companies strive to build a safe and pleasant working environment. On top of that, to have a competitive advantage, organizations are doing their best to provide up-to-date technology and equipment too.

To conclude, in places where there still exist a working environment that is full of various kind of occupational hazards, policy-makers should carefully set safety standards and regulations and regularly check if they are being followed. Developing nations should also take better care about emergency care procedures, they should follow any incidences of injury among workers and try to implement economically effective measures. They should realize that injuries affect national economy in a negative way. What is

DCs	LDCs
Large percentage unionized	Majority work in agriculture, cottage industry or in small organizations; not unionized
Unions interested in safety	Unions mainly interested in wage and income issues
High literacy rate	Low literacy rate
Generally well nourished	Generally malnourished
Most in good overall health	Large number chronically impaired
Most have reasonable eyesight and hearing	Large number suffer from bad eyesight and hearing and have no corrective devices
Large number have medical insurance	Very few have access to reasonable medical care
Not poor in absolute terms	Most very poor in absolute terms
Relatively few migrant workers	Large number of migrant workers
Virtually no child labour	Child labour very common

Figure 3.15: Differences between worker characteristics in developed and less-developed countries

DCs	LDCs
Manual labour content low	Manual labour content high
Little man-machine interaction	Great deal of man-machine interaction
Emphasis on providing automatic protection	Little attempt to provide automatic protection. more reliance on changing worker behaviour
Large number of machines and equipment work at high energy levels	Fewer machines work at high energy levels
Most equipment manufactured locally or in similar countries	Most equipment imported from countries socio-economically dissimilar
Strict quality and design controls on domestic and imported equipment	Very little control on quality of equipment
Machines and equipment maintained well and replaced more frequently	Maintenance irregular and equipment used for very long time

Figure 3.16: Differences in mechanization and equipment in developed and less-developed countries

DCs	LDCs
Low percentage of labour force in agriculture	Most workers in agriculture
Factory design and operation covered by laws and regulations governing health and safety	Few health and safety regulations
Hazards controlled (chemicals, electrical wiring, etc.)	Hazards poorly controlled
Factories often make secondary or tertiary products: processes innately lower in risk	Most factories make primary or secondary products (e.g., ores, steel, etc.): processes more dangerous
Good emergency care	Inadequate emergency care
Quality of health services guarantees complete recovery from minor injuries	Minor injuries may result in impairments which can become disabilities and handicaps
A severe injury may result in a disability, but rehabilitation is available	A severe injury results in death or handicap

Figure 3.17: Differences in mechanization and equipment in developed and less-developed countries

more, designers of factories and equipment should be made aware that built-in protection measures are effective and economical in the long run. Labour unions should realize the role of injuries as a health problem and that they decrease the real workers' wage. Unions should seek safer alternative modes of production.

Leaders should provide alliance with the many non-government, voluntary agencies who work with the poor and workers and make firms aware of information regarding prevalence of injury and effective countermeasures. Besides, it is essential to conduct further local research to gather objective data on occupational health and safety. Finally, "industrialized countries should collaborate with developing countries in order to reduce their contribution to occupational hazards in developing countries." [17]

Drusilla K. Brown, Alan V. Deardorff, and Robert M. Stern in their paper on "The Effects of Multinational Production on Wages and Working Conditions in Developing Countries" discuss whether it is true that multinational firms in developing countries are mistreating their workers and providing them with low wages and violating some common social norms or standards governing their workplace. This includes having coercive, abusive, unhealthy, and insecure working conditions. Moran (2002) has made an essential distinction between low-wage, relatively unskilled-labour-intensive industries and industries that employ more highly skilled workers and produce relatively more skill-intensive products, the distinction that a lot of social activists and activist organizations fail to recognize. "Rather, much of the criticism by social activists, in the United States especially, has been directed at multinational operations in the apparel and footwear industries that are allegedly producing under sweatshop conditions."

There was The Anti-Sweatshop Campaign in the United States. "Elliott and Freeman (2001, 15–16) note that sweatshops have characterized apparel production since industrial revolution days, and so too have campaigns to improve labour conditions in the industry... many of the issues are the same, but a major difference between anti-sweatshop campaigns at the turn of the 21st century and those at the turn of the twentieth century is that sweatshops then were largely local whereas today they are found mostly in poor developing countries. This means that U.S.-based activists cannot lobby the U.S. government to improve labour standards. Instead they must target U.S.-based corporations who operate or source in developing countries or pressure the world trading community to demand changes in less developed countries."

Despite some poor conditions at a workplace, citizens of developing countries still choose to engage in offshoring production of multinational companies operating in their region due to the fact that some evidence shows that they are being paid wages that are on average exceed wages of alternative domestic employment. "The published evidence on the effects of foreign ownership on wages in developing countries is based on ad hoc observations and surveys as well as a number of studies using econometric methods. Lim (2001, 39–40) provides a useful summary of some evidence that foreign-owned and subcontracting firms in manufacturing industries tend to pay higher wages than domestic firms." Nevertheless, these wages are low in absolute terms when compared to those of employees in developed countries. Some researchers claim that workers' wages in developing countries may be insufficient to cover the expenses of basic needs—therefore, the pressure for higher wages.

"In this connection, for example, a group of students from the Columbia University School of International and Public Affairs carried out a study in 1999 for the National labour Committee to calculate a living wage for maquila ¹ workers in El Salvador (see Connor et al. 1999). They found that most maquila workers earned the legal monthly minimum wage of 1,260 colones ², which was estimated to be barely sufficient to meet basic food requirements. According to the formula used, it was estimated that maquila workers in El Salvador required a living wage of 4,556 colones to cover the basic needs of a family of 4.3 people living on one wage and allowing for 12.5 percent to be saved for the future. It was recommended that the process for setting wages according to a living-wage formula be standardized and that multinational firms should adopt industry-wide standards for paying a living wage."

The study suggests that labour-intensive manufacturing, especially when it comes to the sector of apparel and footwear, in developing countries is rather sensitive to altering wages. In such countries as Japan, Hong Kong, Singapore, South Korea, and Taiwan increased labour costs due to their economic expansion from the 1960s onward caused offshoring of labour-intensive industries to relocate to China and Southeast Asia and South Asia. Furthermore, Moran (2002, chap. 4, 9), highlights history of Mauritius and Madagascar, where labour-intensive offshoring producers were sensitive to altering in relative wage levels in deciding where to expand or contract employment and move offshoring production. Finally, there are some reports that maquiladora factories were closing down in Mexico and shifting to Asia or Eastern Europe and also that garment and shoe-manufacturing offshoring sights moved from Indonesia to China and Vietnam, where wages are lower and quality and delivery schedules are more reliable.

Consequently, it can be inferred that requesting an increase in living wage can lead offshoring leaders

¹maquiladora, byname maquila, manufacturing plant that imports and assembles duty-free components for export

²colón was the currency of El Salvador from 1892 until 2001, when it was replaced by the U.S. dollar during the presidency of Francisco Flores

to relocate. One solution could be that living wage should be mandated everywhere in the world, not just in particular countries, so that offshoring firms do not have an incentive to relocate. Different nations have different wage as labour productivity varies with the scale of development. However the living wage may be defined, “it will be above the productivity-based market wages in some countries and below that in others. If employers are required to pay the living wage, they will tend to move to countries where the living wage is justified by productivity.”

As a consequence, it is extremely difficult to properly measure living wage and it is probable that setting a certain living wage that is beyond existing market-determined wage levels will result in employment shifts in developing countries that would be destructive to overall economic prosperity and welfare.[3]

For instance, “Foxconn, the Apple supplier that “has faced a firestorm of international media attention over its labour practices in China” and “reportedly improved working conditions there,” has diversified into other low-wage nations: Malaysia, Mexico, Brazil, Vietnam, Indonesia, where labour regulations are more lax (Christian Science Monitor, 2012).” [14]

Houshang Shahnavaz (1987) in his article “Workplace injuries in the developing countries” is underlining the fact that even though technological and industrial improvement is beneficial, its transfer could be detrimental to local users of developing countries as local environmental conditions there might differ from that of developed countries to a great extent. As a consequence, it might cause social disruptions, material and production losses, harm to workers and sickness resulted from work-related accidents.

Many developing countries having poor working conditions and very weak injury prevention programs and safety regulations, or their absence at all, are, therefore, suffering from very high sickness and accident rate. Thus, wages and social benefits of the worker are rather low, because productivity is much less its capacity. On top of that, as a result employees obtain malnutrition and low working capacity, thus, having greater exposure to diseases as well as accidents at workplace.

Fast technological development has motivated industrialized countries to take great care of occupational health and industrial safety by means of scientific examination of work and working environment, work-related hazards, potential stresses, industrial diseases and occupational accidents. In addition, programs to maintain industrial safety and occupational health services, hygiene at a workplace and hazard controls while planning and designing production are playing a big role for employers and employee organizations. Besides, joint industrial safety councils have been established in many major companies in industrialized countries in order to enhance working conditions and the environment.

However, there are some problems of rapid and abrupt change for developing countries as sometimes it is too fast to suit either the individual or the society. Those nations are attempting to have a better quality of working life to be achieved through economic growth, but with the threat of failure to establish appropriate social structures to address consequent problems.

Having new technology and other developments needs an appropriate adaptation to the local society, but developing countries are abundant with incompatible social functions that are in need of industrial progress. Thus, occupational safety and health programmes are often overlooked and preventative health measures are not adequate to meet the rising issues. Occupational health services should be an important part of any offshoring sight and leaders of offshoring companies should stress the importance of optimum work conditions and environments for the promotion and maintenance of well being and satisfaction in employees. “To achieve this goal, prevention of disease and injury caused by poor working conditions and adverse environmental factors is vital. The common problems of many developing countries, such as poverty, low productivity, chronic ill-health, low motivation level, increased physical and mental stress, high absenteeism and turnover, all contribute to an increased likelihood of accidents and occupational diseases, leading to a depressed community. According to Elgstrand (1985), the aim of occupational safety and health programmes should be to break this vicious circle of failure by creating safe and satisfactory working conditions (Figure 3.18), and also by promoting the health of workers by preventing occupational diseases and problems of unnecessary fatigue. All these measures would ensure proper utilization of human capabilities and thereby promote increased productivity.”

“Few reliable statistics are available on work-related injuries and on the incidence and severity of occupational diseases in the developing countries. The International Labour Office publishes some classified information regarding occupational injuries in developing countries. The ILO Yearbook of Labour Statistics is the most exhaustive compilation of data on the subject. The CIS (International Occupational Safety and Health Information) which is a specialized agency of the United Nations in Geneva also provides documents and statistics on the subject and offers on-line access to the CIS databank. The International Section for Research on Prevention of Occupational Risks (Cornit Recherche, Paris) is another organization for publishing documents and bibliographies on the subject and has a computerized information system. The Center for Ergonomics of Developing Countries (CEDC), has also recently started a databank which includes some limited information on injuries in the workplaces in developing countries.” [23]

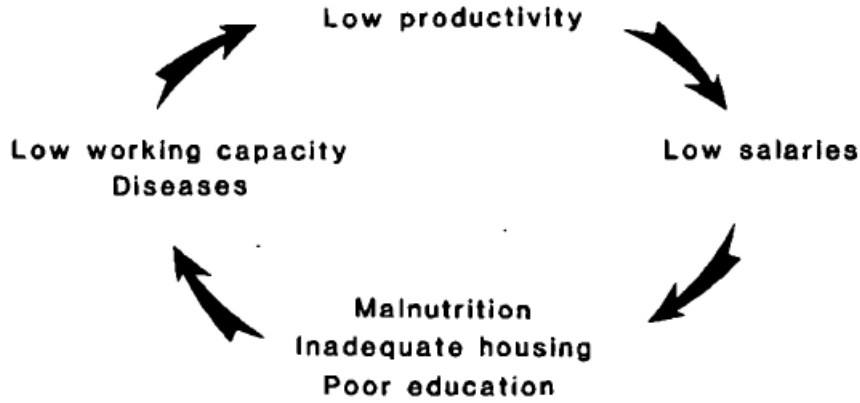


Figure 3.18: Vicious circle of failure

3.6 Eco-friendly consumers

Transportation and its costs are an essential part of the offshoring process. “With innovations in logistics such as uniform shipping codes, express services, and streamlined customs procedures, transportation costs have decreased and have become a minor part of total product cost. Delivery times have been reduced dramatically with the introduction of airborne shipping and streamlined processing. Trade barriers such as tariffs still exist, but are gradually coming down.” [11]

Nevertheless, transportation costs of the company might be very high. A company might be a producer of some large products, for example, vehicle parts. It means that in order to transport it to the home country, many airplanes are needed in the case when offshoring is in a country that is rather far from the domestic market. If the parameter κ_0 of our model, which is unit cost of offshore production, is relatively small and transportation costs are large, it might still be reasonable for the company to continue offshoring as it would still make a larger profit margin. However, in a modern society we see that more and more consumers are becoming eco-friendly and more concerned about environment and sustainability. Therefore, the larger the transportation costs, the more there is pollution and negative effect on the environment. Thus, as those kind of costs increase, the demand for the product decreases.

It is evident that importing any kinds of goods, including the ones produced using offshoring activity, causes increase in pollution emission. In order to see how trade can negatively impact environment, let’s consider the example of China, which is the second biggest importing country in the world. Ling-Yun He, Geng Huang in “Are China’s trade interests overestimated? Evidence from firms’ importing behavior and pollution emissions” show that the importing of intermediate goods, that is directly relevant to the topic of offshoring, brings firm’s production scale up as well as increase their total emission. The paper provides important evidence on the impacts of importing on pollution emissions at product-level. The authors “suggest that when analyzing China’s interests in trade, the environmental effects of trade should be taken into consideration, otherwise China’s gains from trade will be overestimated. Ling-Yun He, Geng Huang are also insisting that it is indeed beneficial to develop economy through international trade, but the states should focus on green trade and take actions to protect environment.”

China is a growing economy and have been developing its imports for the past several years, with annual growth rate of import being precisely 14.1% from 1990 to 2018 and a big portion of that includes importing intermediate goods. However, the large concern here is that the growth of economic scale after importing will can harmfully affect the environment.

Previously, Grossman and Krueger (1991) and Antweiler et al. (2001) looked at how trade affects the environment of countries, and “propose that trade can affect the environment through technical effect, factor composition effect and scale effect.”

Some literature analyses how trade liberalization, like tariff changes can deteriorate environment and some talk about how firms’ trade behavior can cause more pollution emission.

In their analysis, the authors are using Propensity Score Matching-Difference in differences (PSM-DID) model to identify the causal relationship between importing and firms’ pollution emissions.

Our results demonstrate that the impacts of importing on China’s environment actually have two sides. On one hand, the importing of intermediate goods and capital goods will lead to the decrease of firms’ emission intensity. On the other hand, the importing of intermediate goods and capital goods can increase firms’ total amount of emissions. This will bring huge losses to the welfare of the entire society, since total pollution emissions have a tremendous impact on the social welfare. In fact, if we only analyze

Dep. var.	<i>Interimport_{it}</i>				<i>Capimport_{it}</i>			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\ln SO_{2it-1}$	0.0366*** (0.0139)				0.0462** (0.0189)			
$\ln COD_{it-1}$		0.0698*** (0.0108)	(0.0161)	0.1301***				
$\ln eSO_{2it-1}$			-0.2927*** (0.0389)		-0.3330***			
$\ln eCOD_{it-1}$				(0.0546) -0.1809*** (0.0364)			(0.0474)	-0.0795*
$\ln KL_{it-1}$	0.3475*** (0.0360)	0.3270*** (0.0314)	0.3644*** (0.0358)	0.3607*** (0.0314)	0.5409*** (0.0505)	0.5152*** (0.0431)	0.5600*** (0.0501)	0.5691*** (0.0428)
$\ln Age_{it-1}$	0.0074 (0.0364)	-0.0278 (0.0325)	0.0240 (0.0366)	0.0020 (0.0326)	0.0883* (0.0492)	-0.0038 (0.0428)	0.1046** (0.0494)	0.0415 (0.0429)
$\ln Wage_{it-1}$	0.5618*** (0.0698)	0.4640*** (0.0609)	0.5039*** (0.0694)	0.4588*** (0.0607)	0.7663*** (0.0931)	0.5496*** (0.0800)	0.7030*** (0.0930)	0.5736*** (0.0795)
$\ln Subsidy_{it-1}$	-0.1233** (0.0504)	-0.0930** (0.0464)	-0.1197** (0.0501)	-0.0963** (0.0461)	-0.0633 (0.0652)	-0.0407 (0.0593)	-0.0666 (0.0650)	-0.0404 (0.0585)
Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
LR χ^2	948.36	884.20	997.09	864.01	831.26	890.70	860.06	812.35
Pseudo R ²	0.1032	0.0829	0.1092	0.0814	0.1450	0.1296	0.1513	0.1188
Log likelihood	-4122.30	-4888.43	-4068.54	-4873.88	-2451.40	-2990.58	-2412.24	-3013.56
Observations	33,046	30,500	32,702	30,370	32,350	29,794	32,088	29,587

Notes: Table reports the estimated results of Logit regression of importing. Dependent variable in columns (1)–(4) is firm’s intermediates importing dummy, and dependent variable in columns (5)–(8) is firms’ capital goods importing dummy. All columns include the control variables. Fixed effects are year, industry and province fixed effects. Standard errors are shown in the parentheses. Significance: ***1%, **5%, *10%.

Figure 3.19: Logit regression of importing

China’s interests in trade from the perspective of GDP growth and technological progress, but ignore the environmental changes, then China’s gains in trade are likely to be overestimated. Our analysis shows the importance of considering environmental effects in trade benefits.

The authors come up with a theoretical model that is based on the model of Melitz (2003), and incorporate firms’ emission behavior in their study. The goal is to see how intermediate goods importing and capital goods importing is related to the way firms cause pollution emission, and the assumption is that those two goods are main factors of production.

Table 3.19 shows estimated results of Logit Model. “Columns (1)–(4) are the results of importing intermediate goods and columns (5)–(8) are the results of importing capital goods. They first analyze the coefficients of the variables of firms’ emission characteristics. From the coefficients of firms’ total emissions of the lag one period they can learn that firms with higher pollution emissions are more likely to import both intermediate and capital goods. The possible explanation is that productive firms who have higher tendency to import (Castellani et al., 2010; Kasahara Rodrigue, 2008) are large-scale firms, they emit more pollutants in production because of larger production scale. From the coefficients of firms’ emission intensity of the lag one period they can learn that firms with lower emission intensity have higher tendency to import both intermediate and capital goods. Firms with lower emission intensity have better performance in production, thus this kind of firms will choose to import intermediate and capital goods according to their own advantages. This shows that the behavior of firms’ importing intermediate and capital goods does have a self-selection effect, that is, the characteristics of firms’ pollution emissions will affect the behavior of firms’ importing intermediate and capital goods.”

3.7 “Offshoring pollution”

The demand function that describes firm’s production might also decrease due to the fact that the customers might be concerned about so-called “offshoring pollution”. The main concern is that some companies try to decrease the emissions in their more developed and highly regulated home countries by offshoring production to more poor countries with less regulation.

While the firms plants release less toxic emissions in their home countries while doing offshoring, they do more so on a foreign territory. In fact, U.S. plants located in counties with greater institutional pressure for environmental performance offshore more.

In the U.S. there exists Pollution Haven Hypothesis (hereafter PHH) that adopts some strict regulations and institutional pressure for environmental performance. Due to this, some U.S. counties bring their activities to offshoring which actually jeopardizes the environmental sustainability of other countries.

According to PHH, “liberalized trade in goods will lead to the relocation of pollution intensive production from high income and stringent environmental regulation countries to low income and lax environmental regulation countries” (Taylor, 2005). Therefore, a decision of some firms to offshore might be more influenced by environmental rules and regulations rather than minimization of labour cost. Xiaoyang Li and Yue Maggie Zhou in “Offshoring pollution while offshoring production?” show that “domestic plants pollute less on American soil as their parent firm imports more from low-wage countries (LWCs): when

a plant's parent firm increases its share of imports from LWCs by 10 percentage points, the plant's toxic emissions on American soil fall by 4–6 percent". In fact, U.S. is the country that places its most pollution-intensive industries for offshoring to low wage countries compared to the rest of the world. According to some studies, "American firms will engage in more pollution offshoring if their plants are located in counties where the local institutions can exert greater pressure on environmental performance, such as counties with a more informed (educated) population, a higher voter turnout in presidential elections, or a stronger presence of environmental non-government organizations (NGOs) like the Sierra Club." The authors also show that "more-capable firms will enjoy greater compliance benefits and lower compliance costs; they will therefore have greater incentive to comply with strict environmental requirements in the United States and engage in less pollution offshoring." [14]

With the process of globalization local institutional constraints have become less stringent and now it is easier to do arbitrage between different environmental standards of different countries. Stricter environmental standards that have been recently set but most developed countries are supposed to increase production costs of the firms, and therefore, lower the production that is pollution intensive. However, this pressure makes some firms to simply take a step towards "offshoring pollution", the idea with which not all the consumers might agree. Those less developed host countries used for offshoring sometimes fail to adopt stricter environmental standards in order not to hurt economic growth, which for them might be detrimental. Thus, instead of adjusting the functioning of their current plants to reduce pollution at home as it comes with a great deal of costs, organizations from rich countries exploit this arbitrage opportunity. On top of the idea of polluting a foreign country, the idea that new environmental standards, in turn, cause job loss of citizens of the home country also prevails. "The concern over "job killing" environmental regulations in the United States is one major obstacle to trade agreements such as the North American Free Trade Agreement (NAFTA)." As a result, in order not to follow special U.S. pollution regulations, some U.S. firms plan their supply chain in a way that locates more pollution emission production to less developed and low wages countries. As mentioned before, U.S. counties with more informed citizens and with greater voter turnout in presidential elections have less harmful emissions from plants. In light of this, firms from those counties are obliged to place some production elsewhere outside the country. However, the question that might arise here is: Are the local activists that are promoting clearer surroundings, are also concerned about and are speaking against "offshoring pollution"? At the same time we have to consider public in those less developed countries and whether their can react to countries such as the U.S. putting their home in danger. Sadly, the pressure that can come from local institutions as regards to pollution is very limited. The reason is that citizens in those places typically have less access to sources of information and less property right and, as a result, can exercise limited power against their state decisions.

Firms that exhibit more productive, technological, environmental, and marketing capabilities are less likely to exercise pollution offshoring. "Whereas less-capable firms often find it costly or challenging to meet environmental standards, more-capable firms will find it relatively easy to remain profitable while achieving these standards."

Xiaoyang Li and Yue Maggie Zhou research led to result that shows that "the share of imports from LWCs grew by 16 percentage points in the United States, and toxic emissions dropped by about 60 percent over similar period." The authors also "examined whether firms that are more visible to their customers might find it more difficult to engage in "pollution offshoring" without being caught, and will therefore have less incentive to do so. They investigated the impact of brand equity on pollution offshoring. The results showed that for firms in industries with higher brand equity, and firms with higher brand equity themselves, imports from LWCs had a less negative impact on plants' toxic emissions." On the other hand, there is also a belief that even though U.S. firms actively engage in pollution offshoring, they can use more advanced environmental technologies in developing countries that are greener for the same level of productions compared to those that they would use at home.

Arik Levinson in "Offshoring Pollution: Is the United States Increasingly Importing Polluting Goods?" is bringing up a discussion about automobile industry. On top of the fact that transportation of large parts of automobiles that were in offshoring production causes a lot of undesirable emission to the environment, the author mentions that the inputs produced abroad might be very pollution-intensive. Such an industry itself might be relatively clean, but "producing the steel and rubber used in automobile manufacturing is more polluting" and it will not "appear directly in the trade data, because these intermediate inputs (steel and rubber) are never traded internationally; they are embodied in the clean final products (cars)." So, in the interest of actually measuring the amount and impact of pollution, emission of manufacturing inputs must be taken into account.

Some literature even claims that bringing about stricter rules and carbon emission in one country would just force companies to relocate to countries that do not enact similar regulations. This would lead to even worse effect on climate change. "Line 1 in Figure 3.20 plots the real value of manufacturing imports to the United States, adjusted for inflation using the producer price index, and indexed so that the 1972

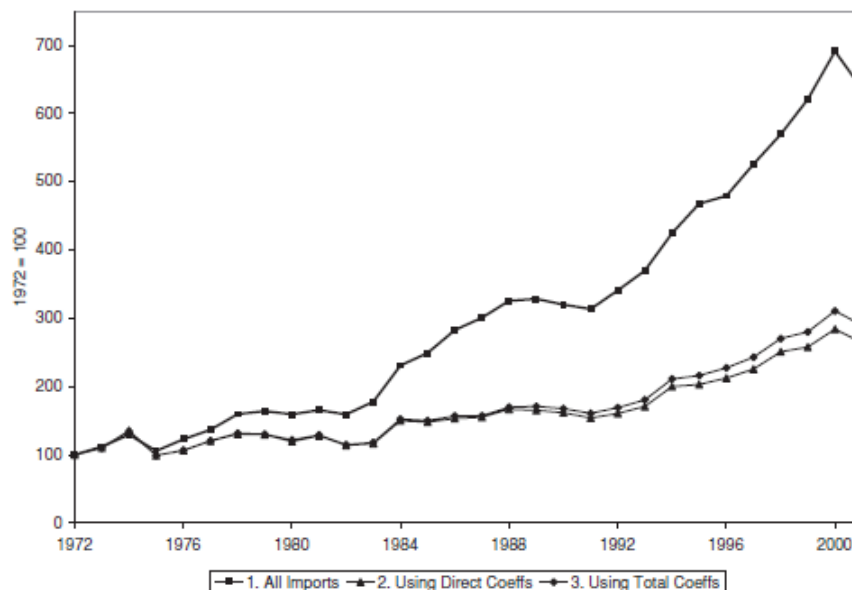


Figure 3.20: Trends in the value and pollution content of U.S. imports

value equals 100. It shows that real imports grew 536 percent between 1972 and 2001. If every industry’s imports grew by the same amount (536 percent), then we might say that the pollution embodied in those imports (ignoring their intermediate inputs) also grew by 536 percent. But, of course, imports of some industries grew more than others, and if imports of relatively polluting industries grew more, then the pollution embodied in imports could be said to have grown more than 536 percent. If imports of relatively polluting industries grew less, then pollution embodied in imports also grew less.

Line 2 makes this calculation precise. First, Arik Levinson multiplies each industry’s imports by the World Bank’s IPPS coefficient (which ignores inputs) for the unweighted sum of four common air pollutants: SO₂, NO_x, CO, and volatile organic compounds (VOCs). This gives the total amount of those pollutants embodied in each industry’s imports in each year. Arik Levinson then sums across all industries in each year, yielding the total pollution embodied in all imports each year. Next the author indexes the figures so that their 1972 values equal 100 to make them comparable to the import numbers in line 1. That indexed figure is plotted as line 2 in the figure. The large difference between lines 1 and 2 indicates a dramatic shift in the composition of imports away from pollution-intensive goods. If imports had been shifting toward more polluting goods—which seems to be most people’s intuition—then line 2 would lie above line 1; instead, it drops far below line 1. This is essentially the methodology often used to claim that the pollution embodied in U.S. trade is decreasing. However, because it ignores inputs, it potentially exaggerates the green shift of imports.

Line 3 of Figure 3.20 addresses this issue by multiplying each industry’s imports by the World Bank’s IPPS (Independent Power Projects) coefficient, which has been transformed using the Leontief input–output procedure to account for domestic intermediate manufacturing inputs, and then aggregating across inputs. Thus, line 3 indicates how the pollution embodied in imports has changed over time, based on the changing industrial composition of those imports. Accounting for imports shifts up the pollution content of imports, but not dramatically, as line 3 lies only slightly above line 2.

The most striking feature of Figure 3.20 is the shifting composition of imports away from polluting goods—the “green shift” of imports—shown as the degree to which lines 2 and 3 fall below line 1 starting in 1972. Imports have shifted toward less pollution, so that the pollution embodied in imports increased 190 percent rather than 536 percent. Put differently, the green shift of imports reduced embodied pollution by 54 percent relative to a proportional increase in all industries’ imports.”

Overall, the analysis that Arik Levinson conducted in his research shows that during the years 1972–2011 the U.S. has been shifting toward importing cleaner, less polluting items and this shift is, in fact, even faster than U.S. domestic manufacturing. [13]

To conclude, new laws and regulations on more environmental sustainability in firms’ home countries can cause them to relocate their activities abroad. Since it also implied relocating pollution, some customers must be reluctant to promote this idea and thus to purchase products when they see offshoring strategy. To deal with this issue more coordination between international trade and environmental agreements should take place. Another solution is for offshoring firms to adopt an internal practice that would be not as strict as home country’s regulations but still stricter than the host country. This would make

both product consumers and citizens of a developing country appreciate the care and responsibility the firm is taking. [14]

Some firms and countries have to be more compliant with the rules due to, for example local activists, press, non-government social movement organizations (such as the Sierra Club in the U.S.). Therefore, firms that are less tolerant to noncompliance relocate some of their business activities somewhere else. However, this leads to environmental damage elsewhere rather than the home country.

It is worth to note that green considerations were among main reasons to reshore for U.S. companies in 2020. Besides, they are becoming more and more vital considering new emission reduction initiative by the International Maritime Organization and their mandates about climate change. As people in the world are getting more concerned about the matter of climate change, environmentally sound products are getting higher in demand. Thus, local sourcing is basically associated with clean and sustainable production.

Moreover, some event might happen that would make a company decide that offshoring is not a good idea anymore and this change is then stochastic. In other words, it could be unexpected. Something could be happening in the country where the production is taking place, it could be even natural disasters like an earthquake, war and related to it unforeseen animosity, pandemic, sudden new rules and regulations, etc.

3.8 New rules and regulations

Xiaoyang Li and Yue M. Zhou in their “Offshoring Pollution while Offshoring Production?” are saying that U.S companies’ goal could be to optimize and rebalance their global sourcing network due to increased costs for domestic environmental compliance. It must be noted that when adopting a pollution offshoring strategy, U.S. firms have not broken any environmental laws in either the United States or their host country. Low wage countries are usually too concerned about keeping exports and foreign direct investment to improve their economic growth to enforce strict environment regulation. For instance, until very recently India was against global climate-change accord, ascertaining that “developing countries should not be asked to limit their economic growth as a way of fixing a problem that was largely created by the others.” India was also not willing to transit from fossil fuel to cleaner energy without a major financial support from the rich world (The New York Times, 2015). “When U.S. firms are in compliance with both U.S. and foreign environmental regulations, it is not easy to detect that they follow less stringent environmental standards in the host country than in the United States. Besides, U.S. firms may adopt an internal practice for their overseas plants that is less strict than U.S. laws but stricter than the laws in the developing country, which may make the host-country residents less critical or even appreciative of U.S. firms’ practices.”

Companies have to follow national regulations as well as local informal institutional norms. Moreover, powerful local news media and activists can have a crucial effect on offshoring companies. Thus, sometimes a country or a local offshoring production place might face an abrupt change in rules and regulation. Citizens of a country or local neighborhood where offshoring company has its sight can perform protests, civil suits and other campaigns in order to fight against environmental damage or other local concerns. This might result in an offshoring company paying legal fees and can worsen public relations and firm’s overall reputation among its workers, customers and shareholders. An example of local residents fighting against local pollution is in Calhoun County, Texas, which was identified by the U.S. EPA (U.S. Environmental Protection Agency) as one of the dirtiest counties in America. People organized various awareness programs to bring awareness to the public. “Under public pressure, Alcoa had to commit to aggressive pollution reduction initiatives at two local plants.” [14]

As an example of a sudden altering of regulations, “in the legislative branch, senators from both major U.S. political parties have introduced bills to try to stop the perceived offshoring. Slade Gorton (R.-WA) proposed an amendment to the 1990 Clean Air Act, levying a duty on “any product imported into the United States that has not been subject to processing... which does not comply with the air quality standards of the Clean Air Act.” “On the other side of the aisle, Senator David Boren’s (D.-OK) Pollution Deterrence Act of 1991 would have required the U.S. EPA to construct an “International Pollution Control Index” for the top fifty trading partners of the United States, comparing each country’s pollution standards to those in the United States. Tellingly, the bill failed to indicate how the EPA was to accomplish this difficult task.”

Some authors even name offshoring process as “leakage” as it badly affects climate change policies. The issue is that if some countries enact strict carbon emissions limits, carbon intensive industries will move their offshoring production to non-participating countries, therefore, eliminating any advantages of participating countries. As a result, non-participating countries must bring up their levels of regulation to that of participants. Otherwise, rigorous emissions limits in participating countries could, on the contrary,

worsen climate change. “Perhaps the most notorious incident in the policy realm concerning offshoring involved a 1991 internal World Bank memo, signed by then-Chief Economist Lawrence Summers. The controversial memo asked rhetorically “shouldn’t the World Bank be encouraging more migration of the dirty industries to the [Less Developed Countries]?” (Economist, 1992). This question presumed that such migration was already happening. All of these concepts – industrial flight, pollution havens, leakage, dirty industry migration – depend on the existence of offshoring.” [13]

As governments and leaders of the state change, so change their particular policies linked to carrying out activities abroad. An important example is the election campaign of Donald Trump in 2016. “Between 2016 and 2018, the most recent year for which data is available, the U.S. lost 1,800 factories to offshoring and outsourcing, according to the progressive Economic Policy Institute.” On the election trail Trump claimed to change tax reforms to make major U.S. companies be back onshore and “bring back trillions of dollars from American businesses that is now parked overseas”. After one year of being the president, Trump and other Republicans were attempting to drive those tax reforms through Congress. On the 1st of November 2017 he claimed: “Finally, our plan will bring back trillions of dollars from offshore ... that will come pouring back into our country that will be put to work and will be spent by our companies that could never get the money back for many years. Bring the money back. We’re rebuilding America.” President-elect at that time announced that government would punish companies trying to offshore their operations, starting with a new extraordinary level of intervention by the White House into private enterprise. For instance, Trump highlighted a decision of Carrier, the heating and air-conditioning company, to continue operating furnace plant in the U.S. and not shift to Mexico, helping keep 1,100 jobs in Indianapolis. The president-elect incentivized companies to reshore back to the United States or rethink their plan to move operations overseas by promising to lower corporate taxes and reduce regulations. “He also warned that businesses that decide to go abroad will pay a price through a border tax on imported goods.”

“On the campaign trail, Trump repeatedly attacked specific companies for outsourcing, drawing huge cheers from his crowds. He blasted Ford Motor Co. for opening factories in Mexico, criticized a U.S. drug company that moved its headquarters offshore and said he would no longer eat Oreo cookies because its maker, Nabisco, moved part of its production to Mexico.” [39]

At the same time, many around Trump are in a close relationship with the offshore world. First, Trump’s chief economic adviser, who is the driving force behind the White House tax reform effort, is a part of offshore finance. The leaked files show that for various periods between 2002 and 2006, Cohn was president or vice-president of 22 separate entities in Bermuda for Goldman Sachs. Second, other leaked documents reveal that Rex Tillerson, the U.S. secretary of state is known as a director of an offshore firm used in a multi-billion-dollar oil and gas venture in the Middle East that became embroiled in controversy. “Tillerson was a director of Marib Upstream Services Company, incorporated in Bermuda in 1997. The company was tied to ExxonMobil, the American oil and gas corporation that Tillerson later led as chief executive. At the time, Tillerson was president of ExxonMobil’s Yemen division. A report published by the campaign group Citizens for Tax Justice said ExxonMobil had at least 35 subsidiaries in tax havens such as the Bahamas, Bermuda and the Cayman Islands – and was holding approximately \$51bn offshore while Tillerson was CEO.” Third, Randal Quarles, “the Trump administration’s most senior banking watchdog appears in the Paradise Papers in connection with an offshore bank that is under investigation by U.S. authorities for possible tax evasion.” Fourth, Jon Huntsman, Trump’s U.S. ambassador to Russia contributed to the functioning of previously undisclosed offshore company. Huntsman was mentioned as a “director of HICI International Sales Corporation in a confidential filing to authorities in Barbados, where the company was formed in 1999. The offshore vehicle was set up to carry out overseas sales for Huntsman ICI, an industrial chemicals branch of Huntsman Corporation.” Finally, Tom Barrack, claiming to be Trump’s “closest friends for 40 years”, is listed in Paradise Papers through offshore subsidiaries of Colony NorthStar, of which he is CEO. [37]

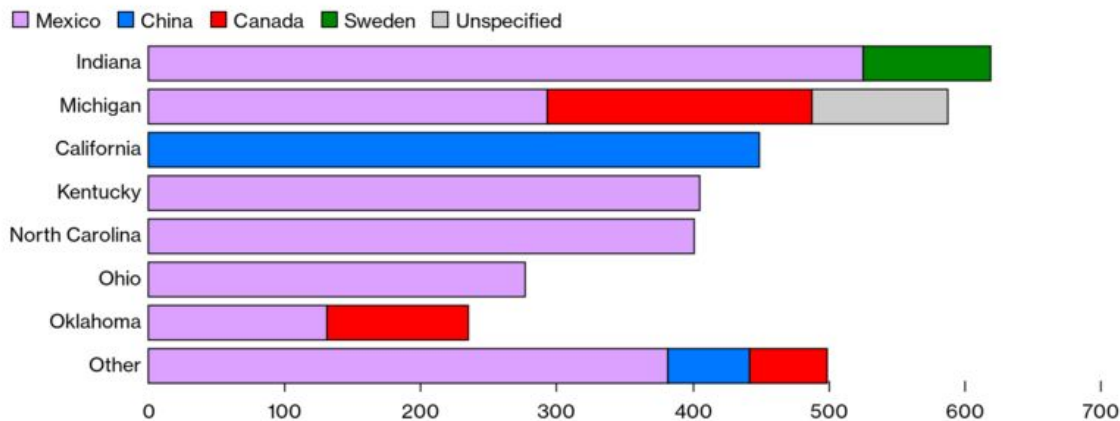
In addition, some data suggests that even though stopping offshoring and bringing back American jobs was a crucial goal for Trump, it did not effectively happen during his administration. In fact, the labour Department certified a lot of petitions linked to companies moving work overseas. Those petitions covered a great number of jobs in fields ranging from manufacturing to back-office functions for financial services companies.

Figure 3.21 is showing trade adjustment assistance petitions by U.S. Auto Companies from the data of the U.S. Department of labour, which attempts to determine to which country the jobs are heading. The statistics collected are on applications for Trade Adjustment Assistance, the federal aid program for workers dislocated by the effects of trade. What is more, workers, local government officials and firms can submit those petitions. Evidently, most offshoring jobs were moved to Mexico.

A reason for reshoring, or at least not starting offshoring, is “a central promise of Trump’s renegotiated The North American Free Trade Agreement, renamed the U.S.-Mexico-Canada Agreement, is that it has stricter auto content rules meant to keep more factories in the U.S. One new provision requires 40% of a

Trade Adjustment Assistance Petitions by U.S. Auto Companies

Workers affected in each state in the first six months of 2020, by country job was moved to



Data: U.S. Department of Labor

Figure 3.21: Trade adjustment assistance petitions by U.S. Auto Companies

car to come from factories that pay \$16 per hour or more, for example.” [36]

Furthermore, Biden talked about new offshoring policy as many U.S. companies have some of their operations in lower-tax countries. Biden is determined to make companies reshore and improve the manufacturing of the country, believing that President Donald Trump did not keep his promises to do so. [27]

Figure 3.22 reveals some cumulative data on trends in U.S. reshoring announcements by U.S. headquartered companies and Foreign Direct Investment (FDI) by foreign companies that have shifted production or sourcing from offshore to the U.S. The years considered are from 2010 to 2020. Both phenomena of bringing back the production to the home country and FDI are caused by existing the financial benefits the company gets by producing in the proximity of customers. “One of the benefits of reshoring initiatives was that 787,000 have been hired, equaling over 100% of the 778,000 increase in U.S. manufacturing jobs since the manufacturing employment low of 11.45 million in February 2010 and 7% of total 12/31/20 manufacturing employment of 11.5 million.” Figure 3.23 depicts reshoring and FDI trends in a separate manner.

Some resources suggest that the intensity of trends for reshoring in the represented years is on a large scale based on, first of all, stronger U.S. competitiveness because of reduction of corporate tax and regulations softening. Second of all, it is based on growing concerns over total cost of offshoring as well as China’s competitiveness and favoritism for Chinese state-owned enterprises. Besides, a multitude of companies were following the reshoring trend as they became more exposed to costs and risks of offshoring production that they previously did not take into account or did not take seriously.

Among other reasons for reshoring and FDI strategy, companies have mentioned:

- “Reshoring places higher emphasis on Made-in-USA image, redesign of the product and impact on domestic economy.
- FDI places more emphasis on government incentives, skilled workforce, and proximity to customers.
- Since reshoring is almost all from low-wage countries, reshoring companies have increased automation to make up for higher domestic hourly labour cost. This trend more recently also applies to FDI.
- Since most FDI is primarily from other developed countries, Made-in-USA is a less powerful sales argument. Shifting from Made-in-Germany to Made-in-USA has less brand value than shifting from Made-in-China.
- Foreign companies can be recruited by all 50 states and often have larger projects; thus, they receive more government incentives. This may be shifting to include reshoring, with the essential products push by the U.S. government.” When reporting their decisions to cease offshoring activities, companies usually underline advantages of bringing them back to the U.S. sight rather than stressing drawbacks of countries they are leaving in order not to put them in a bad light. It is likely that companies want to emphasize their correct move to reshore rather than acknowledge their mistakes made while offshoring.

Some new regulations set by the governments that drive down national dependence on imports of key products, such as medical products, chips, rare earth minerals, EV batteries, make companies choose to reshore. For example, nowadays, President Biden is making this process one of the priorities but applying

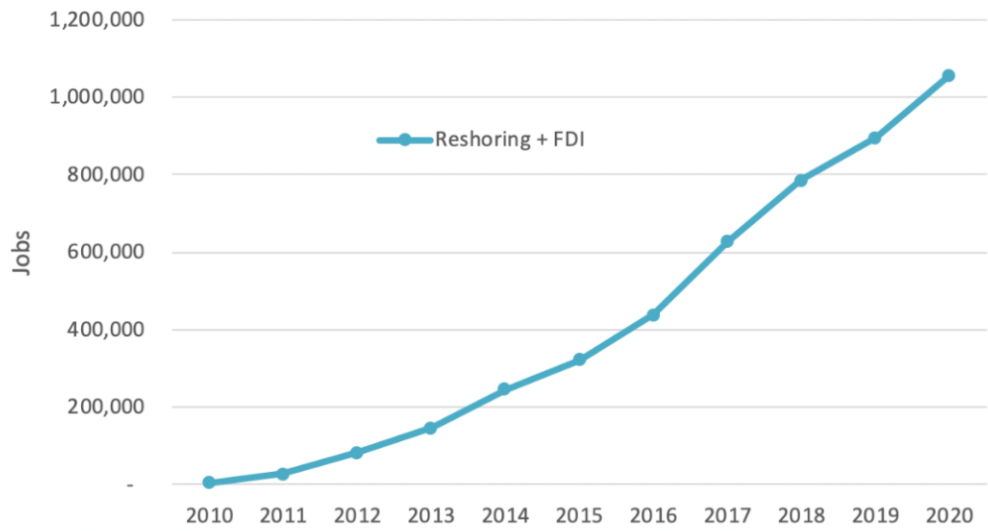


Figure 3.22: Jobs Announced, Reshoring+FDI, Cumulative 2010-2020

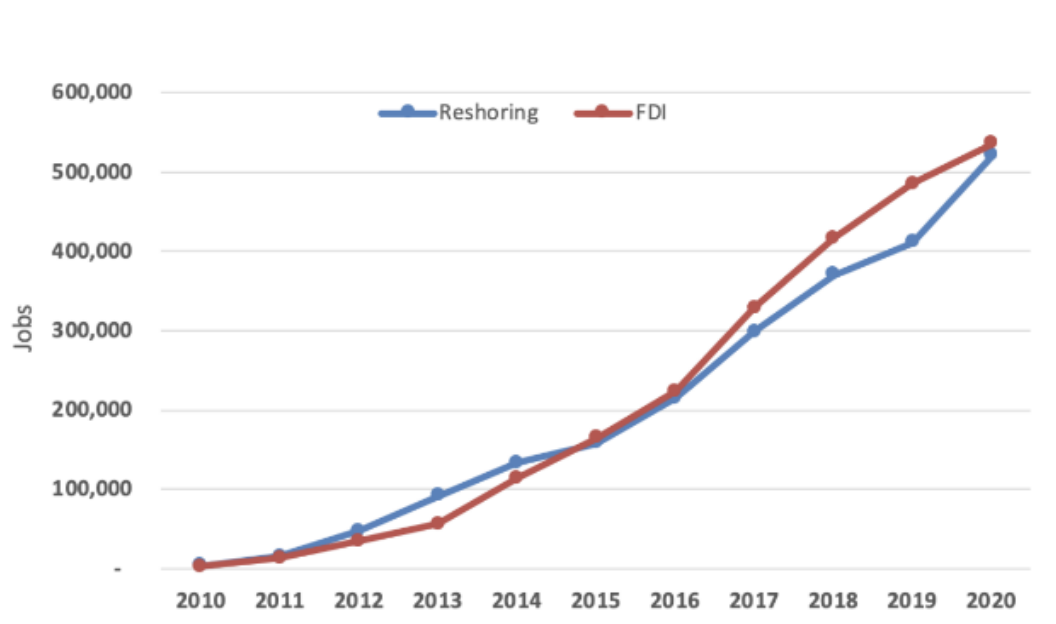


Figure 3.23: Jobs Announced, Reshoring and FDI, Cumulative 2010-2020

Rank by jobs	Industry	Jobs	Companies	Industry % of jobs
1	Transportation Equipment	319,262	1,085	32%
2	Computer & Electronic Products	121,027	657	12%
3	Electrical Equipment, Appliances & Components	98,281	558	10%
4	Chemicals	88,661	800	9%
5	Plastic & Rubber Products	50,438	508	5%
6	Medical Equipment & Supplies	48,150	417	5%
7	Apparel & Textiles	46,060	746	5%
8	Machinery	45,857	393	5%
9	Wood & Paper Products	44,414	150	4%
10	Fabricated Metal Products	37,280	497	4%
11	Primary Metal Products	30,937	207	3%
12	Food & Beverage	21,822	189	2%

Figure 3.24: By industry, Reshoring and FDI, Cumulative 2010-2020

different methods than President Trump.

3.9 Job loss

Offshoring could be seen as a sort of penalty for low-skilled workers as the jobs they perform are rather routinely and it is much easier to offshore them than offshoring what high-skilled workers are usually required to do.

Employment consequences of offshoring might be that a multitude of workers in home country could move to the pool of unemployed and potential ones would have much less chances of employment. Therefore, policy-makers should carefully weight all the pros and cons of bringing national production abroad.

The report by McKinsey Company on “Offshoring: Is It a Win-Win Game?” highlights that whereas in the U.S. many of the offshored jobs are seen as relatively undesirable or of low prestige, in the countries they are offshored to they are often considered desirable and attractive. As a result, workers in low-wage countries often have higher motivation and outperform their counterparts in developed countries in terms of performance measures such as the number of transactions per agent, or the number of errors per transaction.[31]

However, there could be a general belief among the consumers that offshoring eliminates jobs that could be offered to the home population. It especially might be true for countries with a high amount of immigrants who are in need of those so-called low prestige jobs. U.S. itself could be a good example as it has a great deal of immigrants. Therefore, from this perspective it might be not very reasonable for this country to have a large proportion of their companies’ production in offshore while having the demand for those types of jobs in their own country.

As an example, “IBM employed more than 364 thousand people worldwide just in 2020. The New York Times once reported that the American Company has more employees in India than in the United States. IBM’s operations in India helped lower the cost of producing and supplying IT tech services to corporations and governments in the face of competition from other IT companies.” [43]

Table 3.24 shows the amount of jobs that became available to the citizens of the United States in the years 2010-2020 due to reshoring process. According to some statistics reshoring stimulates availability of jobs mostly in High-Tech as the higher tech companies have more employees on average than do the

13	Furniture and Related Products	20,305	246	2%
1	Nonmetallic Mineral Products	12,104	121	1%
15	Miscellaneous	10,397	134	1%
16	Hobbies (subset of Miscellaneous)	7,564	274	1%
17	Castings/Foundries - Subset of Primary Metal Products	6,579	68	1%
18	Energy, Petroleum & Coal Products	2,445	22	<1%
19	Services	308	10	<1%

Figure 3.25: By industry, Reshoring and FDI, Cumulative 2010-2020, continued

Product Technology Level:	Reshoring		FDI		Reshoring + FDI	
	Jobs	Companies	Jobs	Companies	Jobs	Companies
High	28%	17%	18%	20%	21%	18%
Medium-High	36%	20%	48%	41%	44%	31%
Medium-Low	18%	22%	20%	25%	19%	24%
Low	18%	41%	14%	13%	15%	27%
H+MH	64%	37%	66%	61%	65%	49%
ML+L	36%	63%	34%	39%	35%	51%

Figure 3.26: Technology Levels, Reshoring + FDI, Cumulative 2010-2020

lower tech companies. The U.S. had a trade deficit in High-Tech products, therefore, this process was extremely beneficial for the country. Even though main job creators are High and Medium-High tech, Low-Tech has been a large contributor as well, hiring many people in apparel, wood, and plastic, rubber industries and PPE (Personal Protective Equipment).

Table 3.26 reveals the data on job creation sorted by product technology level in the United States in 2010-2020.

Table 3.27 depicts top 10 countries, from which the U.S. companies returned from offshore as well as number of companies and percentage of new jobs.

In the United States “the revised rate of reshoring plus FDI job announcements in 2020 was up about 2500% from 2010. The cumulative 780,000+ jobs brought back represent about 7% of U.S. manufacturing employment. The acceleration of jobs coming back combined with the decline in the rate of offshoring has resulted in a plateauing of the non-petroleum goods trade deficit at about \$900 billion/year. The COVID crisis has revealed the U.S.’s over-dependence on imports. This Data Report should motivate companies to further reevaluate their sourcing and siting decisions by considering all of the cost, risk and strategic impacts flowing from those decisions. Policy makers can use the continued reshoring successes as proof that it is feasible to bring millions of jobs back. Continuation of the trend depends on companies reevaluating their offshoring. Acceleration of the trend depends on the government leveling the playing field, making the United States more price competitive.” [33]

Historically offshoring process is evidently much more important matter when it comes to manufacturing rather than service sector, however, some exceptions might exist. Analysts of offshoring, such as consulting companies and international organizations, in the attempt to justify current or forecasted job losses due to offshoring point out that those losses might be a consequence of changes in general employment.

On the contrary, “Slaughter (2004) draws attention to a less quoted figure, namely the increase in U.S. employment due to international insourcing from foreign countries which grew from 2.6 million jobs in 1987 to 5.4 million in 2002. Kirkegaard (2003) notes that between 1999 and 2002 the majority of job losses in the category “occupations at risk of offshoring” did not happen in services but in the

Rank by jobs	Country	Jobs	Companies	% of Jobs
1	China	58,817	896	46%
2	Mexico	27,481	111	21%
3	Canada	12,744	78	10%
4	India	7,376	27	6%
5	Japan	6,750	43	5%
6	Singapore	4,320	5	3%
7	Germany	1,971	24	2%
8	Russia	1,755	5	1%
9	Switzerland	1,539	8	1%
10	Spain	1,215	5	1%

Figure 3.27: Reshoring

manufacturing industries. Moreover, these were generally low-wage jobs, with services employment in the same occupational category increasing.” [1]

Some authors argue that “there may be economic benefits from reemployment of those who lose their job to offshoring, as these people may eventually move into more rewarding occupations, although temporary adjustment costs of this transition will be incurred.” [30] However, this process does not come easily and would require a government to provide and fund, for example, additional educational and training programs in order for people to be competent enough to acquire those more qualified jobs. Without any doubt, this is not always plausible and would require much of organization and monetary resources from the state as well as sufficient effort from and willingness to participate by the public. On top of that, the economy must be growing enough to be creating the demand for those more rewarding and highly-skilled jobs.

3.10 Other reasons

After having been engaged in offshoring production for some time firms might not be able to overcome difficulties and hardships related to the high levels of internationalization or they might realize that seeking to do so does not bring benefits to the firm. The reasons could be unpredictable and and there could be large risks or changes in the firm’s strategic priorities. Moreover, while offshore, companies might have such issues linked to distance as freight, delivery, inventory, etc. Finally, issues that might arise across various countries include rising wages, intellectual property (IP) ³ risks and political instability, supply chain disruption, loss of control, and strained offshore relationships and, finally, problems related to quality, rework and warranty. Reshoring could also happen due to national security, price gouging, ban on imports of recyclables, like in China, and investing to improve competitiveness.

In 2020 the pandemic and factors related to it were mentioned as one of the main causes of decision to stop offshoring production. The rate of positive factor reporting remained similar to recent years. Covid-19 related reasons are from lead time, or the latency between the initiation and completion of a process, to market underutilized capacity, which might be due to decreased consumer demand in some categories because of COVID.

Tables 3.28 , 3.29 shows various factors contributing to the reshoring decision of the U.S. companies in 2020. Based on history, reshoring was mostly noted in the sphere of machinery, transportation equipment and appliances, personal protective equipment, pharmaceuticals, rare earths, semiconductors and electric batteries.

³refers to the analysis of what an individual or company needs to be prepared for when deciding to protect their intellectual property

Rank	2020 Negative Offshore Factor	# of times cited	Rank	Positive Domestic Factor	# of times cited
1	Quality/rework/warranty	359	1	Proximity to customers/market	1367
2	Freight cost	208	2	Government Incentives	1268
3	Supply chain interruption risk/Natural disaster risk/Political instability	194	3	Skilled workforce availability/training	1041
4	Total cost	179	4	Eco-system synergies	994
5	Tariffs	152	5	Image/brand	842
6	Green considerations	113	6	Impact on domestic economy	748
7	Delivery	109	7	Infrastructure	619
8	Inventory	101	8	Lead time/Time to market	561
9	Rising Wages	97	9	Automation/technology	447
10	Loss of control	76	10	Customer responsiveness improvement	414
11	Intellectual property risk	76	11	Higher productivity	371
12	Travel cost/time	68	12	Under-utilized capacity	368

Figure 3.28: Influencing factors, Reshoring and FDI, Cumulative 2010-2020

13	Communications	63	13	Manufacturing/engineering joint innovation (R&D)	274
14	Currency variation	47	14	U.S. price of natural gas/chemicals/electricity	242
15	Price	41	15	Customization/Flexibility	213
16	Difficulty of innovation/product differentiation	31	16	Raw Materials Cost	207
17	Social/ethical concerns	27	17	Lean/other business process improvement techniques	182
18	Strained offshore relationships	23	18	Walmart	135
19	Product liability	22	19	3D Printing/Additive Manufacturing	57
20	Regulatory compliance	17	20	Labor concessions	37
21	Emergency air freight	10	21	Lower real-estate/construction cost	34
22	Burden on staff	9			
22	Employee turnover	9			
24	Personnel risk	8			
25	Onsite audit cost	6			
25	Corruption	6			
27	Reputation risk	5			

Figure 3.29: Influencing factors, Reshoring and FDI, Cumulative 2010-2020, continued

According to the data, most products that have been stopped to offshore are large in size and have a massive weight such as transportation equipment. Reshoring is also related to frequency of design change and volatility of demand. All of these is, firstly, because some companies may have realized that total cost savings due to offshoring did not meet the expectations or that transportation of large and heavy products causes a lot of extra pollution and consumers having high environmental values would abstain from purchasing such products.

In addition, for instance the United States Manufacturing Extension Partnerships and Economic Development Organizations (EDOs) are promoting and supporting reshoring initiatives. [33] Among other reasons we have discovered hidden costs that were not revealed before. As lower cost is one of the main advantages for outsourcing and offshoring strategies, it will then have no purpose to keep them. Consequently, companies should obtain professional advice from an accountant and/or lawyer before making a firm decision to undertake those kind of processes.

While at offshoring site, companies might observe the lack of customer focus and engagement. It happens when an outsourcing and offshoring partner services several businesses simultaneously. That is why before entering into a contract, a company should carry out the “necessary research and investigation into the trustworthiness and competence of the third party vendor.” [25]

3.11 Categories, segmented markets where we can sustain constant demand

First, we consider a mathematical model where the assumption that consumer’s demand is constant is made. Such an assumption has been used in the literature before. Baxter and Lee introduced a model for an inventory with constant demand. Jiang Weifan analyzed the operations of inventory loan and the influence factors of enterprise inventory management, constructed the inventory control model of inventory loan business based on constant demand. In view of loan-to-value ratio and the prices of pledge are constants, Jiang Weifan paper researched the optimal order quantity and pledge quantity. M. J. G. Van Eijs in the article “A Note on the Joint Replenishment Problem under Constant Demand” considers the joint replenishment problem under constant demand. Jeong Jin Ki , Kyung Eun Lim, and Eui Yong Lee have an article devoted to “Optimal Restocking Policy of an Inventory with Constant Demand”. In general, very few studies use constant demand assumption and we can make a conclusion that it is too strong of an assumption to make for the current study. However, to simplify current analysis, we still have to assume that demand does not depend on price of the goods. Thus, demand is inelastic to price. Here, the total sales, or demand, is comprised of domestic production intensity (u_d) and offshore effort production intensity (u_o): $u_d(t) + u_o(t) = S$. While the change in demand goes down as offshore effort production intensity goes up.

3.12 Functional form for demand

In this section we analyze the reasons for having a functional form presented in the last section. The demand is usually price inelastic for everyday household products and services, so-called necessary goods. When the price increases, people will still purchase roughly the same amount of goods or services as they did before the increase because their needs stay the same. A similar situation exists when there is a decrease in price – demand will not increase substantially because consumers only have a limited need for the products. Therefore, inelastic products are necessities and, usually, do not have substitutes they can easily be replaced with.

Examples of goods with inelastic demand are utilities, prescription drugs, and tobacco products. As a result, necessities and medical treatments tend to be inelastic, while luxury goods tend to be elastic. However, factors that determine a good’s price elasticity of demand also include availability of competitive substitutes, and the effect of a good’s brand name and marketing. It leads to the conclusion that some luxury goods could be also quite inelastic to price as customers might stay loyal to the brand. When comparing similar products with different price points, consumers may purchase the higher-priced product if their brand loyalty to that product is high. As an example of a luxury product which demand might stay inelastic we take Gucci, an Italian high-end luxury fashion house based in Florence, Italy. Its product lines include handbags, ready-to-wear, footwear, and accessories, makeup, fragrances, and home decoration. Gucci loyal customers are the ones who will purchase the same brand regardless of convenience or price. These loyal customers have found a product that meets their needs, and they are not interested in experimenting with another brand. [42] Without any doubt, the manufacturing of such a product could be partly taken to a foreign country.

Goods	Estimated elasticity of demand
Salt	0.1
Matches	0.1
Toothpicks	0.1
Airline travel, short-run	0.1
Gasoline, short-run	0.2
Gasoline, long-run	0.7
Residential natural gas, short-run	0.1
Residential natural gas, long-run	0.5
Coffee	0.25
Fish (cod) consumed at home	0.5
Tobacco products, short-run	0.45
Legal services, short-run	0.4
Physician services	0.6
Taxi, short-run	0.6
Automobiles, long-run	0.2

Figure 3.30: Inelastic demand

Tore Ellingsen in his paper on “Price signals quality: The case of perfectly inelastic demand” uses a simplifying assumption of a model that demand is perfectly inelastic (rectangular). The author is discussing whether high price signals high quality: “One explanation of this phenomenon is that some buyers are well informed and because the seller can extract a higher price from these customers if he sells high quality, other uninformed buyers can use the price as a quality signal. Another explanation, first suggested by Wilson (1980), is that it is more costly to provide high quality than low quality and therefore high quality sellers may be willing to accept a lower volume (or probability) of trade in return for a higher price, whereas low quality sellers are less willing to make such a trade-off. Thus, even when all buyers are uninformed about the true quality, prices may reveal quality.” [6] Patrick L. Anderson, Richard D. McLellan, Joseph P. Overton, and Dr. Gary L. Wolfram 1997 in their work on “Price Elasticity of Demand” provided data (Table 3.30) showing estimated price elasticities of demand for some inelastic goods. They provide such a definition: “price elasticity of demand is the proportionate change in demand given a change in price. If a one-percent drop in the price of a product produces a one-percent increase in demand for the product, the price elasticity of demand is said to be one. For most consumer goods and services, price elasticity tends to be between 0.5 and 1.5.”

Among inelastic demand products and services mentioned in the table 3.30 automobiles (in particular various parts for them) and tobacco products could be offshored. Some business activities related to production of medical drugs and equipment could also be transferred to another country. Moreover, while demand for automobiles is usually elastic in the short-run, the authors also argue that “over the long run, the demand for automobiles in rural areas would probably be inelastic, since there are few alternative modes of transportation.” We can also consider airline travel as a part of offshoring because an organization might have offshored call center for this service and the paper pays specific attention to offshored services as well.

Demand for illicit drugs can also be inelastic. Henry Saffer and Frank Chaloupka in their paper “The demand for illicit drugs” are pointing out that “the estimated price elasticities for alcohol, cocaine are, respectively, -0.30 and -0.28.” The purpose of their paper is to estimate the effects of alcohol and drug prices on alcohol use and drug participation. However, they also claim that the range of price elasticities for certain alcoholic beverages is pretty large : “Studies using aggregate data find price elasticities for beer from about -0.2 to about -1.0, for wine from about -0.3 to about -1.8, and for spritz from about -0.3 to about -1.8.”

Furthermore, Steven R. Hursh and Gail Winger in their work “Normalized demand for drugs and other reinforcers” are analyzing “demand for drugs and variables that alter demand, particularly elasticity of demand, which is the sensitivity of consumption to changes in price for a unit of drug reinforcement.” They “describe a procedure to normalize demand-curve analysis that permits dose- and potency-independent comparisons of demand across drugs. The procedure is shown to be effective for comparing drug demand within and across the drug classes. The technique permits a quantitative ordering of demand that is consistent with the peak levels of responding maintained by the drugs.” [9] As regards to the current study, it is very atypical for companies producing alcoholic beverages to offshore.

Particularly important for policymakers is the consistent evidence that emerges from these studies showing the effects of higher prices for cigarettes and other tobacco products, with growing evidence that youth and young adults are relatively more responsive to price than older adults. Conventional wisdom was that addictive substances, including tobacco products were not following such a principle: as the price of a product rises, the quantity demand of that product falls. However, Frank J. Chaloupka research on

	Offshoring intensity (%)		Variance		Standard deviation	
	2002	2006	2002	2006	2002	2006
Total manufacturing	28.7	26.5	0.024	0.032	0.153	0.178
Non-durables	16.4	20.9	0.022	0.025	0.148	0.157
Food, beverage and tobacco	5.6	5.3	0.008	0.011	0.089	0.103
Paper and printing	11.2	11.7	0.011	0.020	0.103	0.140
Petroleum, chemical, and plastics & rubber	26.3	30.5	X	X	X	X
Textile, clothing and leather	13.6	17.2	0.031	0.039	0.176	0.196
Durables	38.4	31.6	0.030	0.033	0.173	0.181
Computers, electronics and electrical equipment	39.1	34.0	0.040	0.051	0.201	0.226
Furniture and miscellaneous manufacturing	9.7	12.0	0.015	X	0.123	X
Machinery	22.6	22.3	0.026	0.034	0.162	0.183
Non-metallic mineral, primary and fabricated metal	23.0	24.3	0.026	0.033	0.160	0.182
Transportation equipment	60.0	45.8	X	X	X	X
Wood products	5.7	7.4	0.013	X	0.112	X

Figure 3.31: Offshoring intensity and firm variation by industry

“Macro-social influences: tobacco-control policies products” proved otherwise.

The author mentions that “one problem with using state-level sales data is that these data do not accurately reflect consumption in states because of the potential for casual and organized cigarette smuggling in response to interstate price differentials. Failing to account for this would produce biased estimates of the impact of price on demand.”

Most studies on cigarettes show that the price elasticity of overall cigarette demand ranges from -0.3 to -0.5, implying that a 10% increase in cigarette prices would reduce smoking only by 3-5%, which implies that this good could be categorized as inelastic, especially among older cigarette abusers. Chaloupka and Grossman study claims that “the most recent studies, which are based on much larger samples from recent years, confirm the finding that youth and young adults are significantly more responsive to price than older adults.” [4]

Lydia Couture, Jianmin Tang Beiling Yan in the article “Offshoring and Business Organization: Evidence from Canadian Manufacturing Firms” are examining offshore intensity for Canadian manufacturing center (table 3.31). It must be noted from the table that durable manufacturing industries are offshoring more than non-durable ones. We see that food, beverages and tobacco have least offshoring intensity and standard deviation is only 0.1. “The heterogeneity in offshoring across firms seems to be more pronounced in 2006 than in 2002. For the manufacturing sector as a whole, the standard deviation increased from 0.15 in 2002 to 0.18 in 2006. It is interesting to note that the standard deviation was even higher for importers only, being more than 0.23 for total manufacturing in 2002 and 2006.”

The authors also compare offshoring in the U.S. versus the rest of the world as well as multi-plant firm and single-plant firm. The data is shown in table 3.32 and 3.33. As a result, offshoring intensity for total manufacturing is higher for multi-plant, more than double in 2002. “This might be due to firms with multi-plant structure being more likely to specialize in production to take advantage of economies of scale, and to have resources and knowledge to participate in global supply value chains.” However, offshoring for durables significantly decreased from 2002 to 2006 for multi-plant firms, while for single-plant firms it remained almost unchanged.

Overall, not many countries in the world dedicate offshoring to food, beverage and tobacco. This means that those necessities would not serve for the model analyzed in the paper. We will later see that certain luxury goods are a perfect example that fits the model.

3.13 Luxury goods

Now we consider why it could be that while demand is price inelastic, the larger the offshore effort production intensity u_o , the less consumers are willing to buy a product of a firm, in particular tied to the case of a luxury good.

	Destination				By firm structure			
	U.S.		Non-U.S.		Multi-plant firm		Single-plant firm	
	2002	2006	2002	2006	2002	2006	2002	2006
Total manufacturing	21.4	15.3	7.3	11.2	36.6	32.4	15.0	17.9
Non-durables	9.6	7.4	6.8	13.5	20.5	23.5	8.2	15.6
Food, beverage and tobacco	4.1	3.5	1.4	1.8	4.7	4.4	0.8	0.9
Paper and printing	9.9	9.9	1.3	1.8	9.6	9.6	1.6	2.1
Petroleum, chemical, and plastics & rubber	13.6	8.7	12.8	21.8	X	X	X	X
Textile, clothing and leather	9.0	10.6	4.7	6.6	X	X	X	X

Figure 3.32: Offshoring intensity by industry and by firm structure and destination

Durables	30.8	22.4	7.7	9.2	50.2	42.3	19.7	19.4
Computers, electronics and electrical equipment	21.8	14.5	17.3	19.5	25.5	12.5	13.6	21.4
Furniture and miscellaneous manufacturing	6.2	6.8	3.5	5.2	X	X	X	X
Machinery	15.5	14.0	7.1	8.3	14.0	8.9	8.5	13.4
Non-metallic mineral, primary and fabricated metal	15.4	13.9	7.6	10.4	19.3	19.5	3.7	4.7
Transportation equipment	52.4	36.8	7.6	9.0	50.3	35.3	9.6	10.5
Wood products	4.9	6.1	0.9	1.3	4.1	4.9	1.7	2.5

Figure 3.33: Offshoring intensity and firm variation by industry, continued

It could be that the company knows that the generation that buys a certain product of Gucci, say women of age 40-50, are not that sensitive to the “made-in” effect. However, the company might observe that the trend is that current generation of age 20-30 in the country is too concerned by the label so it decides that the demand would go down in several years due to that factor unless it decides to reshore. Therefore, it plans to stop offshoring in advance, for example, in 10 years.

Another factor could be also migration and demography. The migration rate might be increasing in a home country and the studies might show that a lot of younger people are emigrating. However, there might be evidence, such as using surveys, that predominantly younger generation were more satisfied with the offshoring products of the company. For example, they did not care as much about the “made-in” effect or they were not as concerned about the quality of the product as the older generation.

Therefore, the trend would be that the proportion of consumers who care a lot about the “made-in” effect, quality is much higher and the company cannot sustain the same demand if it keeps offshoring.

Similar situation could be with demography. If the studies show that the young population is not emigrating, but decreasing in general, then it is also reasonable to plan to reshore according to the demographic situation in the country.

3.14 Service offshoring

Over the years manufacturing is certainly dominated in the sphere of offshoring compared to services, which is only a small portion of overall world offshoring. However, it does play its role too and it can be especially valuable for transport-related industries, finance and insurance, post and telecommunications, computer services, and other business activities.

Service offshoring is gaining its weight due to digitalization of economic processes “which has enabled business activities to be conducted in entirely new ways, as well as across large distances. This has opened possibilities of trade in a variety of services that were traditionally non-tradable, and caused a growth potential in offshoring activities facilitated by the opening of markets at both global and national levels.”

Offshoring in services came into existence in the late 1980s and early 1990s with the contracting out of tasks linked to customer services. Since then service offshoring started being popular among such activities as engineering, software development and other tasks that involve high-skilled human capital.

Western countries have especially large service sector, therefore, having substantial number of tasks that could be potentially offshored and, as a result, significant job loss. That is the reason why this matter has gained importance in political discussions. “While offshoring has for a long time been limited to material inputs, the last decade has also witnessed an increase in offshoring of services, a trend that has been triggered by the revolution in information and communication technologies.” [22]

Since offshoring of services is becoming more prominent for economies of West, jeopardizing jobs for its citizens, this trend has directed attention towards labour market concerns.

What could make companies change their mind about offshoring their services is, for example, customers’ dissatisfaction of services carried out by labour force at an offshoring site. Anne Stringfellow, Mary B. Teagarden, Winter Nie in their article “Invisible costs in offshoring services work” consider an example of a call center in India. They mention language distance and speech intelligibility as an issue and cause of customer discontent: “In addition to geographic distance, language differences also present a barrier to effective interaction between service providers and customers. Accents interfere with the reception of the message content. First, the sound of the words may not be recognizable and the message content is not received.”

For instance, one Dell customer relates his frustration on PlanetFeedback.com, a web site devoted to customer service problem, “The techs I had the privilege of dealing with were unintelligible due to heavy East Indian accents compounded by speaking much too quickly for me to understand.” (Harrison, 2002). Listeners’ familiarity with accented speech also influences its intelligibility (Gass and Varonis, 1984; Wingstedt and Schulman, 1987). The foregoing argument suggests that foreign accents represent a barrier to effective communication and therefore contribute to interaction distance.” Authors also highlight that “Social identity theory suggests that people prefer to interact with others with whom they share a common identity. Research has also shown that it is easier to establish rapport with persons who are regarded as being similar than with those who are perceived as different (Byrne, 1971). Studies have shown that people with foreign or non-standard accents are regarded as less competent and less credible than standard speakers (Giles, 1972; Lippi-Green, 1997; Ryan et al., 1982; Tsalikis et al., 1991). Research has also found that English speakers of Japanese origin aroused negative feelings in listeners (Cargile and Giles, 1996), as did those perceived to be of Korean, Arabic and Chinese origin (Llurda, 2000). However, there is some evidence that the effect of foreign accents depends on the specific accent (Giles et al., 1995; Ramirez, 2003). This suggests that certain accents not only interfere with intelligibility, but also negatively affect offshore communication by affecting the quality of working relationships.”

Chapter 4

Optimal control models for offshoring and reshoring

In this chapter, we analyze some models introduced by A. Buratto, L. Grosset and M. Muttoni in their research work “Optimal offshore production policy under social and economic uncertainty” [18].

Let us introduce the function $S(t)$, $t \in [0, +\infty]$, to describe sales, that is, the production of the firm at time t , and by σ the level of the sales regime. At any time t a percentage $u(t) \in [0, 1]$ of the whole production $S(t)$ is assumed to be made offshore. Taking into consideration “made-in effect” explained in Chapter 3.2, the main assumption that is taken into account here is that production carried out offshore may hinder sales development. The authors assume that sales change according to the following dynamics.

$$\begin{cases} \dot{S}(t) = \gamma(\sigma - S(t)) - \lambda u(t)S(t) \\ S(0) = S_0 > 0 \end{cases} \quad (4.1)$$

- If $u(t) = 0$, then the firm chooses no offshoring and, as a result, any negative “made-in effect”, can be noticed. On top of that, as mentioned in Chapter 1, there could be many other effects that negatively affect the willingness of customers to buy products.
- If $u(t) > 0$ then the firm produces offshore the quantity of products $u(t)S(t)$ abroad, and, thus, consumers can realize the prevalence of “made-in effect” that results into decrease in sales. Such a negative effect is assumed to be proportional to the amount produced, with proportionality constant equal to $\lambda > 0$. The parameter λ represents all the factors that affect customers’ decision to purchase products based on its relation to offshoring. The less customers are prone to buy offshore products, due to the reasons mentioned in the study, the greater λ in the model. That is why there is a negative sign in front of the parameter. λ would be smaller if customers were more indifferent and careless about the unemployment problems of the country, ecology, sustainability, working conditions and other matters highlighted in the second chapter.

Note that due to the linearity of the ODE in 4.1, sales are always positive for any existing policy of offshoring u .

As mentioned before, one of the most important reasons that pushes a firm to perform offshoring production is cost. Even though transportation costs play its role, production may be much less expensive abroad, which leads to higher profit margins.

An optimal control framework is then used to characterize the offshoring decision problem to govern the optimal offshoring production policy that counterbalances the high costs of local activities.

In mathematical terms we have to maximize the given functional, and in economical terms the goal of the firm is to maximize its discounted profit that it gets from the production as a whole, both from the place of offshoring and the domestic production.

4.1 The offshoring problem with linear costs

A first formulation considers linear production costs:

$$J(u) = \max_{u \in [0,1]} \int_0^{+\infty} e^{-\rho t} [p - \kappa_d(1 - u(t)) - \kappa_o u(t)] S(t) dt \quad (4.2)$$

Notation:

$u(t)$ portion of production offshored at time t , $u(t) \in [0, 1]$

$S(t)$ sales level at time t = total production

σ sales regime with no offshoring ($\sigma > 0$)

γ rate of convergence to regime sales ($\gamma > 0$)

λ impact of offshoring on sales ($\lambda > 0$)

ρ discount rate, $\rho \in [0, 1]$

κ_d unit cost of domestic production ($\kappa_d > 0$) \rightarrow domestic costs = $\kappa_d(1 - u)S$

κ_o unit cost of offshore production ($\kappa_o > 0$) \rightarrow offshoring costs = $\kappa_o uS$

p unit price, $p > \kappa_d$ \rightarrow revenue = pS

In this given functional, we have the price p per unit sold that is multiplied by the total sales $S(t)$, which makes up the revenue. In order to represent the profit, we have to subtract all the costs the company is facing, both in domestic and offshore production. In order to distinguish the two types of production costs, we introduce the unit costs κ_d and κ_o . If κ_d is greater than κ_o it means that it is more costly to produce domestically than in an off-shoring place. This was the main reason for the offshoring decision of the firm, like for most of the firms that decide to offshore, in the first place. All the advantages of offshoring that play a role here and explanations why it could result in less costs are given in previous chapters.

Offshoring costs $\kappa_o uS$ here could represent transportation costs that are inherent in offshore production. While in some cases they could be infinitesimal compared to total profit and benefits of such production in general, in other cases those costs might not overweight the advantages. If the transportation costs and other costs related to producing abroad seem to have the same quantity as the profit itself, a company starts to reverse the process and brings the production back home. In other words, for offshoring to be reasonable, meaning to obtain a higher profit margin while performing offshoring, we need the sum of all the functions that represent the cost of offshoring and the transportation costs to be less than the function representing the cost of the domestic production. If we consider the case when κ_o gets closer to κ_d , then a company has to analyze what will be happening in the near future and has to decide whether it is still profitable to offshore it is time to bring all the production back to the home country.

This offshoring problem with linear production costs can be formulated as the following optimal control problem, and solved applying the Pontryagin Maximum Principle, see [7]. We may also put a limitation to the amount of production offshored because we make an assumption that we do not want to offshore all the production.

$$\begin{aligned} & \max_{u \in [0,1]} \int_0^{+\infty} e^{-\rho t} [p - \kappa_d(1 - u) - \kappa_o u] S dt \\ & \text{subject to } \begin{cases} \dot{S} = \gamma(\sigma - S) - \lambda uS \\ S(0) = S_0 \end{cases} \end{aligned}$$

Since the associated Hamiltonian function is linear in the control function u , the optimal solution turns out to be a bang-bang one. So, the optimal strategy is either no offshoring ($u \equiv 0$) or total offshoring ($u \equiv 1$) and the choice depends on the offshoring costs.

High offshoring costs	Low offshoring costs
$\kappa_o > \kappa_d - \frac{\lambda}{\gamma+\rho}(p - \kappa_d)$	$\kappa_o < \kappa_d - \frac{\lambda}{\gamma+\rho}(p - \kappa_d)$
$u \equiv 0 \leftrightarrow$ no offshoring	$u \equiv 1 \leftrightarrow$ total offshoring
$S_{SS} = \sigma$	$S_{SS} = \frac{\gamma\sigma}{\gamma+\lambda} < \sigma$

Observe that it is not sufficient to simply compare the marginal costs κ_o and κ_d to determine which of the two strategies is optimal: The decision maker must also take into account some other aspects that appear in the term $-\frac{\lambda}{\gamma+\rho}(p - \kappa_d)$, such as the impact of offshoring on sales λ , the rate of convergence to regime sales γ , the discount rate ρ , and the domestic margin $(p - \kappa_d)$.

4.2 The offshoring problem with quadratic costs

The formulation for the objective of the problem presented above considers linear cost functions; however, assuming a quadratic cost function, it is also possible. Let us look at the model in such a case:

$$\max_{u_o} \int_0^{+\infty} e^{-\rho t} \left(pS(t) - \frac{\kappa_d((1-u_o)S)^2}{2} - \frac{\kappa_o(u_o S)^2}{2} - \theta(u_o S) \right) dt$$

Considering a quadratic term means giving a high weight to offshoring costs, and mathematically, it allows for internal optimal strategies, in other terms, for partial offshoring. This is simply another assumption of the functional form that could further improve the study. However, we just take a brief look at the objective here, without elaborating on the solution. It must be noted that these quadratic formulations describes the situation when partial offshoring turns out to be optimal.

4.3 The offshoring problem with switching time

As mentioned above, there could be facts that lead companies to bring offshore production back to their country at a particular point in time. The following formulation takes this possibility into account in the framework of stochastic optimal control theory. Let us call this time the random switching time τ . Due to the regime switch, the firm may be subject to some extra costs (“penalty costs”) to be paid at time τ . This damage or cost, which is inflicted on the firm at the switching time, may capture the physical damage sustained by the firm’s offshore facilities, for instance, due to a war outbreak or a violent manifestation, or the loss of perishable goods due to a disruption in the transportation chain from the offshore country to the home country. Another issue could be assessment costs sustained by the firm in order to analyze the implications that a change in the offshore socio-political scenario may entail on the firm’s production. As such, it depends on the firm’s policy and on the state of things just before the switch happened, and not at all on what happens afterwards. On the other hand, as we have mentioned in the previous discussions, offshoring costs might increase after the switch because of the change of some legal framework in the country where offshoring is taking place, some unexpected events might happen such as natural disasters or essential and/or destructive political actions and so on. These effects can be formalized as follows

- “penalty” cost function in τ : $K(u(\tau^-), S(\tau^-)) > 0$
- Increased marginal offshoring production cost: $\kappa'_o > \kappa_o$

The problem can then be split into two periods (stages): The first before the switch and the second after it.

- **Stage 1:** At $t < \tau$ the decision maker does not know when τ will occur, but knows that it could happen at any time and which may be its effects.
Strategy: $u_1(t), S_1(t)$ with $t \in [0, \tau)$
- **Stage 2:** At $t \geq \tau$ he decision maker knows that τ has happened and when, so that he can adjust his strategy by solving a new simple optimal control problem
Strategy: $u_2(\tau, t), S_2(\tau, t)$ with $t \in [\tau, +\infty)$, $S_2(\tau, \tau) = S_1(\tau)$

In order to formalize the random switching time τ , we must introduce the Hazard rate of τ as the following probability.

$$\lim_{dt \rightarrow 0^+} \frac{\mathbb{P}(\tau \leq t + dt \mid \tau > t)}{dt} = \eta(t, u_1(t), S_1(t)) \quad (4.3)$$

with $\eta \geq 0$ and $\int_0^{+\infty} \eta = +\infty$. 4.3 can be rewritten as follows

$$\begin{cases} \frac{d}{dt} \mathbb{P}(\tau > t) = -\eta(t, u_1(t), S_1(t)) \mathbb{P}(\tau > t) \\ \mathbb{P}(\tau > 0) = 1 \end{cases}$$

and therefore

$$\mathbb{P}(\tau > t) = e^{-\eta t}. \quad (4.4)$$

The offshoring problem with switching time can be formalized as the following stochastic two-stage optimal control problem.

$$\mathbb{E} \left[\int_0^\tau e^{-\rho t} \ell_1(u_1(t), S_1(t)) dt - e^{-\rho \tau} K(u_1(\tau), S_1(\tau)) + \int_\tau^{+\infty} e^{-\rho t} \ell_2(u_2(\tau, t), S_2(\tau, t)) dt \right]$$

where

$\ell_1(u_1, S_1)$ is the Stage 1 payoff with offshore marginal cost κ_o

$\ell_2(u_2, S_2)$ is the Stage 2 payoff with a new offshore marginal cost κ'_o

The problem can be tackled using a backward approach that consists in

1. Solving Stage 2 as an independent simple OC problem and finding its optimal Value function V_2
2. Plugging V_2 into the 2-stage payoff and maximizing the objective value above, finding the optimal strategy for Stage 1

$$\begin{aligned}
& \mathbb{E} \left[\int_0^\tau e^{-\rho t} \ell_1(u_1(t), S_1(t)) dt - e^{-\rho \tau} K(u_1(\tau), S_1(\tau)) + \int_\tau^{+\infty} e^{-\rho t} \ell_2(u_2(\tau, t), S_2(\tau, t)) dt \right] \\
&= \mathbb{E} \left[\int_0^\tau e^{-\rho t} \ell_1(u_1(t), S_1(t)) dt + e^{-\rho \tau} [-K(u_1(\tau), S_1(\tau)) + V_2(S_1(\tau))] \right] \\
&= \int_0^{+\infty} e^{-\rho t} \mathbb{P}(\tau > t) \left\{ \ell_1(u_1(t), S_1(t)) + \eta(t, u_1(t), S_1(t)) [-K(u_1(t), S_1(t)) + V_2(S_1(t))] \right\} dt
\end{aligned}$$

From (4.4), assuming that η is constant, we obtain

$$= \int_0^{+\infty} e^{-(\rho+\eta)t} \left\{ \ell_1(u_1(t), S_1(t)) + \eta [-K(u_1(t), S_1(t)) + V_2(S_1(t))] \right\} dt$$

Solving Stage 2

Just like in the previous case, in order to reach the solution of this offshoring problem with linear production costs, we describe it as the following optimal control problem and solve it applying the Pontryagin Maximum Principle.

$$\begin{aligned}
& \max_{u_2 \in [0,1]} \int_0^{+\infty} e^{-\rho t} [p - \kappa_d(1 - u_2) - \kappa'_o u_2] S_2 dt \\
& \text{subject to } \begin{cases} \dot{S}_2 = \gamma(\sigma - S_2) - \lambda u_2 S_2 \\ S_2(0) = S_1(\tau) \end{cases}
\end{aligned}$$

Again, since the associated Hamiltonian function is linear in the control function u , the optimal solution turns out to be a bang-bang one. So, the optimal strategy is either no offshoring ($u \equiv 0$) or total offshoring ($u \equiv 1$) and the choice depends on the offshoring costs.

High offshoring costs	Low offshoring costs
$\kappa'_o > \kappa_d - \frac{\lambda}{\gamma+\rho}(p - \kappa_d)$	$\kappa'_o < \kappa_d - \frac{\lambda}{\gamma+\rho}(p - \kappa_d)$
$u_2 \equiv 0 \leftrightarrow$ no offshoring	$u_2 \equiv 1 \leftrightarrow$ total offshoring
$V_2(S) = \frac{p - \kappa_d}{\gamma + \rho} \left(S + \frac{\gamma \sigma}{\rho} \right)$	$V_2(S) = \frac{p - \kappa'_o}{\gamma + \lambda + \rho} \left(S + \frac{\gamma \sigma}{\rho} \right)$
$S_{SS} = \sigma$	$S_{SS} = \frac{\gamma \sigma}{\gamma + \lambda} < \sigma$

It is important to note that to decide which of the two strategies is optimal, it is not enough to simply compare the new offshore marginal cost κ'_o with the marginal costs κ_o and κ_d . The decision maker must also take into account some other factors that are present in the part $-\frac{\lambda}{\gamma+\rho}(p - \kappa_d)$.

Conclusion

In conclusion, in this study, the important phenomena of offshoring was discussed. Offshoring allows companies to produce items in another nation by relocating their businesses there. The study looks at the whole production model of offshoring as well as the process of outsourcing and offshoring of services because they all share many of the same characteristics. Moreover, when operating costs are lower in another nation, a corporation may decide to relocate its operations or offices there to save money. Offshoring, in contrast to outsourcing, calls for the third party being contracted to accomplish a task to be based in a different nation. This thesis discussed the phenomenon of offshoring, including all organizational factors, good and negative repercussions, and customer attitudes.

Additionally, outsourcing also includes some disadvantages. Among them is the risk of exposure of sensitive data and/or information, output that is of low quality, etc. The satisfaction of users of offshore products levels can vary. Offshoring production may be a short-term choice depending on the resources that are accessible in a foreign nation. A decision of this nature may be made by the company itself or in response to external factors. We investigated the factors that may affect consumers' purchasing intentions and perceptions of products made overseas. Generational preferences, migration, the "made-in" effect becoming more pronounced, or unexpected antagonism may have an impact. Businesses may find after engaging in offshoring production for some time that they are unable to overcome the difficulties and problems brought by it or that doing so is not beneficial to their business. Changes in the firm's strategic priorities or unpredictable high risks could be the root causes. Therefore, special attention was given to the reshoring process. Finally, offshoring, its profit-making, costs and other characteristics were described from the mathematical point of view in the last chapter, where some optimal control models were analyzed.

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