Central Asia Business Journal

Bang College of Business
Kazakhstan Institute of Management, Economics and Strategic Research

Editor
Dr. William Gissy

Associate Editors
Dr. Dana Stevens Dr. Sang Lee Dr. John Dixon

Dr. Mujibul Haque Dr. Carolyn Erdener

Dr. Vladimir Garkavenko Dr. Mira Nurmakanova Dr. John Burke

Dr. Ken Harvey Dr. Gavin Kretzschmar

Editorial Advisory Board
Dr. Horst Treiblmaier *Vienna University of Economics and Business Administration*

Dr. Garry Bruton *Texas Christian University*

Dr. John Levendis *Loyola University-New Orleans*

Editorial Assistants
Jerry Wang Elmira Rayeva

Volume 3
November 2010

Contents

Shayan, Ebrahim and Fatemeh Ghotb, *Software Implementation and Experimentation with a New Genetic Algorithm for Layout Design*……..1

Amagoh, Francis and Ustina Markus, *Public Sector Reform in the Republic of Kazakhstan*…….12

Gaisina, Sholpan, *Models of Demand for Capital in Agriculture of Kazakhstan*……..26

White, Kristopher, *Geography, Policy and Barriers to International Trade in Central Asia*……44

Treiblmaier, Horst and Jonathan Palmer, *Is there a Continental Divide?: A Comparison of Web Site Capabilities*……..55

Abdullah, Tengku Akbar Tengku, *Competition in the Airline Industry: The Case of Price War between Malaysia Air and Air Asia*…….62

Software Implementation and Experimentation with a New Genetic Algorithm for Layout Design

Ebrahim Shayan and Fatemeh Ghotb

Bang College of Business

KIMEP

Abstract

This paper discusses the development of a new GA for layout design. The GA was already designed and reported. However the implementation used in the earlier work was rudimentary and cumbersome, having no suitable Graphical User Interface, GUI. This paper discusses the intricacies of the algorithm and the GA operators used in previous work. It also reports on implementation of a new GA operator which was not included in earlier reports. The software was then used to conduct a series of experimentations to establish the best configuration of the operators for better results. The paper is also demonstrating a comparison of the new GA results and results from the literature. In addition the results show the solution of two new problems by various methods from the author's own layout developments in industry. The results demonstrate that in most cases the new GA is superior to the existing methods. In particular the speed of the new GA is achieving a reasonable solution is significantly low.

1. Introduction

The material handling cost (MHC) can be reduced by 10–30% by robust facilities layout and material handling systems (Tompkins, 1996). Better design of layouts has become a research issue leading to many approaches. The quadratic assignment problem (QAP) is a famous layout model, which assigns n equal area departments to n equal sized locations. However, in general QAP is an NP-complete problem (Gorey, 1979). To deal with mo general unequal locations, several sub-optimal approaches to solve facilities layout problems using heuristics have also been developed such as simulated annealing, tabu search, artificial neural networks, and genetic algorithms (GAs) widely implemented to solve combinatorial optimization problems (Gero, 1997) and are considered to be robust approaches in artificial intelligence. Facilities layout is interconnected to running costs in the manufacturing industry.

An effective layout should arrange and integrate physical facilities to utilize the offering resource leading to multiple objectives including minimizing investment in equipment, minimizing overall production time, utilizing existing space the most effectively, employee convenience, safety and comfort, flexibility for arrangement and operation, and minimizing material handling cost (Francis, 1992). Most of the facility layout problems found in the literature deals with the arrangement of rectangular departments. There are applications, however, in which an orthogonal arrangement of departments is not necessarily a requirement. For an interesting survey the reader is referred to (Kusiak, 1987). The problem of determining the optimal location of areas in a plant falls in the class of the Quadratic Set Covering (QSC) problems. Because of the large amount of possible area shapes and locations in a plant, there are no computationally feasible optimal or hybrid algorithms available for the QSC problem (Zhang, 1999).

Genetic algorithms are a family of parallel, randomized-search optimization heuristics which are based on the biological process of natural selection (Holland, 1975). In 1992,

Tam (1992) published a work in the European Journal of operational Research on how to use Genetic Algorithms to solve plant layout problems. Afterwards, in 1995, Tate and Smith (1995) published a report on the application of Genetic Optimization to plant layout problems, which focused on the case of compartmenting problems within different surfaces. Suresh, Vinod and Sahu (1995) presented a further application of Genetic Algorithms to the field of layout. Wang et al. (1996) produced software based on GA for layout design. Tam and Chan (1998) further improved the GA based results using the Gambler's ruin method, to make sure that the chromosome represents a slicing tree.

The work carried out by Chittllappilly (2003), implemented a new chromosome representation and decoding scheme introduced by Hanafi (2000) based on slicing trees, using a two dimensional chromosome. It produces better results than existing representations mainly due to the fact that the new chromosome generated by GA operators are always feasible, thus no need for feasibility checks. Accordingly the new algorithm requires considerably less computational effort to produce results for practical sized problems. Further work and experiments were reported by Shayan (2004) to test the performance of the new algorithm under varying parameter settings and problem sizes, as compared with other algorithms from the literature. The experiments were conducted with rudimentary software.

This paper is reporting on yet further extension of the previous work in which a unified user friendly interface called Genetic Algorithm for Layout Planning (GALP) was developed to facilitate further experimentation with the above mentioned GA algorithm. In addition it implemented an additional new operator devised by Shayan (1999) to the GA and tested the effect of this operator on the solution space exploration.

2. GA Representation and Operators

We invite the readers to consult the pervious papers for details of the chromosome design, to avoid repetition. Here the minimum background necessary to understand the content of the software is introduced briefly.

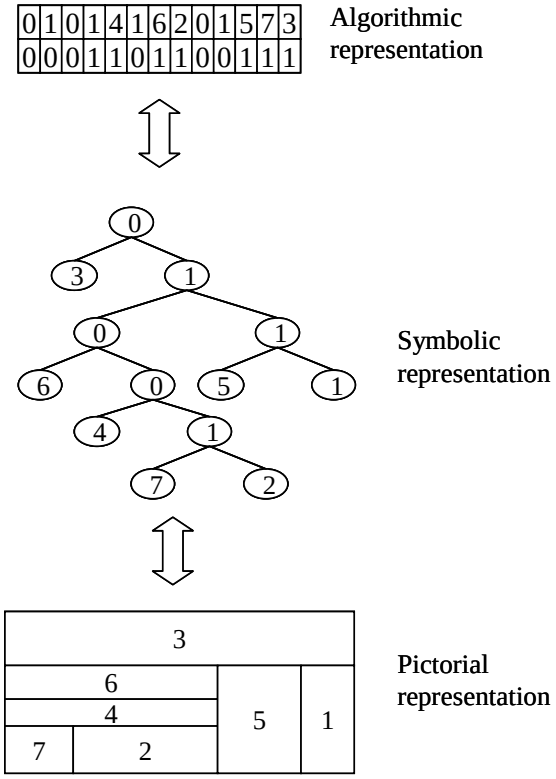


Figure 1. The chromosome structure and the corresponding the search tree and layout

GA Operators:

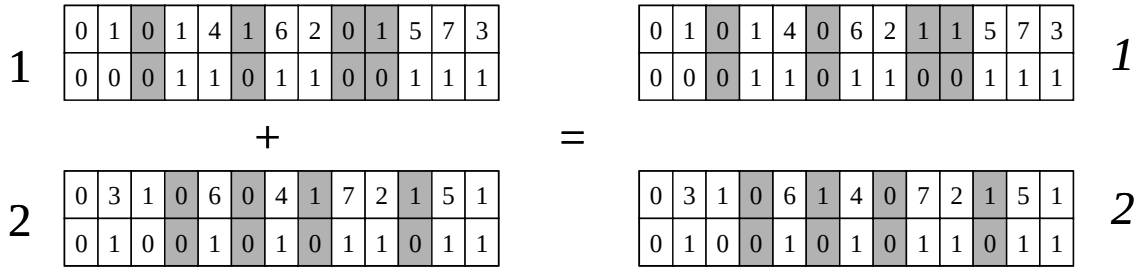


Figure 2– Single point crossover

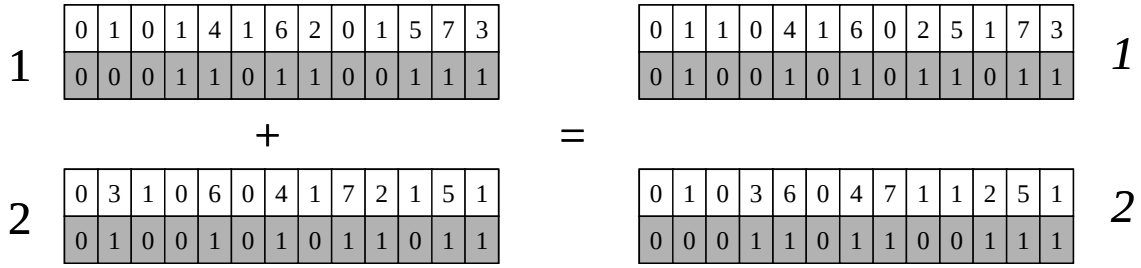


Figure 3 – Row 2 exchange crossover

1	0	1	0	1	4	1	6	2	0	1	5	7	3			0	1	0	1	4	0	6	2	1	1	5	7	3	1
	0	0	0	1	1	0	1	1	0	0	1	1	1			0	0	0	1	1	0	1	1	0	0	1	1	1	
									+						=														
2	0	3	1	0	6	0	4	1	7	2	1	5	1			0	3	1	0	6	1	4	0	7	2	1	5	1	2
	0	1	0	0	1	0	1	0	1	1	0	1	1			0	1	0	0	1	0	1	0	1	1	0	1	1	

Figure 4 – Internal exchange crossover

1	0	1	0	1	4	1	6	2	0	1	5	7	3			0	1	0	3	6	0	4	7	1	1	2	5	1	1
	0	0	0	1	1	0	1	1	0	0	1	1	1			0	0	0	1	1	0	1	1	0	0	1	1	1	
									+						=														
2	0	3	1	0	6	0	4	1	7	2	1	5	1			0	1	1	0	4	1	6	0	2	5	1	7	3	2
	0	1	0	0	1	0	1	0	1	1	0	1	1			0	1	0	0	1	0	1	0	1	1	0	1	1	

Figure 5 – External exchange crossover

1	0	1	0	1	4	1	6	2	0	1	5	7	3	⇨		0	1	0	5	4	1	6	2	0	1	1	7	3	1
	0	0	0	1	1	0	1	1	0	0	1	1	1			0	0	0	1	1	0	1	1	0	0	1	1	1	

Figure 6 – Mutation

1	0	1	0	1	4	1	6	2	0	1	5	7	3	⇨		0	1	1	1	4	0	6	2	0	1	5	7	3	1
	0	0	0	1	1	0	1	1	0	0	1	1	1			0	0	0	1	1	0	1	1	0	0	1	1	1	

Figure 7 – Mutate-alter

1	0	1	0	1	4	1	6	2	0	1	5	7	3	⇨		0	1	0	1	6	1	4	2	0	1	5	7	3	1
	0	0	0	1	1	0	1	1	0	0	1	1	1			0	0	0	1	1	0	1	1	0	0	1	1	1	

Figure 8 – Mutate-exchange

1	0	1	0	1	4	1	6	2	0	1	5	7	3	⇨		0	0	1	1	4	0	6	2	0	1	5	7	3	1
	0	0	0	1	1	0	1	1	0	0	1	1	1			0	0	0	1	1	0	1	1	0	0	1	1	1	

Figure 9 – Mutate-swap

1	0	1	0	1	4	1	6	2	0	1	5	7	3	⇨		0	0	1	1	4	0	6	2	0	1	3	7	5	1
	0	0	0	1	1	0	1	1	0	0	1	1	1			0	0	0	1	1	0	1	1	0	0	1	1	1	

Figure 10 – Mutate-invert

2.1 Cloning Operation

Consider the layout and its chromosome representation of Fig 11. The two type of cloning are shown in Figures 12 and 13.

0	3	1	0	1	6	0	5	1	4	1	7	2
0	1	0	0	0	1	0	1	1	1	0	1	1

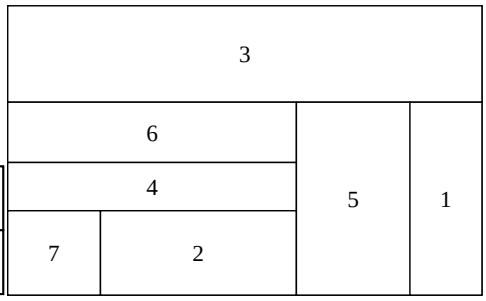


Fig 11 – A Chromosome representation of a layout

0	1	3	0	1	0	6	5	1	1	4	7	2
0	0	1	0	0	0	1	1	1	0	1	1	1

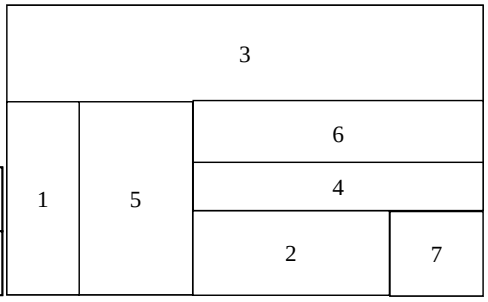


Figure 12 Chromosome representation and layout after horizontal cloning

0	3	1	1	0	1	5	6	0	4	1	2	7
0	1	0	0	0	1	1	1	0	1	0	1	1

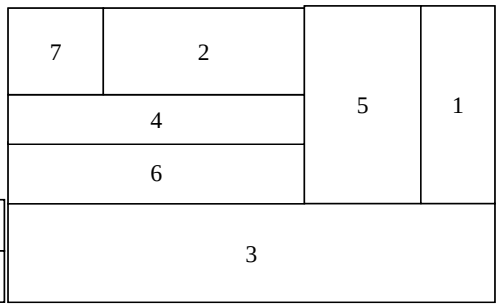


Figure 13 Chromosome representation and layout after vertical cloning

3. Implementation

The software is introduced as in Figure 14.

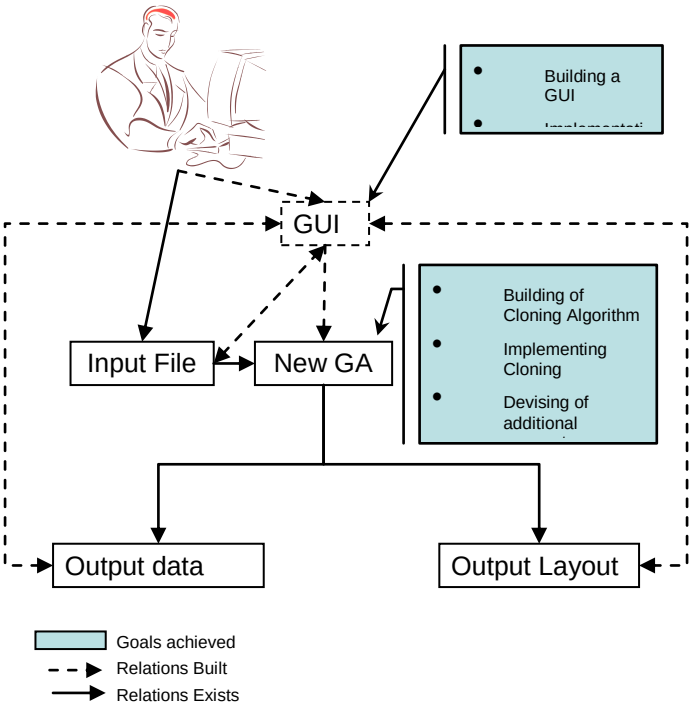
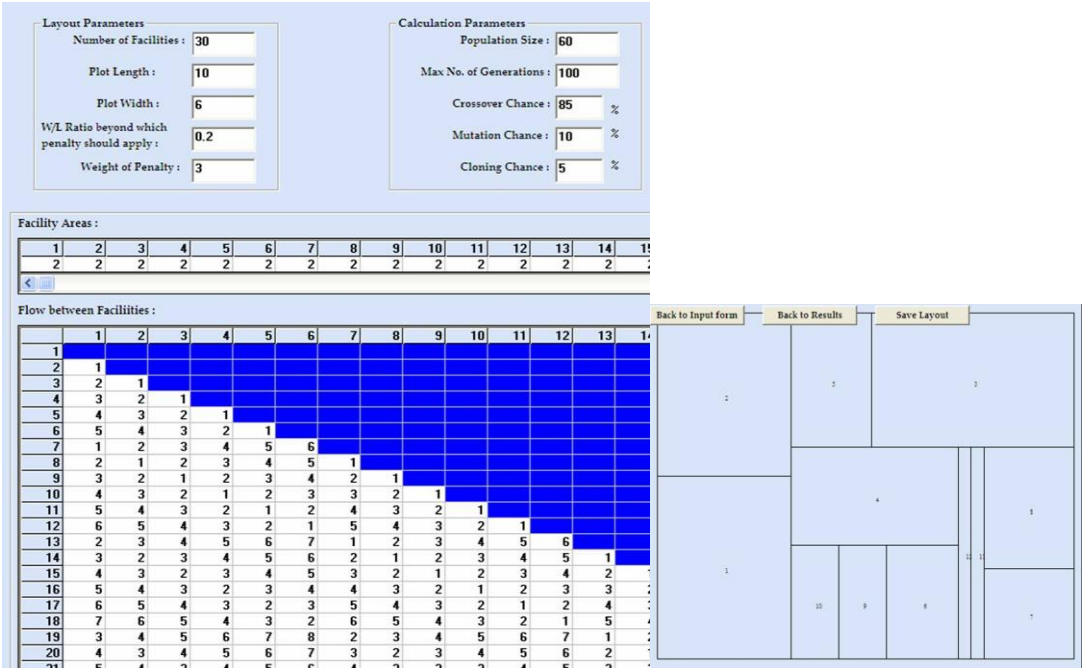


Figure 14 The overall structure of the software

We demonstrate only a few of the GUI features in a collectively referred to Figure 15



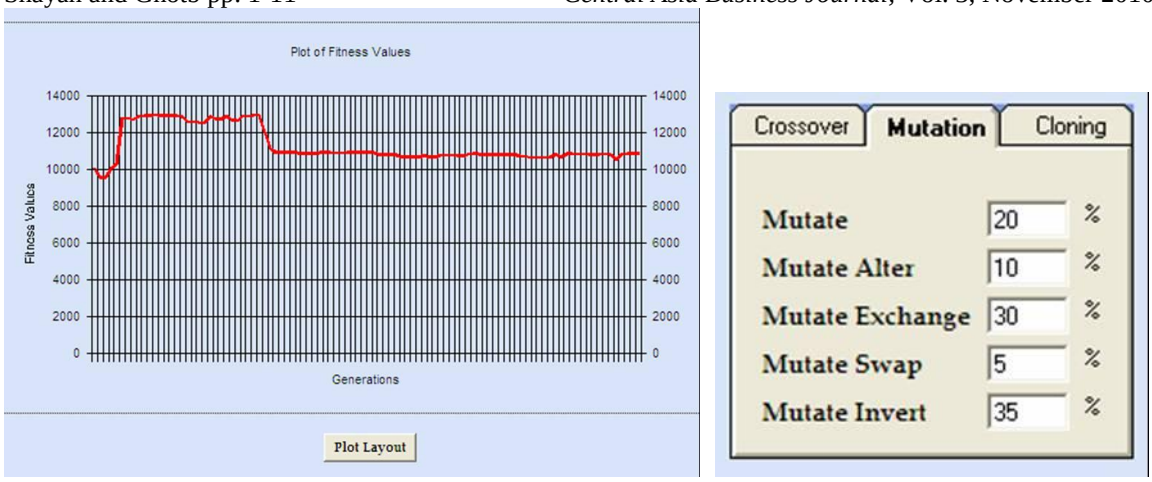


Figure 15 Examples of the Guis developed

4. Experimentations

The test problems can from the literature include Bazaraa (1979), Moghaddam (1997), Imam and Mir (1993), QAPLIB, (www.opt.math.tu-graz.ac.at/qaplib/), J E Beasly (http://mscmga.ms.ic.ac.uk/jeb/or/faclay.html). These consist of unequal area problems with 11, 12, 14 and 20 facilities and equal area problems with 30, 40, 50, 60, 80 and 100 facilities. The real life problems were from two local companies. The results from the New GA are tabulated against the results from other sources

Table 1 – The values of parameters used for all the experiments

Population size	No. of generations	Crossover rate	Mutation rate	Cloning rate	Weight of penalty	length/width ratio
60	60	80	10	10	3	0.33

Table 2 – The summary of results of experiments carried on different problems

Problem	Sources of solution	OFV obtained
11 Facility	GALP	12249
	New GA	16769
	J E Beasly	10189
12 Facility	GALP	11238
	New GA	**10729**
	Bazaraa (1975)	28158
	Moghaddam (1997)	25738
14 Facility	GALP	6772
	New GA	**6214**
	Bazaraa (1975)	16341

	Moghaddam (1997)	14407
20 Facility	GALP	1444
	New GA	1547
	Bazaraa (1975)	2529
	Moghaddam (1997)	2509
30 Facility	GALP	8020
	New GA	7682
	QAPLIB	6214
40 Facility	GALP	191595
	New GA	221104
	QAPLIB	2492850
50 Facility	GALP	410509
	New GA	**395852**
	QAPLIB	3854359
60 Facility	GALP	624845
	New GA	**616930**
	QAPLIB	5555095
80 Facility	GALP	1355758
	New GA	1547083
	QAPLIB	10329674
100 Facility	GALP	2714412
	New GA	**2265172**
	QAPLIB	15824355
Topform	GALP	1084521
	New GA	1534396
	3 OPT	1435419
	Simulated Annealing	1181748
	Mosel	1413604
	Cellular Manufacturing	1308422
Moran	GALP	7030
	New GA	**7381**

The graph shown below is the best OFV generated for a 20 facility problem when only one kind of operator was used. The performances are as plotted in Figure 16.

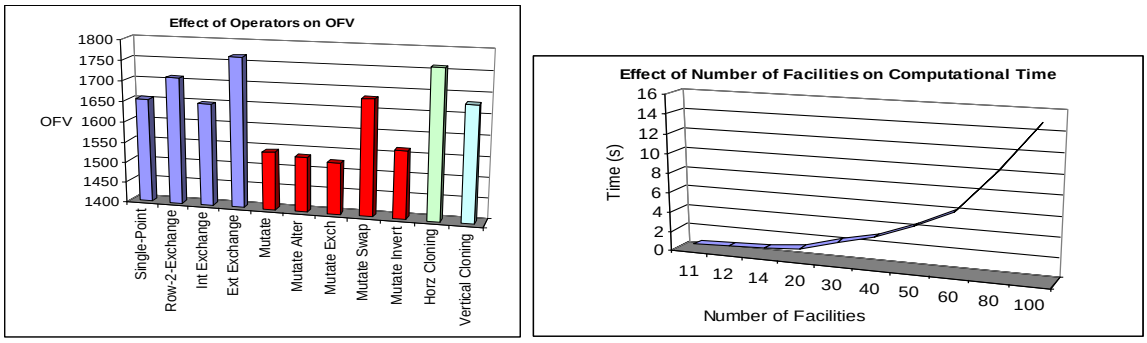


Figure 16 – Examples of experiments: Effect of operator types and number of facilities

5. Conclusions

This paper demonstrates the result of a software development exercise in a relatively difficult area. As a result we were able to conduct several experimentations on a GA algorithm for layout design. This included change of all the parameters and measurement of the fitness of the solutions. Everything is conducted interactively and the user can observe the solution as it develops. The results demonstrate the user-friendliness of the software in producing very interesting results for the algorithm's robustness and speed. Note that even for 100 facilities, the time is in seconds while other software is incapable of reaching a solution in reasonable time. We acknowledge that the experimentation is still limited and more work needs to be done to also improve the software.

References

1. Bazaraa M.S., (1975), "Computational Layout Design: a branch-and-bound approach", *AIIE Transactions*, Vol 7, no 4, pages 432-438.
2. Bazaraa M.S., Kirca O., (1983), "A Branch-and-bound heuristic to solve QAP", *Naval research logistics quarterly*, Vol 30, pages 287-304.
3. Bazaraa M.S., Sherali M.D., (1980), "Benders' partitioning scheme applied to a new formulation of Quadratic Assignment Problem", *Naval Research logistic quarterly*, Vol 27, no 1, pages 29-41.
4. Chittallappilly. A., (2003)" A Genetic Algorithm with two-dimensional chromosomes for Facility Layout", Swinburne University of Technology.
5. Francis .R.L, McGinnis. L.F, White. J.A (1992*), Facility layout and location: An analytical approach*. Prentice Hall, Englewood Cliffs, NJ
6. Gero. J.S. and Kazakov. V., (1997) "Learning and reusing information in space layout planning problems using genetic engineering". *Artificial Intelligence Engineering* Vol 11, no 4, pages 329–334.
7. Gorey. M.R. & Johnson. D.S., (1979), *Computers and intractability: a guide to the theory of NP-completeness*. W. H. Freeman, New York
8. Hanafi. R., (2000*), Design of a Genetic Algorithm to solve the Facility Layout problem*. Swinburne University of Technology, Melbourne, unpublished dissertation.
9. Holland. J., (1975*), Adaptation in Natural and Artificial Systems*, Ann Arbor, The University of Michigan Press.
10. Imam. M.H., Mir. M., (1993), "Automated layout of facilities of unequal areas", *Computers and Industrial Engineering*, Vol 24, no 3, pages 355-366.
11. Kusiak. A & Heragu. S.S., (1987), "The facility layout problem" *European Journal of Operations Research*, Vol 29, pages 229–251.

12. Moghaddam R.T., & Shayan E., (1998)," Facility layout design by genetic algorithm", *International Journal of computers and Industrial Engineering* Vol 35, no 3-4, pages 527-530.
13. Moghaddam. R.T., (1997), Design of a genetic algorithm to solve manufacturing facilities layout problem, Swinburne University of Technology, Melbourne, dissertation.
14. Shayan. E., & Al-Hakim, L., (1999), Cloning in Layout design problems: A genetic algorithm approach, unpublished desertion.
15. Shayan E., A. Chilliappilly, 2004, "Genetic Algorithm for Facilities Design Based on Slicing Tree Structure," *International Journal of Production Research*
16. Suresh, G, Vinod, V.V, Sahu, S (1995), "A genetic algorithm for facility layout", International Journal of Production Research, Vol. 33 pp.3411-23
17. Tam .K.Y., Chan. D.K., (1998), Solving facility layout problems with geometric constraints using parallel genetic algorithms: experimentation and findings. International Journal of Production Research, Vol 36, no 12, pages 3253–3272.
18. Tam. K.Y., (1992) A simulated annealing algorithm for allocating space to manufacturing cells. International Journal of Production Research, Vol 30, no 1, pages 63–87.
19. Tam. K.Y., (1992), "Genetic algorithm, function optimization, and facility layout design", *European Journal of Operational Research*, Vol 63, pages 322–346.
20. James A. Tompkins, John A. White, Yavuz A. Bozer, 1996, *Facilities Planning*, 2nd Edition
21. Zhang. L & Zhang.B. (1999), "A Geometrical Representation of McCulloch-Pitts Neural Model and Its Applications", *IEEE Transactions on Neural Networks*, Vol 10, no 4, pages 291-295.

Acknowledgements: Authors acknowledge that Mr. Manjunath Shivarudrappa has made significant contribution to the development of the software.

Kazakhstan's Outward Foreign Investments: Issues and Perspectives

Francis Amagoh
Department of Public Administration
KIMEP, Almaty

Ustina Markus

American University of Iraq
Sulaimani, Iraq

Abstract

Since its independence from the Soviet Union in 1991, Kazakhstan has been undergoing a transition to a market based economy, and this has helped in enhancing its economic growth. One factor used in the country's integration into the global economy is outward foreign direct investments (OFDI). This paper examines the patterns and implications of Kazakhstan's OFDI. Evidence suggests that the trend of OFDI from the country has continued to increase in recent years, and that the government needs to address certain policy areas in order to continue to harness the benefits of OFDI in the long-term

Keywords: Foreign direct investments, Economic Growth, Kazakhstan, and Commonwealth of Independent States.

1. Introduction

The question of whether a country should invest abroad is very important to policymakers. The ability of a country to attract foreign direct investments (FDI) and invest outside its borders – outward foreign direct investments (OFDI) has implications for economic development (Kornecki and Rhodes, 2007; Mariotti et al., 2003). The collapse of communism shaped the global economic and political development in the twenty-first century (Kaynak et al., 2006; Konercki and Rhodes, 2007). Following the fall of the Soviet Union, countries of the Commonwealth of Independent States (CIS) began the transformation towards a market economy. These countries have seen their economies stabilizing and some have even seen considerable growth in their economies (Kaynak et al., 2006). They have privatized many state-owned enterprises, signed foreign trade agreements with other countries, and have generally achieved a significant level of macroeconomic stability with improved growth rates (Kutan and Vuksic, 2007).These countries have attributed these positive trends to a significant increase in FDI.

This is particularly true for the economy of Kazakhstan, which gained independence from the Soviet Union in 1991. In the case of Kazakhstan, one of the most striking new trends is that the country has been engaging in OFDI by actively investing outside its borders. According to the United Nation's Conference on Trade and Development's (UNCTAD, 2008), Kazakhstan has emerged as the second largest recipient of FDI in South-East Europe and CIS, after the Russian Federation. Similarly, Kazakhstan now ranks as one of the largest outward investors in the Commonwealth of Independent States (CIS) region. OFDI from former Soviet States remains a largely unexplored research terrain. While there is a considerable literature on OFDI from Western countries, research on countries of the former Soviet Union remains minimalist at best (McDonnell, 2008; Driffeild and Love, 2007). This, also, is particularly the case for Kazakhstan

As investing outside its borders is a relatively new phenomenon for Kazakhstan, there have been no major studies of its foreign investments' patterns and strategies. Consequently,

most information on Kazakhstan's OFDI can only be gathered through the country's business press. The purpose of this paper is therefore to fill this gap of knowledge by examining the pattern of Kazakhstan's OFDI and assess the potential opportunities.

2. Theory of FDI

The theory of FDI, also known as the theory of multinational enterprise (MNE) examines conditions under which firms or governments may undertake FDI (Kutan and Vuksic, 2007). The starting point for the theory is the idea that firms must have certain advantages in order to become multinational companies. The general principles of the theory of FDI are based on two premises:

(1) firms internalize missing or imperfect external markets until the costs of further internalization outweigh the benefits; and
(2) firms choose locations for their constituent activities that minimize the overall costs of their operations (Buckley and Casson, 1976; Buckley et al., 2007).

The main aspect of the general FDI theory is encapsulated in Dunning's eclectic paradigm (Dunning, 1993; Dunning, 2001) which suggests three primary motivations for FDI:

(1) foreign-market-seeking FDI;
(2) efficiency (cost reduction)-seeking FDI; and
(3) resource-seeking FDI (including a subset that is known as strategic-asset-seeking FDI).

Market-seeking FDI is undertaken by firms for traditional trade support reasons (such as access to distribution networks, to facilitate the exports of domestic producers, and to enhance exports from the host country to other large and rapidly growing markets). Efficiency-seeking FDI occurs when outward investors seek lower-cost locations for operations, particularly in the search for lower labor costs. Resource-seeking FDI occurs when firms seek to acquire the supply of raw materials and energy sources in short supply at home (Buckley et al., 2007; Capic, 2007; Dunning, 2001).

According to Kutan and Vuksic (2007), when discussing FDI, it is useful to distinguish between horizontally and vertically integrated multinational firms. Horizontal integration occurs when the MNE produces the same product in multiple plants located in more than one country. Horizontal investments replicate in a foreign country the complete production structure of the home country (Mariotti et al., 2003; Hejazi and Pauly, 2003). Horizontally integrated firms sometimes arise because of trade barriers in the form of tariffs or high transport costs. This causes the MNE to decide whether to build an additional plant in the host country to supply the host country's market, or export to the host country from the existing plant in the home country (Choong et al., 2004; Barrios et al. 2005).

On the other hand, vertical integration implies that different segments of the production process of a firm are carried out in different countries. Vertical FDI takes place when the MNE re-deploys only part of its production process. According to Mariotti et al. (2003), firms which undertake vertical FDI actually dismantle the structure of their value chain through re-localization of the labor-intensive activities in low-cost countries. Vertical FDIs are mainly driven by differences in factor endowments between home and host countries, and they are explained by the need to exploit location-specific factors of production (cheap labor, natural resources, specific skills). As a consequence, the structure of domestic

production changes, since both capital and highly skilled labor intensity increase (Hejazi and Pauly, 2003; Kalotay, 2004; Lim and Moon, 2009; Kwok and Tadessee, 2006).

FDI have implications for home and host countries. FDI impact on the host country's exports can be direct, through the exports of the foreign affiliates, and indirect on the export performance of domestic producers. The extent of the direct and indirect effects of FDI on exports depends on three factors:

(1) the initial technological and human capital level of the domestic producers (Girma et al., 2007; Barrios et al., 2005);
(2) the intensity of competition in domestic markets; and
(3) the government policies promoting linkages between domestic and foreign firms (Barry and Bradley, 1997).

According to Mariotti et al. (2003), the direct effects include contribution to the welfare of the host country through the introduction of new technologies and innovation, new managerial techniques, skills, capitals, new jobs, and the growth of local industrial sectors. The indirect effects may be in many forms. For example, when an MNE transfers its competitive assets to its affiliate in the host economy, there is the possibility of knowledge spillovers to domestic firms in the host country. One specific channel through which domestic firms may increase their productivity and export competitiveness is by copying the operations of the foreign producer. This may be facilitated by the mobility of workers previously trained in the MNE's affiliate (Girma et al., 2007; Lim and Moon, 2001; Driffield and Love, 2007).

Another important indirect effect on domestic producers is the competition effect. The entry of an MNE in one sector of the host economy increases the intensity of competition in the sector (Markusen and Venables, 1999; Barrios et al, 2005). While this may potentially have the negative effect of forcing domestic companies to leave the market, this disadvantage is compensated for through forward linkages, which occur when foreign affiliates sell goods or services to domestic firms. Improved products and services in the downstream sector of a domestic firm incurred through more intense competition may improve the domestic firm's own productivity and competitiveness (Kwok and Tadesse, 2006; Ruane, 2008).

There is also the added benefit to the host country through backward linkages to suppliers. If the presence of a foreign producer creates additional demand for local inputs, then the local supply industries are strengthened (Lim and Moon, 2001; Kwok and Tadesse, 2006; Witt and Lewin, 2007). According to Markusen and Venables (1999), strengthening the supply industries may benefit the domestic producers in the MNE's industry, and this positive side effect can be stronger than the competition effect in the MNE's sector. Finally, MNEs may facilitate access to foreign markets for the domestic producers by processing information about their home economies, or by lobbying for favorable treatment of exports from the host economy in their home countries (UNCTAD, 1999).

3. Literature review

A number of studies have been conducted on the benefits of FDI to the economies of host and home countries. This study builds upon the premise in the literature that FDI (inward and outward) are important policy measures that governments can use to enhance economic growth and global integration.

Kaynak et al. (2006) investigated various dimensions of FDI in Georgia and the Kyrgyz Republic. The results indicate that the FDI activities in both countries were a market-seeking type, focusing heavily on location-specific attractions of the two countries. The most serious problem affecting the performance of FDI firms in both countries was found to be the inefficiency of the labor force, excessive bureaucracy and red tape, and differences inherent in the business practices of both countries.

Torrisi et al. (2009) examined the determinants of FDI in Poland since its transition to a market economy. Using a one-step dynamic panel estimation, the model tested the dependency of FDI in Poland to a number of macro-economic variables. The results suggest that market size and market growth, the relative strength of the US dollar, and the trade openness of the host economy are important factors in FDI attractiveness. The results also suggest that tax reform and tax cuts are incentives governments should consider in attracting FDI.

Kornecki and Rhoades (2007) reviewed the experience of Central and Eastern Europe (CEE) countries in integrating into the global market. Specifically, the study analyzed the FDI experiences of Hungary, Poland, Slovakia, The Czech republic and Slovenia between 1993 and 2003. Results of the study indicate a strong link between FDI stock and economic growth for the CEE countries.

Ang (2009) conducted a study on the impacts of FDI on the economy of Thailand by examining the roles of FDI and financial development in the process of economic development. Using annual time series data from 1970 to 2004, results of the study showed that financial development stimulates economic development, and that an increased level of financial development allowed Thailand to gain more FDI. The study further suggests that the impact of FDI on economic growth can be enhanced through financial development.

Demirbag et al. (2007) examined the trends and patterns of European foreign equity venture formations in Turkey between 1996 and 2003. Their study revealed that new FDI by European firms tend to be located in the concentrated industries (such as manufacturing, agriculture and mining).

Kyrkilis and Pantelidis (2003) examined the macroeconomic determinants of OFDI in nine countries. The study tested the hypothesis that the OFDI position of countries may be considered as a function of country specific characteristics, such as income, exchange rate, technology, human capital and openness of the economy. Using time series data from five European Union members (France, Germany, Italy, The Netherlands, and UK) and four non-European Union countries (Brazil, Republic of Korea, Singapore, and Argentina), the study identified the main determinants of OFDI, and found that real gross national product is the most important determinant of OFDI. Furthermore, developed European countries tend to specialize in human capital intensive OFDI, while non-European Union countries specialized in technology intensive OFDI.

Buckley et al. (2007) analyzed the determinants of Chinese OFDI using official Chinese data between 1984 and 2001. The study found that Chinese OFDI was associated with high levels of political risks in, and cultural proximity to host countries. Chinese OFDI was also found to be associated with host countries' market size, geographic proximity, and natural resource endowments. In a follow-up study, Buckley et al. (2008) examined the recent increase in Chinese OFDI using data from Chinese Ministry of Commerce and the State Administration of Foreign Exchange. It was found that Chinese OFDI increasingly

replaced trade-related investment activities. With regards to asset-seeking FDI, there was improved access to foreign-owned technologies, brands, and distribution channels.

McDonnell (2008) examined the pattern of OFDI by Irish MNEs. Specifically, the study focused on Irish MNEs' approach to human capital development (i.e. training and development expenditure, succession planning, management development programs, etc.) and how it compared to foreign companies in Ireland. Using data set from 260 interviews of senior executives from Irish MNEs, the study found that Irish MNEs compared favorably with their foreign counterparts in terms of human capital development mechanisms. However, it was found that Irish firms were less likely to have formal management development programs.

While these studies suggest great promise for the countries under investigation, a relevant question is whether a concerted FDI policy will yield similar dividends from a transitional CIS country like Kazakhstan.

4. History of Kazakhstan's OFDI

Since 2000, Kazakhstan has enjoyed strong economic health, derived mostly through its revenues from energy sources, and this has enhanced its ability to invest abroad. The average GDP growth rate since 2000 is about 10 percent, making Kazakhstan one of the fastest growing economies of the world, and by far the fastest growing economy in Central Asia (kazakhstanlive.com). A good indicator of Kazakhstan's strong macroeconomic performance and financial health is that the country was able to repay all its debt to the International Monetary Fund (IMF) in 2000, seven years ahead of schedule (IMF, 2008).

According to UNCTAD (2004), Kazakhstan's OFDI stock grew significantly between 1998 and 2002. Between 2001 and 2002, Kazakhstan's OFDI grew tenfold from $42.6 million in 2001 to $463.9 million in 2002 (UNCTAD, 2006). The rapid increase was due mainly to increases in outward investment in the energy sector, and investments made in developed countries. According to the same UNCTAD report, OFDI flows from Kazakhstan as a percentage of gross fixed capital formation grew from less than 20 percent in 1993 to over 50 percent in 2001.

In 2007 alone, Kazakhstan's OFDI rose to $3.2 billion, an all-time high (UNCTAD, 2008). The increase was caused by the expansion abroad of Kazakhstan's State-owned enterprises in search of new markets for oil exports, and for refineries and new processing technologies. Kazakhstan's OFDI showed such an improvement in 2007 that its OFDI Performance Index rose from a position of 128 in 2006 to 46 in 2007 as shown in Table 1. The OFDI Performance Index is computed by the UNCTAD using a ratio of a country's share in global FDI outflows and its share in global GDP.

As percentage of gross fixed capital formation, Kazakhstan's OFDI was 10 percent in 2007, and constituted 2.1 percent of the country's GDP (UNCTAD, 2008). Between 2004 and 2007 Kazakhstan's OFDI grew from $1.8 billion to over $18 billion (UNCTAD, 2008). This growth in Kazakhstan's economy was caused by high commodity prices, expansionary macroeconomic policies, strong capital inflows, rapid credit growth and rising asset prices. Table 2 shows real GDP and the development of current prices and current account balance in CIS economies from 2006 till 2009. Real GDP growth in 2007 for the CIS was 8.5 percent, and 7.0 percent in 2008.

Table 1: Outward FDI Performance Index for Selected Economies

Economy	Outward FDI Performance Index 2006	Outward FDI Performance Index 2007
Saudi Arabia	79	41
Greece	45	42
Lithuania	41	43
Japan	44	44
Brazil	37	45
Kazakhstan	**128**	**46**
Oman	46	47
Republic of Korea	51	48
Philippines	67	49
India	50	50

Source: UNCTAD, World Investment Report 2008

Note: The UNCTAD Outward FDI Performance Index is based on a ratio of the country's share in global FDI outflows and its share in global GDP.

As can be seen from Table 2, Kazakhstan's real GDP growth was 8.5 percent in 2007, and 5 percent for 2008 (lower than an average of 7 percent for CIS), and anticipated to be 7.0 percent for 2009 (higher than an average of 6.5 for CIS). Thus, while Kazakhstan's overseas investments have increased in recent years, its real GDP has continued to grow modestly. However, the current account balance as a percentage of GDP has been negative since 2006, with the highest negative current account balance as a percentage of GDP recorded for 2007 (-6.6 percent). This may have been caused by the record high overseas investment of $3.2 billion made by Kazakhstan in 2007.

Table2: Real GDP Growth and Development of Consumer Prices and Current Account Balances in CIS Economies (Annual percent changes unless noted otherwise)

	Real GDP				Consumer prices				Current account balance*			
	2006	2007	2008	2009	2006	2007	2008	2009	2006	2007	2008	2009
Russia	7.4	8.1	6.8	6.3	9.7	9.0	11.4	8.4	9.5	5.9	5.8	2.9
Ukraine	7.1	7.3	5.6	4.2	9.0	12.8	21.9	15.7	- 1.5	- 4.2	- 7.6	- 9.7
Kazakhstan	**10.7**	**8.5**	**5.0**	**7.0**	**8.6**	**10.8**	**17.1**	**8.3**	**- 2.2**	**- 6.6**	**- 1.7**	**- 1.0**
Belarus	10.0	8.2	7.1	6.8	7.0	8.4	11.2	8.8	- 4.1	- 6.6	- 7.5	- 7.7
Turkmenistan	11.1	11.6	9.5	10.0	8.2	6.4	12.0	12.0	15.3	16.8	23.6	28.1
Armenia	13.3	13.8	10.0	8.0	2.9	4.4	6.8	4.5	- 1.8	- 6.5	- 6.8	- 5.0
Azerbaijan	30.5	23.4	18.6	15.6	8.4	16.6	19.6	20.5	17.7	28.8	39.5	39.2
Georgia	9.4	12.4	9.0	9.0	9.2	9.2	9.6	6.4	-15.9	-19.7	-16.6	-13.2
Kyrgyz Republic	3.1	8.2	7.0	6.5	5.6	10.2	18.8	10.2	- 6.6	- 6.5	- 8.3	- 7.4
Moldova	4.0	5.0	7.0	8.0	12.7	12.6	11.4	7.9	-12.0	- 9.7	-10.3	-10.6
Tajikistan	7.0	7.8	4.1	7.0	10.0	13.2	18.5	10.5	- 3.0	- 9.5	- 8.3	- 7.1
Uzbekistan	7.3	9.5	8.0	7.5	14.2	12.3	11.8	10.9	18.8	23.8	24.6	20.8
CIS total	8.2	8.5	7.0	6.5	9.5	9.7	13.1	9.5	7.5	4.5	4.8	2.4
* Percent of GDP												

Source: IMF World Economic Outlook, 2008.

5. Geographic and sectoral distributions of Kazakhstan's OFDI

Kazakhstan's OFDI covers a number of countries within the CIS region, former Soviet States, and Western countries. The country's inclination to invest in the CIS region is partly due to its greater familiarity with business practices, and some cultural similarities with its CIS neighbors. Furthermore, countries in the CIS region share the same recent history of Soviet rule. Studies suggest that developing economies, such as Kazakhstan tend to have OFDI in other countries that share similar consumer markets, or other social or cultural backgrounds (Zhang, 2001).

The sectors of Kazakhstan's OFDI have evolved from the early years of economic transition as the country has realized the potential of its natural resources. Table 3 shows the most important industries in terms of Kazakhstan's OFDI in 1995, 1998 and 2002. From Table 3, it is observed that while all OFDI stock in 1995 was in the trade sector, by 1998 it has diversified to other sectors, such finance, transport and construction. By 2002, with the development of its energy sector, mining constituted 90 percent of Kazakhstan's OFDI.

Table 3: Most Important Industries in terms of OFDI stocks (1995, 1998, 2002)
(Shares in total)

Year	Industry	Percent shares
1995	Trade	100
1998	Finance Transport Construction	55 26 15
2002	Mining (includes quarrying, petroleum, etc.) Business Activities Transport (includes storage, communications, etc.)	90 4 2

Source: UNCTAD, World Investment Directory Online, Asia and the Pacific, 2004.

Sources of Kazakhstan's OFDI include private companies and public corporations, such as the country's National Oil Fund. The fund was established in 2000 with a start up capital of $1 billion, part of which was raised through tenders on the country's oil contracts. As Kazakhstan has a mixed economy of State-owned enterprises and private companies, the two entities have been following their own strategies for investment. For example, Kazmunaigaz has focused on energy assets, while private companies have entered the banking field, construction and the tourist industry.

5.1 Kazakhstan's Investments in the CIS States

Within its immediate neighborhood, Kazakhstan is the largest foreign investor in Kyrgyzstan. According to *Tazar* (2008), between 2004 and 2007 Kazakhstan's investment in Kyrgyzstan grew from $16 million in 2004 to $40 million in 2005, and over $60 million in 2006. That figure continued to grow in 2007 when $133 million was invested, amounting to over 40 percent of total foreign investment in Kyrgyzstan. Kazakhstan's investments in Kyrgyzstan are spread across a number of businesses including gold mining, sugar processing plants, a cement plant, an antimony factory in the south around Batken, and the construction of a highway from Almaty to the tourist resorts around Lake Issyk-Kul. The two countries are important partners in terms of trade, which amounted to

over $2 billion between January and May 2008. (*Tazar*, 2008). Kazakhstan has also invested in Tajikistan. About $100 million has been invested, much of it in the banking sector (*Turkish Weekly*, 2008). Kazakhstan has had less success in investing in Uzbekistan, largely because the country does not provide an investment friendly environment. However, trade between the two countries rose to $1.4 billion in 2008, and the number of Kazakh businesses operating in Uzbekistan increased from 73 to 400 over a two-year period (*Eurasia Daily Monitor*, 2008).

5.2 Kazakhstan's Russian Investments

While Kyrgyzstan and Tajikistan have enjoyed significant investment from Kazakhstan, most of Kazakhstan's investment has gone to Russia. Between 2004 and 2008 Kazakhstan's investment in Russia amounted to $715 million (*Eurasia Daily Monitor*, 2008). Much of the investment has been in banking, construction and energy projects. These are the business sectors most developed within Kazakhstan itself, and therefore, the most active sectors abroad for its OFDI. The amount of investment in Russia is not surprising given that the two countries made up a total of 80 percent of the area of the former USSR and share a 7,000-kilometer border. The bilateral trade between both countries amounts to $18 billion and Russian pipelines are the main export routes for Kazakhstan's oil (*Turkish Weekly*, 2008).

According to *Silk Road intelligencer* (2008), one of Kazakhstan's biggest investment projects in Russia is the Konstantinovo complex outside of Moscow that is being built by Kazakhstan's Build Investment Group (BI Group) in conjunction with Russia's Eurasia-City. The project is a $3 billion development that will construct 6.5 million square meters of residential space and 2.6 million meters of commercial space, financed by Kazakhstan's second biggest bank, Bank Turan Alem (BTA). In total, in 2006, Kazakhstan's banks collectively invested $5billion in Russia, making Russia the recipient of the largest investment from Kazakhstan for that year (*Kommersant*, 2007).

5.3 Other Investments

Kazakhstan's OFDI have not been limited to its immediate neighbors. The countries that received the greatest share of Kazakhstan's overseas investments during the early years of economic transition to a market economy (1995, 1998, and 2002) are shown in Table 4. In 1995 the United Kingdom received the greatest share (67 percent) of OFDI stock from Kazakhstan. By 1998, Italy had the greatest share of Kazakhstan's overseas investment, while in 2002 the Netherlands had most of Kazakhstan's OFDI.

Table 4: Top Investment OFDI Stocks Partners (1995, 1998, and 2002)

Year	Country	Outward FDI Stocks (Percent)
1995	United Kingdom	67
1998	Italy Netherlands United Kingdom	37 13 2
2002	Netherlands Russian Federation Czech Republic	92 3 1

Source: UNCTAD, World Investment Directory Online, Asia and the Pacific, 2004

In 2006 Kazakhstan was the largest investor in the Caucasian Republic of Georgia, with an investment of $300 million in Georgian projects (*Kommersant*, 2007). By 2008

Kazakhstan's total investment in Georgia had reached $2 billion (*Voice of America*, 2008). Kazakhstan's Georgian investments are well diversified in the energy, construction and banking sectors. The state company Kaztransgaz also bought out the Georgian gas distributor Tbilgaz for $12.5 million, and Bank Turan Alem bought the controlling share of United Telecom of Georgia for $90 million (*Voice of America*, 2008).

To enhance its OFDI in other countries of the former Soviet Union, Kazakhstan's construction company Eurasia Logistics plans to build four industrial plants in Ukraine at a cost of $1.25 billion, and another four in Turkey for $1 billion (*Gudok*, 2008). The company has already built several plants in Russia and the CIS amounting to 2 million square meters of space (*Gudok*, 2008). Kazakhstan's investment in the tourist and financial sectors in Turkey is also worth noting. In 2006, Bank Turan Alem bought a 33.98 percent stake in Turkey's 17th largest bank, Sekerban at a cost $256 million, making Bank Turan Alem able to offer its banking services in nine countries (*Invest Kazakhstan*, 2007).

In 2007, Kazmunaigaz purchased 75 percent of the shares of Romania's Rompetrol for $2.7 billion (*Eurasia Daily Monitor*, 2007). The purchase of the controlling shares of Rompetrol gives Kazamunaigaz two refineries (Petromedia and Vega) in Romania, as well as 630 gas stations in Romania, Bulgaria, Georgia and France. The Petromedia refinery produces 96,000 barrels per day in refined products, and the Vega refinery produces 10,000 barrels per day. In addition to energy assets, Kazakhstan has acquired interests in a gold producing project in Romania through Kazakh Gold Group, in conjunction with Britain's Oxus Gold (*Invest Kazakhstan*, 2007).

6. Benefits of OFDI for Kazakhstan

OFDI has created a number of opportunities for Kazakhstan. According to Kutan and Vuksic (2007), the increased competitiveness gained by overseas experiences gives parent firms the ability to adapt and grow in an open economy. Kazakhstan's competitiveness is enhanced by the increased efficiency associated with the new structure of the production chain in the host countries which has improved Kazakh companies' competitive position. As Kazakh firms become more internationalized, they are able use the skills and experiences from their activities abroad to improve their global market condition by raising their efficiency or acquiring new sources of competitive advantage. The improved competitiveness has helped to increase domestic production and demand through positive externalities (Mariotti et al., 2003). The pace of Kazakhstan's OFDI has also provided the know-how and skills needed to upgrade existing or obsolete technologies, and new management skills at home. According to UNCTAD (1999), OFDI may facilitate access to foreign markets for domestic producers by processing information about their home economies, or by lobbying for favorable treatment of exports from their home countries. Thus, it is plausible to suggest that Kazakh firms and industries benefit from the activities of other Kazakh companies that invest abroad.

With regards to employment effects of OFDI, Mariotti et al. (2003) suggest that OFDI induce in the home country additional requirements for skilled labor, because of additional supervision and coordination-related activities, research and development, and marketing activities by the parent company. Thus, even as OFDI from Kazakhstan has increased over the years, it has generated inflows of capital in the form of repatriated profits and royalties. These contributions in turn, have improved the country's export performance, facilitating higher national income and better employment opportunities for its citizens. As shown in Table 5, the unemployment rate in Kazakhstan has continued to decline from a high of 8.8 percent in 2003 to a low of 7.3 percent in 2007 even as the rate of overseas investments has increased.

Another motivation for Kazakhstan's OFDI activities is risk diversification from its dependence on energy revenues. In order to diversify its incomes, acquisitions in foreign markets seem an optimal strategy. Additionally, by investing abroad, Kazakhstan's firms are able to use knowledge and practices gained overseas for human capital development (training and development, succession planning, management development, etc.) in the home base. Human capital development is one of the major benefits of OFDI for home countries (McDonnel, 2008). Consequently, there seem to be an increased level of human capital development in Kazakhstan since it gained its independence.

Table 5: Kazakhstan's Unemployment Rate

Year	Unemployment Rate (Percent)
2003	8.8
2004	8.8
2005	8.0
2006	8.1
2007	7.4
2008	7.3 expected

Source: CIA World Factbook, 2008.

There is also the added benefit of improved trade relations between Kazakhstan and overseas countries. Kazakhstan's foreign trade balance has been rising over the past 10 years at an annual average growth rate of 19.1 percent (*Kazakhstan Live*, 2007). The balance of trade between Kazakhstan and the international community has increased from less than $2 billion in 2002 to almost $18 billion by end of the third quarter of 2008 as shown in Table 6.

Table 6: Kazakhstan's Foreign Trade balance

Year	Foreign Trade Balance (Million USD)
2002	1,987
2003	3,679
2004	6,785
2005	10,322
2006	14,642
2007	15,091
Jan. – Sept. 2008	17,971

Source: National Bank of Kazakhstan, 2008.

In terms of trade, Kazakhstan's top three export partners in 2007 were Switzerland, Italy, and Russia; while it's top three import partners for the same year were Russia, Germany, and China (nes.alibaba.com). Kazakhstan's drive for global integration through OFDI and trade has been recognized by the international community. Because of its macroeconomic policies, Kazakhstan was the first country in the CIS to receive an investment-grade credit rating from the major international credit rating agency Moody's in September 2002. In addition, between 2005 and 2007, 18 Kazakh companies were listed in London Stock Exchange (kazakhstanlive.com).

7. Implications

It is understood from a macroeconomic standpoint that OFDI is needed in an economy for a successful participation in the global context. This calls for serious efforts in areas of

business ethics and practices. By increasing its OFDI activities, Kazakhstan needs to address issues related to corporate governance and transparency. Kazakhstan has made efforts in this regard. In 2005, Kazakhstan adopted the United Kingdom's Extractive Industries Transparency Initiative to assure the international community about its efforts toward greater transparency in economic and business activities. Similarly, in 2007 the government established the Kaznya Fund for sustainable development, and the Regional Financial Center was established in Almaty in 2006. These measures are aimed at ensuring Western instruments, management skills and transparent business standards in Kazakhstan's economy (kazakhemb.org)

Kazakhstan should encourage OFDI that are aimed at promoting competitiveness at home and enhancing domestic economic growth. Such OFDI policies should be aimed at generating domestic capabilities, especially in areas that can stimulate the development of small and medium-sized enterprises, technology and innovation.

The government's policies to promote OFDI should be closely coordinated with those related to attracting inward FDI, promoting trade, migration and technology flows (UNCTAD, 2006). An important policy tool of OFDI is active promotion, which requires active government involvement in promotional activities for domestic industries (UNCTAD, 1999). Such institutional setting may be either in the form of an outward investment promotion agency, a development finance institution, or an investment guarantee scheme (Kolatay, 2004).

8. Conclusion

As FDI is one of the means of integration into the global economy, the rapid increase in Kazakhstan's OFDI in recent years has enabled it to establish a closer link with the economies of the rest of the world. It seems obvious that Kazakhstan's OFDI has served its economy well, and enhanced its reputation in the global economic community. Kazakhstan is seeking to diversify its economy from reliance on natural assets through these OFDI initiatives. Kazakhstan has also embarked on a strategy to enter the 50 most competitive nations in the world 2015 (kazakhstanlive.com). Economic diversification and the adoption of internationally accepted standards of corporate governance are some of the key benefits to be gained by increasing the scope of overseas investments. Furthermore, promotion of greater transparency and accountability, and a concerted administrative reform are key areas that will enhance Kazakhstan's efforts towards a vibrant and competitive economy. The current trend of Kazakhstan's overseas investments is essential in integrating the country's economy with that of the international community, and enhancing its goal of being one of the 50 competitive economies of the world.

9. References

1] Ang, J. (2009), "Foreign direct investment and its impact on the Thai economy: the role of financial development", *Journal of Economics and Finance*, Vol. 33 No. 3, pp. 316-323.

2] Barrios, S., Gorg, H., and Strobl, E. (2007), "Foreign direct investment, competition and industrial development in the host country", *European Economic Review*, Vol. 49, pp. 1761-1784.

3] Barry, F. and Bradley, J. (1997), "FDI and trade: the Irish host-country experience", *The Economic Journal*, Vol. 107, pp. 1798-1811.

4] Buckley, P., and Casson, M. (1976), *The Future of Multinational Enterprise*, Macmillan, London.

5] Buckley, P., Clegg, L., Cross, A., Liu, X., Voss, H., and Zheng, P. (2007), "The

determinants of Chinese outward foreign direct investments", *Journal of International Business Studies,* Vol.38, pp.499-518.

6] Buckley, P., Cross, A., Tan, H., Xin, L., and Voss, H. (2008), "Historic and emergent trends in Chinese outward direct investment", *Management International Review,* Vol. 48 No. 6, pp.715-747.

7] Capic, P. (2007), "Organizing FDI promotion in Central-Eastern European regions", *Place Branding and Public Diplomacy,* Vol.3 No. 2, pp.152-163.

8] Choong, C., Yusop, Z., and Soo, S. (2004), "Foreign direct investment, economic growth, and financial sector development: a comparative analysis", *ASEAN Economic Bulletin,* Vol.21 No. 3, pp.278-289.

9] CIA (Central Intelligence Agency) (2010), *The World Factbook, Central Asia: Kazakhstan (*available at: https://www.cia.gov/library/publications/the-world factbook/geos/countrytemplate_kz…)

10] Demirbag, M., Tatoglu, E., and Glaister, K. (2007), "Dimensions of European direct investment activity in Turkey: patterns and prospects", *International Journal of Emerging Markets,* Vol.2 No.3, pp.274-297.

11] Driffield, N., and Love, J. (2007), "Linking FDI motivation and host economy productivity effects: conceptual and empirical analysis", *Journal of International Business Studies,* Vol.38, pp.460-473.

12] Dunning, J. (2001), "The eclectic (OLI) paradigm of international production: past, present and future, *International Journal of the Economics of Business,* Vol. 8 No. 2, pp. 173-190.

13] Dunning, J. (1993), *Multinational Enterprises and the Global Economy,* Addison Wesley, Workingham.

14] *Eurasia Daily Monitor* (2008), "Karimov, Bakiyev react differently to Nazarbayev's Central Asia Union", 25 April (available at: http://www.jamestown.org/print_friendly.php?volume_id427&issue_id=4469&article_id=2373006).

15] Girma, S., Kneller, R., and Pisu, M. (2007), "Do exporters have anything to learn from foreign multinationals?", *European Economic Review,* Vol. 51, pp. 981-998.

16] *Gudok* (2008), "Kazakhstanskaya kompaniya postroyit logisticheskiye objekty za rubezhom", 8 November.

17] Hejazi, W. and Pauly, P. (2003), "Motivations for FDI and domestic capital formation", *Journal of International Business Studies,* Vol. 34, pp. 282-289.

18] IMF (International Monetary Fund) (April 2008), *World Economic Outlook.* Washington DC.

19] *Invest Kazakhstan* (2007), "Merge and acquire! The M&A market in Kazakhstan".

20] Kalotay, K. (2004), "Outward FDI from Central and Eastern European countries", *Economics of Planning,* Vol. 37, pp. 141-172.

21] Kaynak, E., Yalcin, S., and Tatoglu, E. (2006), "A comparative study of foreign direct investment activities in Georgia and Kyrgyz Republic", *Multinational Business Review,* Vol.14 No. 3, pp. 29-52.

22] kazakhemb.org, "Kazakhstan Economy Overview" (available at: http://www.kazakhemb.org.il?categoryID=184&ArticleID=183&print=1).

23] *kazakhstanlive.com,* "Economic overview", available at: (http://www.kazakhsanlive.com/4en.aspx).

24] *Kommersant* (2008), "Liquidity crisis hits Kazakhstan', 18 September (available at: http://www.kommersant.com/p805526/macroeconomics).

25] Kornecki, L., and Rhoades, D. (2007), "How FDI facilitates the globalization process and stimulates economic growth in CEE", *Journal of International Business Research,* Vol.6 No.1 pp.113-126.

26] Kutan, A., and Vuksic, G. (2007), "Foreign direct investment and export performance: empirical evidence", *Comparative Economic Studies,* Vol.49, pp. 430-445.

27] Kwok, C., and Tadesse, S. (2006), "The MNC as an agent of change for host-country institutions: FDI and corruption", *Journal of International Business Studies,* Vol.37, pp.767-785.

28] Kyrkilis, D., and Pantelidis, P. (2003), "Macroeconomic determinants of outward foreign direct investment", *International Journal of Social Economics,* Vol. 30 No. 7/8, pp. 827-836.

29] Lim, S., and Moon, H. (2001), "Effects of outward foreign direct investment on home country exports: the case of Korean firms", *International Business Review,* Vol. 9 No. 1, pp. 42-49.

30] Mariotti, S., Mutinelli, M., and Piscitello, L. (2003), "Home country employment and foreign direct investment: evidence from the Italian case", *Cambridge Journal of Economics,* Vol. 27, pp. 419-431.

31] Markusen, J. and Venables, A. (1999), "Foreign direct investment as a catalyst for industrial development", *European Economic Review,* Vol. 43, pp. 335-356.

32] McDonnell, A. (2008), "Outward foreign direct investment and human capital development: a small country perspective", *Journal of European Industrial Training,* Vol. 32 No. 6, pp. 452-471.

33] nes.alibaba.com, "Kazakhstan: economic and political outline", (available at: http://nes.alibaba.com/article/detail/country-profiles%2523kazakhstan/100019975-1-kazakhstan- economic-politicl-otline.t...)

34] Ruane, M. (2008), "Attracting foreign direct investments: challenges and opportunities for smaller host countries", *Journal of International Business Research,* Vol. 7 No. 2, pp. 65-74.

35] *Silk Road Intelligencer* (2008), "BI group and Eurasia City in a USD 3 Billion Moscow development project", 26 August.

36] *The National Bank of Kazakhstan,* "Macroeconomics" (available at: http://www.nationalbank.kz/...)

37] *Tazar,* (2008), "Biznes & vlast: Kazakhstaniye investory vyvodyat aktyv Kyrgyztana", 6 August, available at: (http://www.tazar.kg.news.php?I=9113)

38] Torrisi, C., Delauney, C., Kocia, A., and Lubieniecka, M. (2009), "FDI in transition economies: the case of Poland", *Journal of Applied Business and Economics,* Vol. 9 No. 3, pp. 1-14.

39] *Turkish Weekly* (2008), "Russian President Medvedev visits the East", 27 May (available at: http://www.turkishweekly.net/nes.php?id=55712).

40] UNCTAD (United Nations Conference on Trade and Development) (2008), *World Investment Report.* New York and Geneva.

41] UNCTAD (United Nations Conference on Trade and Development) (2006), *World Investment Report: FDI from Developing and Transition Economies: Implications for Development.* New York and Geneva.

42] UNCTAD (United Nations Conference on Trade and development) (2004), *World Investment Directory Online, Asia and the Pacific.* New York and Geneva

43] UNCTAD (United Nations Conference on Trade and Development) (1999), *World Investment Report.* New York and Geneva

44] *Voice of America* (2008), "Ekho globalnovo finansovovo krizisa I geopoliticheskie sdvigi v Tsentralnoy Azil", 20 September (available at: http://www.voanews.com/russian/mobil/displaystory.cfm?id=158776).

45] Witt, M., and Lewin, A. (2007), "Outward foreign direct investment as escape response to home country institutional constraints", *Journal of International Business Studies*, Vol. 38, pp. 579-594.

46] Zhang, K. (2001), "Does foreign direct investment promote economic growth? evidence from East Asia and Latin America", *Contemporary Economic Policy*, Vol. 19, pp. 175-185.

Models of Demand for Capital in Agriculture of Kazakhstan

Sholpan Gaisina
Innovative University of Eurasia, Kazakhstan
sholpan66@yahoo.com

Abstract

The financing of agricultural producers is one of the most acute problems along the entire scope of economic reforms in Kazakhstan. The issue is: What kind of financial sources could maintain the development of agricultural production?

Internal sources such as profit, depreciation capital, and various reserve and insurance funds can not be considered as a key financial base. State financial support of agriculture in Kazakhstan (which plays a significant role in the most developed countries), is episodic in nature, small in size and typically does not reach the recipients. In these circumstances, a potential supplier of financial and investment resources could be a banking system and such non-banking credit institutions as credit cooperatives.

In this study capital demand functions were used to analyze an influence of a number of factors on capital demand in agriculture. The results of simulations suggest the most significant factors are a rental price of capital and a price of production output. Major determinant of credit demand is collateral, that is, size of arable land possessed by the agricultural enterprise and a cost of equipment. Despite subsidized credit plays significant role existing corruption in this sphere decreases capital demand and investment opportunities for agricultural producers.

Keywords*: agricultural finance in Kazakhstan, production functions, capital demand*

1. Introduction

Development of rural financial market is of high importance for Kazakhstan, as 44 percent of population live in rural areas and about 24 percent of the total population is engaged in agricultural production. There are three main sources of formal credit in the agricultural sector of Kazakhstan: commercial banks, rural credit partnerships (RCP), and micro-credit organisations (MCO). However, their shares in the total loans for agriculture are unequal. Commercial banks provide the major share of all loans for agriculture, more than 90 percent, the RCPs' share is declining and accounting for about 5 percent; the MCOs take less than 1percent of the total loans (Table 1).

Table 1: Shares of loans to agriculture in Kazakhstan

	2005	2006	2007
Total, million KZT*	198728.3	254677.5	298172.3
Share of credits, percent:			
Commercial banks	90.2	95.5	94.5
Rural Credit Partnerships (RCPs)	9.3	3.8	5.1
Micro Credit Organisations (MCO)	0.5	0.7	0.4

Source: Ministry of agriculture of Republic of Kazakhstan, http://www.minagri.kz

Note: * - Kazakh Tenge (Kazakhstani currency)

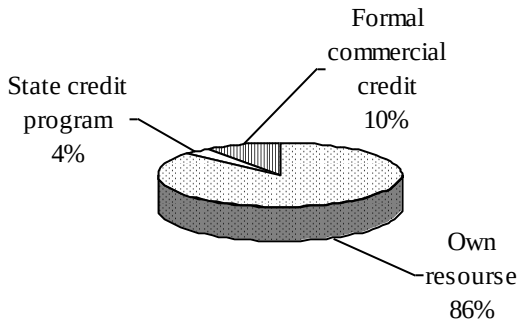
Despite commercial banks have such a big share of the loans for agriculture, there is no well-developed rural banking system currently existing in the country. Moreover, only two commercial banks of thirty have limited networks of branches in rural areas. In comparison with urban areas, rural clients in Kazakhstan are more dispersed, with a low average population density of six individuals per square kilometre. According to the statistical data, all banks provide loans to agricultural producers; however, the share of agricultural banking in the total bank loan portfolio is quite insignificant. Additionally, commercial banks prefer to provide loans to large-scale agricultural enterprises; in 2007, the latter obtained 95.5 percent of total credit to agriculture whereas the share of loans to private family farms has been continually decreasing. Banks are wary of lending to small rural households and private family farms because of the unacceptably low return rate, the high risk, a small size of demanded loan, and high transaction costs (Table 2).

Table 2: Loans provided by commercial banks to agriculture in Kazakhstan

	2005	2006	2007
Loan volume, billion KZT	189.5	243.2	282.0
Share of agricultural lending in total loan portfolio, percent	6.3	4.6	3.5
Share of agricultural enterprises in loans granted to agriculture, percent	96.3	96.0	96.5
Nominal interest rate, percent	14	13.6	15

Source: National Bank of Kazakhstan, http://www.nationalbank.kz

Although demand for investment is currently covered mostly by remained earnings (Figure 1), the role of external financial sources is of very high importance. The steady growth in agriculture could not be achieved without intensive investment in production. In turn, it is impossible to rely exclusively on own recourses, in particular taking into consideration a very low rate of profitability of agricultural producers in Kazakhstan. Thus, access to bank credit could be considered as a key factor influencing economic growth in rural areas of Kazakhstan.



Source: Agency of statistics of Kazakhstan, www. stat.kz.

Figure 1. Structure of investments in agriculture in 2006

However, a source of financing such as RCP could be considered as having good prospects in the near future. A rural credit partnership system is a new form for Kazakhstani agriculture. The history of its development accounts for only 7 years, including 2 years as a pilot project. According to the project idea, RCPs had to become prototypes of rural credit cooperatives. However, it is still too early to make a strong

analogy between RCPs and rural credit cooperatives of the Reiffeisen's type. According to a regulating law on Rural Credit Partnerships, the latter are not allowed to take deposits; they are partly state-owned organisations (although private ones are permitted, none exists) and all credits come from a state budget. Membership in the RCP is very restricted and depends heavily on the production type and size of land plot.

Micro-credit institutions in rural areas are still the least developed financial organisations. There is a state program aimed to cover needs in micro-crediting in rural areas, however, the scope of this program is insignificant and cannot solve problems with crediting small households.

2. Characteristics of the data

The model discussed herein is a static model, with cross-sectional data and it considers one production period (year). The agricultural enterprises data in this study was obtained from data of the Regional Agency of Statistics (Pavlodar Region, Kazakhstan). This data source includes annual records on all medium and large-scale agricultural enterprises, which are submitted to local statistical offices annually (and some of them quarterly). The data on agricultural land was obtained from the Regional Land Committee (Pavlodar Region, Kazakhstan) and contains all data of the amount of land rented or owned by agricultural enterprises, distinguishing arable and pasture land, and the land is measured in hectares (ha). This research is focused on middle and large-scale agricultural enterprises, the successors of kolkhozes (collective farms) and sovkhozes (state farms), additionally, only grain producing agricultural enterprises with more than 40 ha of arable land were taken into consideration. This selection has been used because of the situation in the rural credit market, where about 90 percent of all credits come from commercial banks and the overwhelming majority of credits are granted to large-scale enterprises. In the Pavlodar region large-scale enterprises are mostly specializing in grain production. State agricultural enterprises and the enterprises with livestock production specialization were excluded from the sample.

From 157 agricultural enterprises only 93 enterprises submitted reports to the Agency of Statistics in 2006. With respect to all agricultural enterprises that reported to the Agency of Statistics in 2006, the sample covers 81 percent of the total number of reported agricultural enterprises, 91 percent of the employment, and 75.5 percent of agricultural land, as reported by the Agency of Statistics. Next, such variables as labour and land are measured in people and hectares respectively. Agricultural enterprise output is measured as gross production in a metric center. It should be noted that the analysis is confined to the agricultural part of the enterprise. A problem of obtaining the value of capital was encountered here, because it was not available: neither on the regional level nor on the enterprise level. The value of capital was measured as the costs of expenditure (seeds, fodder, mineral fertilizers, oil products, energy, spare parts, and other) and the cost of buildings and machinery calculated using a sum of depreciation from annual reports and measured in Kazakh Tenge (KZT). For calculating a total cost of production, the cost of labour was measured as a payment for farm employees engaged in plant production and the cost of land was measured as a rent for arable land, in KZT. Both labour and land are not corrected for quality, due to a lack of data on quality. Regional price indices for aggregated agricultural output were used.

3. Production function estimations

3.1 Measurement of inputs and outputs

In order to answer research issues in this study, agricultural production is assumed to be a function of productive inputs, which are defined as productive resources, or the services they provide, used over a given production period to produce a certain amount of outputs (Upton 1976). There is a vast variety of the inputs involved in producing a particular output. Some inputs are under a producer's control, some of them are completely out of it such as rainfalls and sunshine, some are partly controllable such as pests, quality of soil, and diseases.

For some study purposes it is necessary to consider very specific inputs, but it is also possible to aggregate inputs into the broad groups of land, labour, and capital. Thus, there is a technical relationship between inputs and outputs, that is, to achieve a certain level of output it is necessary to use a certain quantity of inputs in a given period of time.

A production function describes a way that output and inputs are related. This relationship can be expressed using different mathematical approaches. It describes the maximum output obtainable, at the existing state of technological knowledge, from given amounts of factor inputs (Humphrey 1997). The production function, $f(X_1, X2)$, is assumed to be linearly homogeneous, increasing, strictly quasi-concave and twice-continuously differentiable in its arguments. We can write the output, y, of a farm as:

$y = f(X_1, X2_{\ldots} X_i)$,

where y is a quantity of output and X_i is a quantity of inputs (Silberberg 1990).

According to Heady and Dillon (Heady 1961, p.220) in an ideal case all the input and output variables should be measured in physical units. However, the situation differs for studies based on cross-sectional data. Such inputs as capital goods can not be measured in physical terms, because they have no common physical unit. They must be aggregated and measured in value terms for computation purposes. Thus, in an agricultural production analysis the theoretical distinction between a physical production function and a value production function is generally blurred.

The production function study for firms usually is oriented on the short run of a single production period or year (Heady 1961, p. 221). Therefore, the input of durable assets should be measured using depreciation or maintenance cost relevant to the period of study. Additionally, such variables as equipment and machinery, fuel, lubricants, spare parts, power should be grouped together due to high correlation among them. From the capital inputs should be excluded such items which are determined directly by the volume of production because they could cause rise in the production elasticity and marginal productivity of capital inputs. When farms hire or purchase machine, buildings, and land they should pay some price. Once purchased, these resources are used over several production periods and do not have a purchase price each production period (Doll 1978). However, it is possible to evaluate them through using an opportunity cost, in other words, the money would be used and would earn in an alternative more profitable way, in this study as the opportunity cost of capital could be used a deposit interest rate.

There are three major resource categories: capital, labour and land. Macroeconomics typically uses two types of inputs – capital and labour. Land is even less than a kind of

capital as modern textbooks only mention labour and capital (such as machines, buildings or monetary funds) as production factors and make no reference to land (Metzemakers and Louw 2005). Land is considered as a part of capital. It is true for such sectors of an economy such as industry and service, but in the case of agriculture land should be considered as a separate input, since land and capital are essentially different because capital can be accumulated while land cannot (Echevarria 1998). As Timmer said:"Agriculture is the only major sector that uses the land surface as an essential input into its production function" (Timmer 2007). The measuring of the land input is not associated with large difficulties. The flow of services from the land input could be measured either in physical terms (hectares) or in market value terms (rent price)/ In this study only land actually used in production is included as input and the differences in land quality are not taken into account. The perceived price of land and land rent price are the same for all producers, and equal their market price. Thus, the amount of land used for production process characterizes the productive quality of land.

In measuring of labour input two factors should be taken into consideration: 1) distinction between a measure of total labour and labour actually utilised in the given production; and 2) variation in labour quality, namely, farm family labour and hired labour. In the case of labour the rental price could be expressed as an average wage in the economic sector, in the case of land the rental price is expressed as a land rent. In this study the importance of factor prises, especially the cost of capital, is emphasized. Thus, capital, land and labour can be hired in competitive markets at (exogenously given) prices i, r and w, respectively. The price, P, of output is also exogenously given - determined, say, in the world market (Eswaran and Kotwal 1986).

A production function including three major inputs as capital, labour and land in general form could be express as follows:

$y= f(K,L,N)$

y – output, metric centner
K – capital, 1000 KZT
L – labour, people
L – arable land, ha.

The factor demands, obtained from the firm's profit-maximization problem, are the firm's optimal choices of input quantities and are a function of input prices and the price of the output product. The most common application of factor demands is the calculation of comparative statics with respect to input and output prices (Taylor B. 2009)
The following assumptions will be maintained: 1) a firm is a price taker, that is, the firm is not large enough to influence the sales price, which is assumed to be a random variable. Furthermore, the prices of the inputs, capital, land, and labor, are given to the firm; 2) the decisions concerning a volume of output and inputs must be made prior to the knowledge of the market price; 3) a firm seeks to maximize profits (Batra and Ullah 1974).

Assuming farms are operating in a perfectly competitive market, one can expect that the main problem of a producer is maximizing profit, π. The profit function possesses many desirable properties and without loss of generality, one can consider only profit functions

in the empirical analysis of the behaviour of profit-maximizing, price-taking firms (Yotopoulos and Lau 1972).

A profit function (defined as current revenues less current total costs) can be written as follows:

$$\max \pi = Pf(K,L,N) - (iK+wL+rN)$$

where
P – price for grain,1000 KZT
i – interest deposit rate (1+deposit interest rate)
w – average wage rate in agriculture, 1000 KZT
r – agricultural land rent, 1000 KZT
K – capital, 1000 KZT
L – labour, people
L – arable land, ha.

A firm chooses input quantities so as to maximize expected utility from profit. The first-order conditions for the maximum should be found by taking the derivative of profit, π, with respect to each the inputs and setting this derivative equal to zero (Batra and Ullah 1974):

$$\partial\pi/\partial K = P^* \partial f/\partial K - i = 0$$
$$\partial\pi/\partial L = P^* \partial f/\partial L - w = 0$$
$$\partial\pi/\partial N = P^* \partial f/\partial N - r = 0.$$

The demand for each variable factor of production is obtained by solving this system of three equations for capital, K, labour, L, and land, N. One would get a relationship of factors to price of the products, P, the wage rate, w, the price of capital, i, the land rent, r. Also one can put into the equations additional parameters characterizing debt capital demand such as a loan interest rate, transaction costs, a size of collateral. Taking into account the fact that agricultural production is one of the high risky types of production one can enter into equations a probability of default depending on a probability of getting bad or good yield. Considering subsidized credit one can put into equations such a factor as a bribe rate.

3.2 Functional forms

The production function has been widely applied in agricultural studies focusing on the impact of different factors. Significant model specification problem is a selection of a functional form and methods of dealing with potential data.

Agricultural economics uses diverse algebraic equation forms for deriving production functions. Guides on appropriate algebraic forms may come from previous investigations and the theories of the sciences involved (Heady 1961, p.73). A selection process of any specific type of functional form imposes a number of certain restraints and assumptions concerning relationships involved and optimum resource quantities which will be specified. However, there are some functional forms traditionally used for agricultural production studies. As proposed by several authors (Heady 1961, Debertin 1986, Griffin et al. 1987, Felipe 2005, Mohaddes 2008) those types of production functions are follows: the Cobb-Douglas, Transcedental, and Translogarithmic production functions. In

this study these three types of production functions were estimated. All these functions can be expressed in a linear form and can be estimated using the OLS method.

The estimated equations are expressed as follows:
1) Cobb-Douglas production function:
in log linear form

$$\ln Y = c + \alpha \ln K + \beta \ln L + \gamma \ln N$$

estimated function

$$\ln Y = 1.312 + 0.670 \ln K + 0.157 \ln L + 0.160 \ln N,$$

2) Transcendental production function
in log linear form

$$\ln Y = c + \alpha \ln K + \beta \ln L + \gamma \ln N + aK + bL + dN,$$

estimated function

$$\ln Y = 2.182 + 0.633 \ln K + 0.181 \ln L + 0.124 \ln N + 8.13868E\text{-}07K - 0.0007L + 5.80219E\text{-}06N,$$

3) Translogarithmic production function
in general form

$$\ln Y = \ln c + \alpha \ln K + \beta \ln L + \gamma \ln N + \tfrac{1}{2} a \ln K \ln L + \tfrac{1}{2} b \ln K \ln N + \tfrac{1}{2} g \ln L \ln N$$

estimated function

$$\ln Y = 145.8 + 0.394 \ln K + 0.81 \ln L - 0.72 \ln N - \tfrac{1}{2}(0.34) \ln K \ln L + \tfrac{1}{2}(0.16) \ln K \ln N +$$

$$+ \tfrac{1}{2}(0.21) \ln L \ln N.$$

After estimating these functional forms a problem of choosing the best form for the given study purposes is arisen. Griffin et al. suggested to consider four choice criteria: 1) an extent of appropriation of a chosen functional form to maintained hypotheses; 2) availability of data and computing recourses; 3) data-specific considerations as goodness-of-fit and general conformity of data by means of use a variety of statistical and econometrical tests; 4) application-specific characteristics, for example, if a chosen form is to be used for simulations or mathematical expressions (Griffin et al 1987). In this study the alternative forms satisfy equally the first two criteria, however undertaken tests showed that not all the functional forms are good enough for the study. Also, a necessity to derive an input demand functions and express them mathematically required a choice of a proper functional form.

If one considers alternative models with the same specification of the dependent variable, the selection procedure is straightforward. The F-test procedure is used broadly for testing nested functions. The main idea is to compare the accuracy of prediction of a more complex model with a subset of the model, in other words, whether the gain in predictive accuracy is large enough to attribute it to something other than chance or random effects. As the Cobb-Douglas production function is nested within the Transcedental production function and the Translogarithmic production function it could be considered as a constrained function and taken as a null hypothesis, whereas the Transcedental and Translogarithmic functions could be considered as an unconstrained function. In this study the calculated F values for both comparisons are equal to 0.193

and 2.21 respectively, the critical point for $F_{crit,6,69}$ is 2.25; therefore, in the case of the Cobb-Douglas and Transcedental production functions $F(0.193) < F_{crit,6,69}$ the null hypothesis is not rejected; the same is in the second case of the Cobb-Douglas and Translogarithmic production functions $F(2.21) < F_{crit,6,69}$ and the null hypothesis is not rejected too. Thus, the constraining a=b=d=0 in Transcedeantal and Translogarithmic production functions would not change the estimated line by very much (Doran 1989). When comparing these functional forms one sees that R^2 is practically similar for three models the Cobb-Douglas, Transcedental and Translogarithmic functions: 0.759, .762, and 0.781, respectively, that is very satisfactory for a cross-section equation, and the t-statistics are better for the Cobb-Douglass type of production function (Appendix 1).

Thus, being based on the tests and also on the fact that factor demand functions formulated within the framework of the Cobb-Douglas production function have been widely used for the study of production behaviour of farm firms (Chand 1986), one can suggests that the Cobb-Douglas production function could be considered as the most fitting functional form for this study:

$$Y=1.312\ K^{0.67}L^{0.157}N^{0.16}.$$

Since the parameters α, β and γ yields a value smaller than one (0.67+0.157+0.16 = 0.987), the production function displays decreasing returns to scale, as expected. The elasticity of output indicated by the parameters α, β and γ reflects the increase of the output (Y) caused by one per cent change of the input factors (K), (N) and (L). Hence, the contribution of capital (K, comprising all capital inputs) to output (Y) is 67 per cent, of land (N) 15.7 per cent and of labor (L) 16 per cent.

4. Capital demand functions

Capital being a factor of production along with land and labour contributes services to the process of production. The sum used for financing a production process could be identified as either externally come, through increase in debt, or internally from farm cash flow (net income and depreciation allowances); or the sum could be a combination of external and internal sources of financing (Melichar 1973).

Stronger GDP growth during last decades in Kazakhstan and increased state support of agricultural sector have led to an increase in demand for credit by agricultural producers via income effect, as increased income can sustain higher credit repayments, and via wealth effect, as higher valued collateral can be offered to secure higher credit repayment (Gattin-Turkalj 2007).

The study is aimed to take a closer look at the following questions:

- What sort of factors could influence demand for both own and debt capital?
- How do those factors influence demand for capital?

4.1 Own capital demand function

Own capital formed from the remained earnings is a main source of financing for agricultural production in Kazakhstan. The Cobb-Douglas functional form is taken as a production function:

$$Y=cK_o^{\alpha}L^{\beta}N^{\gamma},$$

where
K_o – own capital, 1000 KZT,
L – labour, people,
N – land, ha,
$\alpha+\beta+\gamma < 1$ – decreasing return to scale,

and the profit function, π, is assumed also to be the Cobb-Douglas in form:

$$\pi = P\, cK_o^{\alpha} L^{\beta} N^{\gamma} - (iK_o + wL + rN),$$

where
P – price for crop, 1000KZT,
i – deposit interest rate (1+i),
w – average wage rate, 1000KZT,
r – agricultural land rent, 1000KZT.

To find input demand function for capital, K, labour, L, and land, N, first order conditions for profit maximization in respect to each input should be undertaken and then those first order equations should be solved for K, L, and N. First order condition equations could be expressed as follows equations:

$$\partial\pi/\partial K = Pc\alpha K_o^{\alpha-1} L^{\beta} N^{\gamma} - i = 0 \quad (1)$$

$$\partial\pi/\partial L = Pc\beta K_o^{\alpha} L^{\beta-1} N^{\gamma} - w = 0 \quad (2)$$

$$\partial\pi/\partial N = P\, c\gamma\, K_o^{\alpha} L^{\beta} N^{\gamma-1} - r = 0. \quad (3)$$

If one solve the equations (1)-(3) for K, L, and N, independently, it would mean that all the inputs are technically independent; in other words, the marginal product of one input would be unaffected by the quantity of the other input that is available. However, this situation is very unlikely. That is, if the price of one input increases the farmer might response on this increase by substitution another input for the first one. Thus, an approach for finding the input demand function needs to take into account the possibility of substitution; the use of one input should be a function not of the quantity of other factors, but rather of the prices of other factors. Thus prices and production function parameters should be treated as known terms, the quantity of K, L, and N, as unknowns. Equations (1)-(3) represent three equations in three unknowns that should be solved as a system of equations (Debertin 1986, p. 221).

Taking logs and rearranging the system of equations (1)-(3) as a following system of equations:

$$(\alpha-1)\ln K_o + \beta \ln L + \gamma \ln N = \ln (i/Pc\alpha) = k_1 \quad (4)$$
$$\alpha \ln K_o + (\beta-1)\ln L + \gamma \ln N = \ln (w/Pc\beta) = k_2 \quad (5)$$
$$\alpha \ln K_o + \beta \ln L + (\gamma-1) \ln N = \ln (r/P\, c\gamma) = k_3, \quad (6)$$

and considering decreasing returns to scale, the system of equations (4)-(6) could be solved using the Matrix Inversion method. This method is an alternative method of the Gauss-Seidel iteration and has two advantages:

- errors do not accumulate during the calculation. If the procedure converges, it approaches the correct answer without rounding errors such as can occur during

inversion of large matrices. As a result, very large sets of equations can be solved; the method has been applied to sets of thousands of equations.

- the method can be used for nonlinear sets of equations.

To solve the linear system of equations A X = b, one can multiply both sides by the inverse of A, provided this exists, to give $A^{-1}A\ X = A^{-1}\ b$ (Croft 2000).
But $A^{-1}A = I$, the identity matrix. Furthermore, Ix = x, because multiplying any matrix by an identity matrix of the appropriate size leaves the matrix unaltered. So, $X = A^{-1}\ b$, if AX = b, then $X = A^{-1}\ b$.
Assuming that $1-\alpha-\beta-\gamma= \eta$ and solving the system of equations (4)-(6) using the Matrix Inversion method one can get a matrix of parameters (Figure 2).

$$A= \begin{pmatrix} \alpha-1 & \beta & \gamma \\ \alpha & \beta-1 & \gamma \\ \alpha & \beta & \gamma-1 \end{pmatrix} \qquad X = \begin{pmatrix} \ln K \\ \ln L \\ \ln N \end{pmatrix} \qquad b= \begin{pmatrix} \ln (i/Pc\alpha) \\ \ln (w/Pc\beta) \\ \ln (r/P\ c\gamma) \end{pmatrix}$$

$$1/\det A = 1/ (\alpha+\beta+\gamma-1) \text{ or } = 1/ (-\eta)$$

$$\begin{pmatrix} (1-\beta-\gamma)/-\eta & \beta/-\eta & \gamma/-\eta \\ \alpha/-\eta & (1-\alpha-\gamma)/-\eta & \gamma/-\eta \\ \alpha/-\eta & \beta/-\eta & (1-\alpha-\beta)/-\eta \end{pmatrix} * \begin{pmatrix} \ln (i/Pc\alpha) \\ \ln(w/Pc\beta) \\ \ln (r/Pc\gamma) \end{pmatrix} \Rightarrow A^{-1}$$

Figure 2. Matrix

Substituting parameters from the matrix (Figure 2) in the equations (4)-(6) and solving for K_o one can get an own capital demand function, K_o:

$$K_o = (\alpha/ i)^{(\eta+\alpha)/\eta} (\beta/w)^{\beta/\eta} (\gamma/r)^{\gamma/\eta} (Pc)^{1/\eta} \qquad (7)$$

Looking at the given equation in general, the demand for capital as derived from the profit maximization process is a function of the price of inputs, like w = wage, r = land rent, the price of the product, P, and the opportunity cost of capital i. As one can see from the (7) $\partial K/\partial i < 0$, or as the cost of own capital increases, then demand for own capital decreases; $\partial K/\partial P > 0$, so as the price of the product increases, then there is increased demand for the capital input to produce more output in response to the price increase.

4.2 Debt capital demand function

When using debt capital for the production process a firm maximization expected profit, π in general form could be expresses as follows:

$$\pi = (\theta f(H) - (1+R)\ \omega H)$$

where ω – the rental rate per unit of input employed; since firm borrows the entire amount required to rent the capital input, its costs are incurred at the end of period when it pays off the loan; R – the interest rate charged by the intermediary (supplier of loan); ωH – loan payment, the amount borrowed to finance production; $R\omega H$- the interest charges incurred over the production period; $(1+R)\omega H$ – the total payment.

The level of production realized by the firm at the end of the period is given by $\theta f(H)$, where H is the amount of the capital input employed by the firm, f(H) is a non-random term and the random term in the production function is θ, which is considered as an indicator of solvency.

This equation states that the firm chooses to maximize expected profits taking as given both the rental price of capital and the loan rate. Realized profits are the excess of revenues over loan payments provided the difference is positive (the firm is solvent) and zero otherwise. (Hughes et al. 1986)
In the reality farmers make decisions in a risky environment every day. The consequences of their decisions are generally not known when the decisions are made. Furthermore, the outcome may be better or worse than expected. Variability of prices and yield are the biggest sources of risk in agriculture (Kaan 2009).

Thus, the profit function of the Cobb-Douglas form for the case of debt capital as a source of financing is:

$$\pi = \theta P(cK_d^{\alpha} L^{\beta} N^{\gamma}) + (1-\theta) K_d - \theta RK - (1-\theta) sK_d - \mu K_d - wL - rN$$

where
P – price for crop, 1000KZT
w – average wage rate, 1000KZT
r – agricultural land rent, 1000KZT
θ – probability of success, percent
R – (1+ loan interest rate)
s – share of collateral, percent of credit
μ – share of a transaction cost, percent of credit.

"Risk" and "uncertainty" are two terms basic to any decision making framework. Risk can be defined as imperfect knowledge where the probabilities of the possible outcomes are known, and uncertainty exists when these probabilities are not known (Hardaker et al 1997). Incorporating risk in the production function means incorporating random variables in the decision problems faced by farm managers. (Antle 1983).

In agriculture, in particular in grain production, uncertainty is reduced to two main outcomes:

1) with probability, θ, farmers have such a level of revenue which covers all the production costs and, in the case of borrowing, allows to cover interest and principles;
2) with probability, $(1-\theta)$, farmers receive output only to repay the capital expenditures (K), and in the case of taking a loan no interests could be paid. Additionally, farmers will face a loss of assets given as collateral.

In this study the probability of success, θ, is supposed to be equal to the probability of situation when an enterprise realizes values to cover both principal in the amount of debt capital and the interest.
Taking first order conditions for a system of equations with debt capital as a term, and employing the Matrix Inversion method, and solving for capital, K, one can get the debt capital demand (K^d) function:

$$K_d = (\alpha/(\theta R+(1-\theta)(s-1)+\mu))^{(\eta+\alpha)/\eta}(\beta/w)^{\beta/\eta}(\gamma/r)^{\gamma/\eta}(\theta Pc)^{1/\eta} \quad (8)$$

From the equation (8) it is seen that $\partial K/\partial R < 0$, or as the cost of debt capital increases, then demand for debt capital decreases; the higher share of transaction cost and collateral, the lower demand for capital; $\partial K/\partial P > 0$ and $\partial K/\partial \theta > 0$, so the price of production and the probability of success increases, then demand for capital increases too.

4.3 Mixed capital demand function

The capital demand could be financed by debt and retained earnings. Most agricultural enterprises in Kazakhstan rely mainly on their own financial sources, but formal credit is very desirable and needed. The demand for debt capital and demand for own capital is strongly related. The question is what factors influence a proportion of debt and own capital and in what way.

Given the assumptions of profit-maximizing and price-taking behaviour on the part of the agricultural enterprises, the decision variables are the quantities of output and inputs. Thus, the profits function under combination of debt and own capital could be expressed as follows:

$$\pi = \theta P (cK_m^{\alpha} L^{\beta} N^{\gamma}) + (1-\theta)K_m - \theta R b K_m - (1-\theta) s b K_m - \mu b K_m - \nu b K_m - i a K_m - wL - rN,$$

where
a – share of own capital,
b – share of debt capital,
P – price for crop, 1000KZT,
w – average wage rate, 1000KZT,
r – agricultural land rent, 1000KZT,
θ – probability of success, percent,
R – (1+ loan interest rate),
s – share of collateral, percent of credit amount,
μ – share of transaction cost, percent of credit amount,
ν – bribe rate, percent of credit amount in the case of subsidised credit.

The first-order conditions for the maximum is found by taking the derivative of profit, π, with respect to each the inputs and setting this derivative equal to zero

$$\partial\pi/\partial K_m = \theta P c \alpha K_m^{\alpha-1} L^{\beta} N^{\gamma} + (1-\theta) - \theta R b - (1-\theta) s b - \mu b - \nu b - i a = 0 \quad (9)$$

$$\partial\pi/\partial L = \theta P c \beta K_m^{\alpha} L^{\beta-1} N^{\gamma} - w = 0 \quad (10)$$

$$\partial\pi/\partial N = \theta P c \gamma K_m^{\alpha} L^{\beta} N^{\gamma-1} - r = 0. \quad (11)$$

Undertaking above used algebraic steps for solving this system of equations (9) – (11) one can get the following function for mixed capital demand (K_m) in the case of decreasing returns to scale:

$$K_m = (\alpha/(\theta R b + (1-\theta)(sb-1) + \mu b + ia + \nu b))^{(\eta+\alpha)/\eta} (\beta/w)^{\beta/\eta} (\gamma/r)^{\gamma/\eta} (\theta P c)^{1/\eta} \quad (12)$$

From the equation (12) it is seen that demand for debt capital decreases with increasing a bribe rate; the higher share of transaction cost and collateral, the lower demand for capital; $\partial K/\partial P > 0$ and $\partial K/\partial \theta > 0$, so the price of production and the probability of success increases, then demand for capital increases too.

4.4 Simulations

The "economic problem" to be solved is for a firm to maximize an objective function (profit function) in the face of constraints and cost (Anderson and Ross 2005). The firm faces constraints both with the physical nature of production (the production function) and costs (due to the production function and input prices).

In this study constrains are following:
1) own capital <= mean value of capital expenditures from the sample;
2) debt capital <= size of collateral;
3) labour <= mean value of labour in man power from the sample;
4) and land <= mean value of land size from the sample.

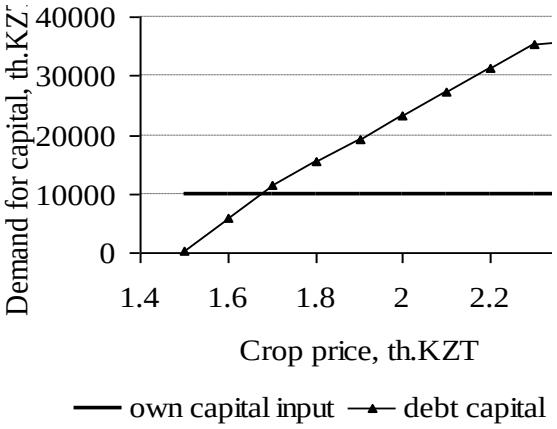
The size of collateral is taken as a lending limit equal .5 of equity (guarantee). In this study a mean value of equity is 25000 thousand KZT. An optimal ratio of own and debt capital is found using a sum of profit and of equity by the end of period as objective functions. Additionally, for the simplicity a sum of transaction cost is taken equal to zero.

Six factors influencing the ratio of own and debt capital are taken in simulations (Figure 3):

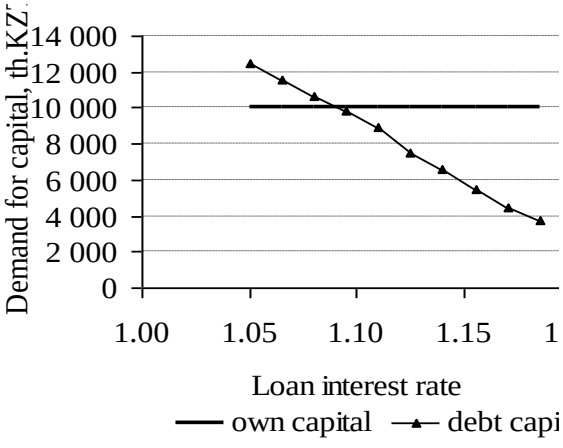
1. Price for output (price of wheat). As it is seen from Figure 3 (a) demand for debt capital increases with increasing of price for output. The increase in the price of product encourages a producer to increase the production, that is, there is a need to undertake additional investments. As the own capital is limited, the producer will inevitably resort to the debt capital.
2. Loan interest rate. Demand for debt capital decreases with the increased loan interest rate. At the rate of 1.09, the producer uses equally both own and borrowed capital (Figure 3 (b)). The interest rate of 1.09 corresponds to a loan interest rate by Rural Credit Partnerships and state favorable credit programs. Despite a high level of the interest rate for debt capital, agricultural producers still have a certain demand for debt capital.
3. Collateral. In economies with underdeveloped agricultural sector, credit is always rationed according to the ability to offer collateral. The amount of capital the agricultural producer can mobilise depends on the amount of land he owns or rents, which could be a good proxy for the overall wealth and, thus, his ability to offer collateral (Eswaran and Kotwal 1986). Agricultural land in Kazakhstan has not been accepted as collateral for bank loans during the 1990s due to an absence of clear ownership rights. However, even when property rights were established by the new Land Code of 2003, banks are still often refusing to accept agricultural land as collateral because of the absence of a functioning land market. Typically banks require residential property in urban as collateral. Decline in the amount of collateral reduces the ability of producer to apply for the loan; in the context of Kazakhstan it is impossible to receive the credit without collateral. Simulations show the proportion of debt capital in the total amount of capital increases with increase in the value of collateral up to a value of 6000 thousand KZT, after reaching this value the demand for debt capital is not longer dependant on size of collateral (Figure 3 (c)).
4. Deposit interest rate. In this study a deposit interest rate is taken as an opportunity cost of own capital. With increasing a deposit interest rate a producer is interested to put his own capital to a bank instead of investing it into production process and the lower a loan interest rate and the higher a deposits interest rate, the more profitable to

borrow capital than to use own capital. In this study, with deposit interest rate of 1.16 a producer will benefit using exclusively debt capital (Figure 3 (d)). Obviously, a producer would prefer to invest his own capital to the projects with higher opportunity costs than to have his capital tired in the less profitable activity.

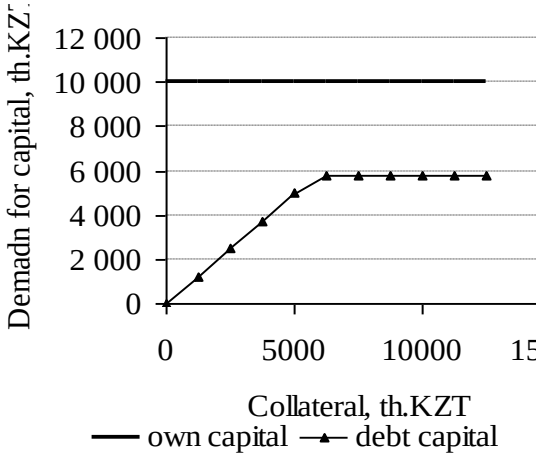
5. Probability of success. When the probability of success is of 40 percent it becomes unprofitable to use own capital and the usage of the debt capital becomes inefficient when the probability of success is lower than 90 percent. The average probability of good harvest in the Pavlodar region based on data for the last 15 years is about 80 percent (Figure 3 (e)). Thus, agricultural producers have every reason to expect not to be rejected in obtaining credit from formal sources.
6. Bribe rate. From the Figure 3 (f) it is seen that a higher bribe rate leads to decreasing demand for subsidised credit. However, despite the bribe rate approaches a level of the loan interest rate, the demand for capital is still exists. The officials, who are in charge of the credit allocation, often deliberately undertake dilatory tactics with a view to forcing the offer of bribes from the agricultural producers. Let assume the enterprise would like to apply for the subsidized credit. The supply of this credit is controlled by a local agricultural department. The department recommends commercial banks the enterprises which could be considered as potential borrowers. Thus, the enterprises having need for credit are dependent on the local officials' decision. It creates conditions for the corruption. Thus, even though local officials have no control over the loan interest rate which is administratively determined, the effective interest rate on subsidized credit must include the bribe and the officials concerned determine the bribing rate (Manash and Chaudhuri 1997).



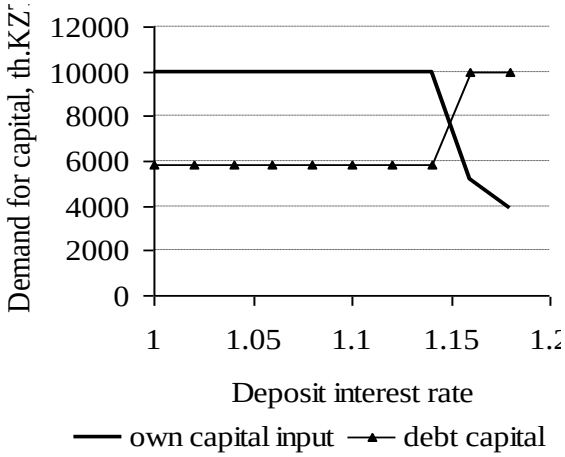
a. Price for output



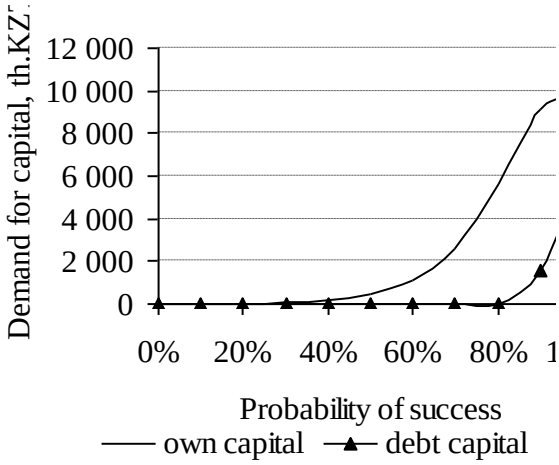
b. Loan interest rate



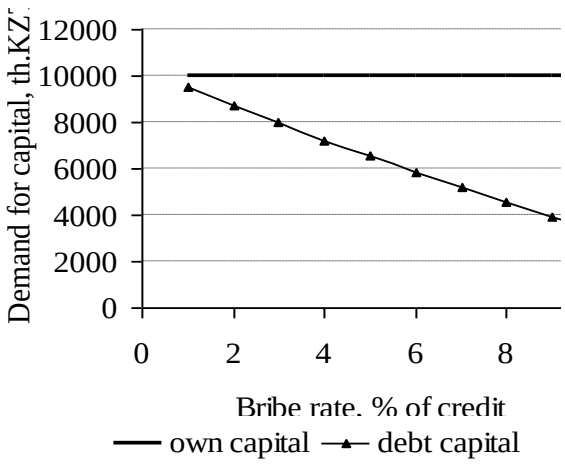
c. Collateral



d. Deposit interest rate



e. Probability of success



f. Bribe rate

Figure 3. Factors influencing capital demand

5. Conclusions

The main purpose of this paper is to show how various factors influence demand for capital in agriculture of Kazakhstan. A capital demand function was expressed from a profit function of the Cobb-Douglas type of production function.

Demand for capital heavily depends on such a factor as a rental price for both own and debt capital: the higher price for capital the less demand for it. If opportunity cost of own capital is higher than cost of debt capital, the enterprise preferably would use debt capital. However, agricultural enterprises in Kazakhstan are very credit rationed and access to formal credit is very restricted.

Among other factors influencing demand for capital such a factor as a price for output is very significant. An increase in the price of output encourages a producer to increase the production volume, that is, he/she faces a necessity to undertake additional investments. As an own capital is limited, the producer will inevitably resort to the debt capital.

Since grain production in Kazakhstan is very risky, commercial banks are very reluctant in crediting agricultural producers. However, it is so-called an "exclusive circle", agricultural enterprises need investments into technology and equipment in order to decrease risks of production and as a result they need external financing, at the same time formal credit institutions do want to take risky projects and finance agriculture. In this situation subsidised credits could play a significant role and facilitate access to a formal crediting for agricultural producers. However, this process should be more transparent and exclude such a phenomenon as corruption.

Major determinants of credit rationing are the size of arable land and the cost of equipment expressing an ability to submit them as collateral. Indeed, commercial banks as well as rural credit partnerships in Kazakhstan are reluctant to have any deal with agricultural enterprises having no sufficient collateral to submit. Taking into account that the overwhelming majority of agricultural producers have very worn-out machinery and buildings, they are very strictly rationed by commercial banks. Additionally, underdeveloped land market and unclear regulations concerning implementation of the land use rights in Kazakhstan makes commercial banks accept as collateral preferable land situated in the urban area or very close to it, to be able to sell it without problems in the case of default. As for rural credit partnerships, those enterprises which have large enough land plots have high probability to be granted with credits. Additionally, those enterprises, whose production capacities are higher, that is, they need more fuel and seeds could be considered as the most reliable borrowers.

6.References

Book reference

1. Debertin D.L. (1986), "*Agricultural production economics",* New York: Macmillan Publishing Company
2. Doll J.P. and Orazem F. (1978), "*Production economics: theory with applications*", Ohio: Grid Inc
3. Doran H.E. (1989), "*Applied regression analysis in econometrics",* New York and Basel: Marcel Dekker, Inc.
4. Dougherty C. (2002), "*Introduction to econometrics",* 2nd ed. New-York: Oxford University Press
5. Hardaker, J. B., Raud B.M. Huirne, and Jock R. A. (1997), "*Coping With Risk in Agriculture*", New York: CAB International.
6. Heady E.O. and Dillon J.L. (1961), "*Agricultural production functions",* Iowa: Iowa State University Press.
7. Hughes D.W., Gabriel S.G., Barry P.J., and Boehlje M.D. (1986), "*Financing of agricultural sector: future challenges and policy alternatives",* Boulder, Colo: Westview Press.
8. Silberberg, E. (1990), "*The structure of economics: a mathematical analysis",* 2nd ed. New York: McGraw-Hill Publishing Co.
9. Upton M. (1976), "*Agricultural production economics and resource-us",*. London: Oxford University Press.

Journal reference

10. Antle, J.M. (1983), "Incorporating risk in production analysis", *American Journal of Agricultural Economics*, No. 65, 1099-1106.
11. Anderson, W.L. and Ross, R. L. (2005), "The methodology of profit maximization: an Austrian alternative", *The Quarterly Journal of Austrian Economics*, Vol. 8, No. 4 (Winter), 31–44.
12. Batra, R. N. and Ullah, A. (1974), "Competitive firm and the theory of input demand under price uncertainty", *The Journal of Political Economy*, Vol. 82, No. 3 (May - June), 537–548.
13. Chand R. and Kaul J.L. (1986), "A note on the use of the Cobb-Douglas profit function", *American Journal of Agricultural Economics*, Vol. 68, No.1., 162-164
14. Echevarria, C. (1998), "A three-factor agricultural production function: The case of Canada", *International Economic Journal*, Vol. 12, No 3, 63–75.
15. Eswaran, M. and Kotwal, A. (1986), "Access to capital and agrarian production organization", *The Economic Journal*, Vol. 96 (June), 482–498**.**
16. Felipe J. and Mccombie J. S. L. (2005), "How sound are the foundations of the aggregate production function?", *Eastern Economic Journal*, vol. 31, no. 3, 467-488.
17. Griffin R.C., Montgomery J.M., Rister M.E. (1987), "Selecting functional form in production function analysis", *Western Journal of Agricultural Economics*, 12(2), 216-227.
18. Manash G. R. and Chaudhuri S. (1997), "Formal credit, corruption and the informal credit market in agriculture: A theoretical analysis", *Economica, New Series*, Vol. 64, No. 254 (May), 331-343.
19. Melichar E. (1973), "Financing agriculture: demand for and supply of farm capital and credit", *American Journal of Agricultural Economics*, Vol. 55, No. 2 , 313-325
20. Mohaddes S.A. and Mazhari M. (20080, "Total and input productivity analysis of poultry production in Khorasan province, Iran", *American-Eurasian Journal of Agricultural and Environmental Science*, Vol. 2, Supplement 1, 151-154.
21. Yotopoulos P.A. and Lau L.J. (1972), "Profit, supply, and factor demand functions", *American Journal of Agricultural Economics*, Vol. 54, No. 1 (Feb), 11-18

URL reference

22. Croft, A. (2000), "Engineering maths. First-Aid Kit", viewed 25 September, 2009, <http://www.booksites.net/download/croft_me/student_files/first_aid_kit.pdf >
23. Humphrey, T.M. (1997), "Algebraic production functions and their uses before Cobb-Douglas", viewed 25 September,2009,

    <http://ideas.repec.org/a/fip/fedreq/y1997iwinp51-83.htm>
24. Kaan, D. (2009), 'Defining risk and a framework for moving towards resilience in agriculture", viewed 25 September, 2009

<http://agecon.uwyo.edu/RnRinAg/RnRpercent20Sectionpercent201/Definingpercent20Riskpercent20andpercent20apercent20Frameworkpercent20forpercent20Movingpercent20Towardspercent20Resiliencepercent20Inpercent20Agriculture.pdf >

25. Metzemakers P. and Louw E. (2005), "Land as a production factor", viewed 15 July, 2009,

<.http://www-sre.wu-wien.ac.at/ersa/ersaconfs/ersa05/papers/220.pdf >

26. Taylor B., 2009. On the equivalency of profit maximization and cost minimization: a note on factor demands. www.mtsu.edu/~jee/pdf/taylor.PDF, *15 October 2009*

Book chapter reference

27. Timmer C.P. (2007), "Agricultural transformation », in: Chenery H.B. and Srinivasan T.N. (eds.), *Handbook of development economics*, Volume 1, North-Holland: Elsevier

Appendix 1
Estimated production functions

	Production functions					
N=76	Cobb-Douglas		Transcedental		Translogarithmic	
Residual sum	8.40		8.32		40.5	
Residual variance	34.99		26.68		145.06	
R^2	0.76		0.76		0,78	
	Estimated coefficients	t-values	Estimated coefficients	t-values	Estimated coefficients	t-values
Constant	1.31 (0.69)	1.89	2.18 (0,.99)	1.9	145.87 (3.30)	1.51
lnCapital	0.67 (0.13)	4.87	0.63 (0.17)	3.7	0.39 (0.57)	0.69
lnLand	0.16 (0.10)	1.54	0.12 (0.13)	0.9	0.81 (0.78)	1.03
lnLabour	0.157 (0.14)	1.12	0.18 (0.18)	0.9	-0.72 (0.,48)	-1.48
Capital			8.1E-10 (3.7E-10)	0.2		
Land			5.802E-08 (1.5E-09)	0.4		
Labour			-0.0007 (0.002)	-0.3		
.5lnCapital lnLabour					-0.34 (0.15)	-2.22
.5lnCapital lnLand					0.17 (0.15)	1.13
.5lnLabour lnLand					0.22 (0.23)	0.96

Note: standard errors in the parentheses

Geography, Policy, and Barriers to International Trade in Central Asia

Kristopher D. White
Kazakhstan Institute of Management, Economics, and Strategic Research

Abstract

The region of Central Asia today faces a number of barriers to international, extra-regional trade. Nearly two decades after independence, the former Soviet republics of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan confront trade-hindering obstacles emanating from the region's geography and individual state trade policy regimes. Geographical barriers include a landlocked location at great distances from major world markets, an isolating endogenous physical geography, and a complexity in political boundary delimitation. Policy barriers in general result from a restrictive trade policy resulting in political boundaries themselves functioning as barriers to the movement of tradable goods. Examining the World Bank's Trading Across Borders dataset, the Central Asian region emerges as one of the world's most expensive, time consuming, and bureaucratically encumbered regions with which to trade. While geography may be unavoidable, liberalizing trade policy may yield drastic increases in trade performance. To ameliorate a portion of the region's geographical disadvantage, greater intra-regional integration and possibly a future Central Asian Union can ensure long term regional economic sustainability.

Introduction

Central Asia, defined here as including the former Soviet republics of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, remains a region in transition. Each of these states met independence in 1991 with similar histories as components in a Soviet centrally-planned economic and political order. At independence, infrastructure stocks were similar, as was the alignment of these networks with Moscow and the Soviet core. While some researchers and commentators highlight each republic's initial conditions at independence as being equal, in fact the Central Asian republics (CARs) exhibited striking discontinuities in natural resource endowments as well as human capital stocks. Viewed in both political and economic terms, transition implies a certain dynamism, a movement toward market orientation and to some extent democratization. This paper takes aim at a particular aspect of economic transition, that of access to global trade. The assumption here is that increased global market access will have long-term benefits for each of the CARs. Specialization based on comparative advantage, resulting efficiencies and increasing gains from trade, sustainable economic growth, and ultimately increases in overall standards of living within the region are anticipated results.

Today, however, nearly two decades after independence, significant barriers to international trade continue to afflict the region. In general, these barriers are grouped in this paper along the dimensions of geography and policy. Globally, as states clamor for membership in the World Trade Organization (WTO) and any number of the myriad of

preferential trading agreements in effect, free trade is lauded as a potential antidote to a number of economic (as well as political, social, and the like) woes in this latest wave of so-called globalization. The purpose of this paper therefore is to examine the contemporary barriers to international trade facing the region of Central Asia. First addressed will be those geographical barriers to trade, many of which are unavoidable, which currently (and will continue to) impede extra-regional trade. Next will be an examination of generalized state trade policies within the region, which also act to hinder trade, though policy impediments show some variation between regional states. Following the discussion of geography and trade policy within Central Asia, a cursory treatment of trade performance will substantiate the negative geographical and policy influences on the region's international trade. The paper will conclude with policy prescriptions aimed at facilitating extra-regional trade and improving trade performance, while recognizing the inherent and unavoidable geographical constraints. Given these constraints, an intra-regional trade focus, culminating in some sort of Central Asian Union, appears paradoxically to be both unfeasible in the near term and necessary for long term regional economic sustainability.

Geography

With respect to integration into the global economy and associated global trade networks, Central Asia is at a geographical disadvantage. Today the region is landlocked and remote, possessing an isolating endogenous physical geography and in many places an illogical framework of political boundary delimitation. These impediments, discussed below, are largely unavoidable today and will continue to be so given the current state of transportation technologies and regional boundary configurations.

Landlocked location

Each of Central Asia's states is landlocked without direct port access to the world's open oceans. This locational fact itself adds costs (fiduciary, time, processing documents, etc.) to the import or export of goods via oceanic trade routes as port access requires crossing an additional international boundary. For Uzbekistan, this is a particular disadvantage as this state is one of only two in the world (Europe's Liechtenstein is the other) that is doubly landlocked – landlocked itself and completely encircled by landlocked states. A landlocked location has been shown empirically to increase trade transport costs by over 50 percent, and the world's median landlocked economy has less than a third of the trade volume of the median coastal economy (Limão and Venables, 1999). In a further indictment of Central Asia's location, nearly all Chinese goods bound for Europe travel via oceanic routes, largely a result of the break-of-bulk costs associated with negotiating a complex mix of rail, road, and sea transport modes overland through the Eurasian heartland (Norling and Swanström, 2007).

Distance

Aside from being landlocked, Central Asia's location, centrally positioned on the Earth's largest landmass, imparts another impediment to international trade – that of distance. The region is hampered by great distances to major global economic centers (Table 1). Data presented here depict rather simplistic straight-line distances, and actual

distances, of course, are greater and exacerbated by poor regional infrastructure (Linn, 2009).

Table 1: Distances to/from Central Asia[1]

From	To	km	miles
Tashkent, UZ	Frankfort, Germany	4,678	2,905
Tashkent, UZ	New York, US	10,181	6,322
Tashkent, UZ	Seoul, S. Korea	4,884	3,033

[1] Straight line distances between a centrally-located major Central Asian city (Tashkent, Uzbekistan) and major cities in the European Union, United States, and Pacific Asia.

The concept of distance decay, an axiom within economic geography (see e.g. Hanink, 1989), clearly illustrates the economic costs and decreasing likelihood of interaction with increasing distances. In the case of international trade, spatial interaction (the movement of exports or imports) is expected to decline with increasing distances between exporter and importer. In simple terms, the costs associated with overcoming the friction of distance manifest themselves in transportation costs and related costs of time and uncertainty as distances increase.

At the global scale, the negative influence of distance on bilateral trade flows has been well documented (Carrère and Schiff, 2005; Gallup *et al*., 1999; Henderson *et al*., 2001). For Central Asia, given the great distances involved in reaching major world markets, distance would appear to be a particular trade impediment. In analyzing a perceived 'under-trading' between Europe and Central Asia, Raballand et al. (2005) identify transportation costs as a major contributor to less than expected trade flows between these two regions. While total transport costs clearly rise with distance, per kilometer transport costs also rise dramatically once European goods enter former Soviet space. Transport inefficiencies and corruption at border crossings help to explain much of the transport cost rate differential between Europe and Central Asia (Raballand et al., 2005).

Physical geography

Adding to the disadvantageous conditions of being landlocked and located at great distances from major markets, Central Asia also possesses an isolating physical geography. In nearly all directions, significant physical barriers to extra-regional trade exist. To the west lies the Caspian Sea, where transport cost-increasing break-of-bulk facilities are needed both at exit ports in Kazakhstan or Turkmenistan and entry ports in

Russia, Azerbaijan, or Iran. To the southwest lie Turkmenistan's harsh Kara Kum desert and the Kopet Dag mountain range separating the region from Iran. Along the region's southern and southwestern flanks rise Afghanistan's Hindu Kush and Tajikistan's Pamir and Fan ranges. To the east, along the political boundary separating Kyrgyzstan and Kazakhstan from China lay the Tien Shan Mountains. To the northeast, roughly coinciding with the Kazakhstan-China and Kazakhstan-Russia borders rises the Altay range. Central Asia's North and Northwest offer topographically routes of least resistance for extra-regional trade. To the north, Kazakhstan's border with Russia essentially coincides with a transition zone into Siberia. To the northwest, between the Caspian Sea and where the Ural Mountains extend South to penetrate Kazakhstan's border with Russia, lies the most amenable exit route from Central Asia.

Political boundaries

An additional geographical factor complicating Central Asian trade are the region's political boundaries. While the functioning of these international borders (degree of openness, etc.) falls within the policy sphere, where the boundaries are delimited and the complexity of the boundary framework can also hinder trade. As Stalin-era Soviet constructs, the CAR borders were not drawn with independent states in mind – quite the contrary. These republican borders were delimited to minimize ethnic cohesion, separatist tendencies, or any other factors conducive to independence (International Crisis Group, 2002). Particularly curious is the political boundary situation in the Ferghana Valley, where a complex ethnic distribution has an equally complex international border framework artificially superimposed upon it. Within this particular region, three states, Kyrgyzstan, Uzbekistan, and Tajikistan intertwine, with a number of territorial enclaves existing entirely within the bounds of one state, but part of another's sovereign territory. Here, travelling a short distance in many cases involves the crossing of as many as three international boundaries. In the case of the European Union, with relatively free factor flow across national boundaries, the frequency of border crossings is not problematic. In Central Asia, however, the functioning of these borders, discussed later in this paper, significantly restricts such movement.

Policy

In general, a state's trade policy is reflected in a number of government-imposed elements through which, taken as a whole, restrict or facilitate international trade. A grouping of such elements would include tariffs, quotas, non-transparent trade regulations, licensing requirements, and overall complexity in customs regulation. Such barriers have been described as "exceptionally high" for the Central Asian states (Linn, 2009, p. 249). Some intra-regional variation does exist, however, with respect to trade policy restrictiveness. The Asian Development Bank (ADB) (2006) provides a general description of this variation, categorizing Kyrgyzstan (the regions only WTO member) as "very liberal," "fairly liberal" for Kazakhstan and Tajikistan, and "quite restrictive" for Uzbekistan (p. 24). Turkmenistan, not considered in the ADB trade report mentioned above, and where economic data are classified as state secret, would (as discussed below) most likely join Uzbekistan as having a very restrictive trade policy.

To further investigate trade policy within Central Asia, a number of trade-related economic indicators can be considered to tease out intra-regional indirect nuances of trade policy implementation (**Table 2**). Regional disparities in *per capita* gross domestic product (GDP) are striking (column 1), particularly so between Kazakhstan and

Tajikistan. The value of Kazakhstan's economic output is certainly buoyed by its sizeable oil exports, while Tajikistan remains largely impoverished, relying on its main

Table 2: Selected Economic Indicators, Central Asia

	pcGDP[1]	OpTr[2]	CPIr[3]	EFr[4]
Kazakhstan	10,863	0.773	120	82
Kyrgyzstan	2,006	0.948	162	80
Tajikistan	1,753	1.049	158	128
Turkmenistan	4,953	0.749	168	171
Uzbekistan	2,425	0.577	174	158

[1] Gross Domestic Product per capita ($US, PPP) 2007. Source: United Nations, 2009
[2] Openness to Trade, calculated by author using 2007 import, export, and GDP data
[3] Corruption Perceptions Index rank 2009 (of 180 ranked). Source: Transparency International, 2009
[4] Index of Economic Freedom rank 2010 (of 179 ranked). Source: Heritage Foundation, 2010

exports of cotton and aluminum. Turkmenistan's *per capita* GDP position within the region is largely a result of its status as a major global exporter of natural gas and cotton. Uzbekistan, with a *per capita* GDP of roughly half of Turkmenistan, relies greatly on export earnings from cotton and natural gas. Kyrgyzstan, with a *per capita* GDP just slightly above Tajikistan, relies primarily on revenue from gold and hydropower exports.

Openness to trade (column 2), which is calculated as simply the value sum of imports and exports as a proportion of GDP (imports + exports/GDP), shows the importance of international trade to a given state's economy. Openness to trade ratios do not necessarily indicate the level of restrictiveness or openness of a state's trade policy (i.e. trade policy barriers) (Gerber, 2002), though in the case of Central Asia these ratios (aside from Tajikistan) do correlate with the ADB liberal-restrictive classification described above. Tajikistan, showing the region's highest openness to trade ratio, is likely highly reliant upon imports from Russia, and this coupled with a low GDP may influence its ratio in this regard. Also of note here is the importance of remittances of Tajik laborers working abroad (mainly in Russia), which amount to as much as half the value of Tajikistan's GDP (Kireyev, 2006).

An additional condition which can significantly impede trade is corruption (column 3). Transparency International's ubiquitous Corruption Perceptions Index places each of Central Asia's states (with the possible exception of Kazakhstan) near the bottom of its annual rankings of perceived corruption within global states. Uzbekistan (ranked 174 out of 180), and Turkmenistan (168) stand out as particularly corrupt, though

Kyrgyzstan (162) and Tajikistan (158) fare just slightly better. As a barrier to international trade, corruption at border crossings can increase the cost and time required of trade transactions, as well as lead to non-transparency in actual customs and tax levies. Corruption has been shown to greatly hinder international trade globally (Anderson and Marcouiller, 2002), and results in border-crossing difficulty and increased transportation costs within Central Asia (Raballand et al., 2005). Corruption is also deemed a particular economic development challenge within each of the Central Asian states, though somewhat less so for Kazakhstan (Humala, 2009).

The notion of economic freedom, particularly the freedom of individuals and firms to freely make their own economic decisions without excessive government intervention, can also impact international trade performance. In this context, economic freedom is of heightened relevance in Central Asia, a region with a history (both Soviet and post-Soviet) of strong centralized state control. The Heritage Foundation's Economic Freedom index, applied to 179 world economies in 2010, measures economic freedom, broadly incorporating the concepts of "empowerment of the individual, non-discrimination, and open competition" (Miller and Kim, 2010, p. 57). More specifically, a given economy's final index score results from an average of ten separate indices reflecting property rights, trade freedom, business freedom, investment freedom, freedom from corruption, fiscal freedom, government spending, monetary freedom, financial freedom, and labor freedom (Heritage Foundation, 2010). While the trade freedom component (incorporating tariff and non-tariff barriers) has a direct bearing on barriers to international trade, each of the other nine constituent indices can, directly or indirectly, impact trade performance. According to final index rankings (column 4), Kyrgyzstan and Kazakhstan are classified as 'moderately free,' Tajikistan as 'mostly un-free,' and both Uzbekistan and Turkmenistan as 'repressed' (Heritage Foundation, 2010).

Barriers to Trade, Empirical Evidence

Presented above has been a general overview of geographical and policy elements that impede international trade within Central Asia. The empirical expression of these trade barriers is elucidated by examining the Trading Across Borders dataset found within the World Bank's most recent Doing Business report (World Bank, 2010). The trading across borders data indicate the cost, time, and documents required to import and export a standardized 20-foot container by ocean transport. For exports, this reflects all costs and procedures involved in moving goods from the factory to the nearest port, while for imports it includes procedures in moving goods from the port to a domestic warehouse or factory. An examination of these data for each of the Central Asian states (Turkmenistan is omitted for lack of data) with respect to imports (**Table 3**) and exports (**Table 4**) shows significant barriers to international trade within the region. Data values are included for cost, time, and documents required to import and export, as are each regional state's world ranking for each. With a total of 183 world economies considered, the Central Asian states generally rank near the bottom of world rankings in cost, time, and documents required for both imports and exports. With the exception of documents required to import and export for Kyrgyzstan (likely a function of its adherence to policy norms associated with its WTO membership) and number of documents required to export for Uzbekistan, all other data values are among the highest in the world. Costs

across the region are exceptionally high, particularly those to import to Uzbekistan and those to export from Tajikistan. The time requirements for regional imports and exports exceed two months in all cases, and approach three months in many. The 92 days required for importing goods into Uzbekistan and the 89 days required to export from Kazakhstan are very near the longest times in the world (101 days to import and 102 days to export into/from Iraq). Similarly, though with the seeming exception of WTO member Kyrgyzstan, the number of documents required to import and export are also high regionally, particularly in Kazakhstan. The 13 documents required for import into Kazakhstan approach the greatest number in the world (17 for Central African Republic), as do Kazakhstan's 11 documents required to export (the 13 documents required to export from Fiji are the most in the world).

Table 3: Trading Across Borders: Imports[1]

	Cost ($)	*World rank*	Time (days)	*World rank*	Docs. (#)	*World rank*
Kazakhstan	3,055	*167*	76	*178*	13	*181*
Kyrgyzstan	3,250	*169*	72	*176*	7	*97*
Tajikistan	4,550	*178*	83	*180*	11	*165*
Turkmenistan	N/A	-	-	-	-	-

[1] World Bank Doing Business, 2010: Trading Across Borders. Data refer to the cost (USD), time (days), and documents required (#) to import a standardized cargo container by ocean transport. World ranks list position among 183 world economies.

Table 4: Trading Across Borders: Exports[1]

	Cost ($)	*World rank*	Time (days)	*World rank*	Docs. (#)	*World rank*
Kazakhstan	3,005	*173*	89	*182*	11	*181*
Kyrgyzstan	3,000	*172*	63	*176*	7	*128*
Tajikistan	3,150	*175*	82	*181*	10	*172*
Turkmenistan	N/A	-	-	-	-	-

[1] World Bank Doing Business, 2010: Trading Across Borders. Data refer to the cost (USD), time (days), and documents required (#) to export a standardized cargo container by ocean transport. World ranks list position among 183 world economies.

Discussion

This paper has sought to examine the general geographical and policy-related international trade barriers faced by the states of Central Asia. As seen above, significant trade barriers, particularly for oceanic trade, make Central Asia one of the world's most expensive, time consuming, and bureaucratically encumbered regions with which to trade. Central Asia is clearly at a disadvantage with respect to oceanic trade, being landlocked within the world's largest landmass. Given the empirical evidence shown above, it becomes clear why overland rail transport is the mode of choice for extra-regional trade.

Both geography and governmental actions (policy) would seem to impact the cost, time and documents required for import and export. Being landlocked and distant from ports, as Central Asia surely is, would certainly increase the time for import and export, and greater transport costs would, of course, increase costs. The region's physical geography might also make for longer, more expensive movements of goods. Crossing an additional international boundary (as a landlocked state) would increase the cost and time to import/export, and would also add another layer of required documents. Tariffs and other taxes increase cost, and additional required documents raise bureaucratic obstacles as well as add time and perhaps cost. With both geography and policy impacting the Trading Across Borders performance of Central Asian states, as well as presenting significant barriers to international trade, it would seem advantageous for regional states to attempt to ameliorate some of these barriers.

The Central Asian states are burdened by a location and internal physical geography that present real barriers to international trade. In many ways these states must accept their geography as these constraints are largely unavoidable. With geographical barriers largely intransient, the trade policy arena offers particular opportunities for improvement (relaxing trade barriers) in international trade performance. In the Trading Across Borders dataset, one policy-related variable that offers ample room for improvement is the number of documents required to import and export. One could expect Uzbekistan, as a doubly landlocked state, to have at least one set of additional documents required, though the exceptionally high requirements in this regard for Kazakhstan and Tajikistan offer significant room for improvement. In Kazakhstan's case, its major export revenue earner, oil, exits the region via pipeline and rail networks. As a result, perhaps less of a priority may exist to decrease the documentary requirements and time to export goods. Across the region, Kyrgyzstan (again likely a result of its WTO membership) exhibits the fewest documents, shortest time, and in most cases, least cost to export and import. The only exception to this is the cost of import for Kazakhstan, which is the lowest in the region, though the documents required to import are exceedingly high. At any rate, it seems lowering the number of documents required to import and export, across the region, would yield shorter import and export times, as well as possibly lessening the cost of international trade. Fewer documents would also decrease the opportunity for corruption and other non-transparent uncertainties, improving the overall regional performance and efficiency in the import and export of goods.

Conclusion

Geography and general policy have been discussed with respect to the expected barrier effects on international trade within Central Asia. Examining the World Bank's

Trading Across Borders dataset, the role of both geography and policy interact to present significant empirical barriers to international oceanic trade as expressed by many required documents, long time periods, and high costs associated with import and export. While the region's geography may be unavoidable, the trade policy arena offers much opportunity for improvement in international trade efficiency. Greater efficiency it this regard would also be expected to increase global competitiveness and perhaps increase overall levels of economic development.

Central Asia's geography, its landlocked location at great distances to world markets, as well as its internal physical landscape and complex boundary configurations, remains a largely unchangeable extra-regional trade impediment. To ameliorate some of the negative aspects of its geography, the region could certainly benefit from increased intra-regional integration, harmonizing trade policy, and increasing intra-regional trade. Such benefits seem to be, in part, rationale for the creation of a Central Asian Union (see e.g. Yermukanov, 2005) that would have sustainable, long term economic benefits for the region. With an unfavorable geography (at least for extra-regional trade), a single market, free trade area with policy harmonization capitalizing on internal comparative advantage and associated efficiencies may be the region's best long term option. The region's geography, in fact, encourages trade introversion, making a greater case for increased intra-regional integration and leading, at some point in the future, to some form of regional preferential trading agreement. Clearly intra-regional trade would be enhanced under this scenario, and Central Asia's global competitiveness would also be heightened. It is hoped that such benefits would culminate in increased levels of economic development and human welfare across the region.

References

Anderson, James E. and Marcouiller, Douglas. 2002. Insecurity and the pattern of trade: An empirical investigation. *The Review of Economics and Statistics* 84(2): 342-352.

Asian Development Bank. 2006. Central Asia: Increasing Gains from Trade through Regional Cooperation in Trade Policy, Transport, and Customs Transit. http://www.adb.org/Documents/Reports/CA-Trade-Policy/ca-trade-policy.pdf (last accessed 24 October 2010).

Carrère, Céline and Schiff, Maurice. 2005. On the geography of trade: Distance is alive and well. *Revue économique* 56(6): 1249-1274.

Gerber, James. 2006. *International Economics* (Boston, MA: Pearson Education).

Grafe, Clemens, Raiser, Martin, and Sakatsume, Toshiski. 2005. Beyond borders: Reconsidering regional trade in Central Asia. European Bank for Reconstruction and Development Working paper No. 95.

Hamala, Heidi. 2009. Market-to-economy developments in Central Asia: performance measurement. *International Journal of Emerging Markets* 4(3): 207-219.

Hanink, Dean M. Introduction: Trade theories, scale, and structure. *Economic Geography* 65(4): 267-270.

Henderson, J. Vernon, Zmarak, Shalizi, and Venables, Anthony J. 2001. Geography and Development. *Journal of Economic Geography* 1: 81-105.

Heritage Foundation. 2010. 2010 Index of economic freedom: The link between economic opportunity and prosperity. http://www.heritage.org/index/Ranking.aspx (last accessed 17 July 2010).

International Crisis Group. 2002. Central Asia: Border disputes and conflict potential. Osh/Brussels, ICG Asia Report No. 33, 4 April.

Linn, Johannes F. 2009. First Eurasia emerging markets forum: 'Connecting Central Asia with the world.' *Global Journal of Emerging Market Economies* 1(2): 241-258.

Limão, Nuno, and Venables, Anthony J. 1999. Infrastructure, geographical disadvantage, and transport costs. Policy Research Working Paper 2257, The World Bank: The Policy Research Working Papers Series.

Miller, Terry, and Holmes, Kim R. 2010. *2010 Index of Economic Freedom*. (New York and Washington, D.C.: Heritage Foundation and Wall Street Journal).

Newman, David. 2006. The lines that continue to separate us: Borders in our 'borderless' world. *Progress in Human Geography* 30(2): 143-161.

Norling, Nicklas, and Swanström, Niklas. 2007. The virtues and potential gains of continental trade in Eurasia. *Asian Survey* 47(3): 351-373.

Rabaqlland, G., Kunth, A., and Auty, R. 2005. Central Asia's transport cost burden and its impact on trade. *Economic Systems* 29: 6-31.

United Nations Development Program. 2005. Central Asia Human Development Report, Bratislava: UNDP.

World Bank. 2010. *Doing Business 2010* (Washington, D.C.: The international Bank for Reconstruction and Development/The World Bank) http://www.doingbusiness.org/~/media/fpdkm/doing%20business/documents/annual-reports/english/db10-fullreport.pdf (last accessed 13 November 2010).

Yermukanov, Marat. 2005. Nazarbayev's integration drive blows wind into Moscow's sails. Central Asia-Caucasus Institute Analyst 3 September, http://cacianalyst.org/?q=node/2861 (last accessed 4 September 2010).

Is There a Continental Divide? A Comparison of Web Site Capabilities

Horst Treiblmaier
Bang School of Business, Kazakhstan Institute of Management, Economics and Strategic Research, Kazakhstan
treiblma@kimep.kz

Jonathan Palmer
Principia College, United States
jonathan.palmer@principia.edu

Abstract
The article examines 100 Web sites randomly selected from the Forbes list of top 2000 firms. The sites are drawn almost equally from Asia, North America, and Europe. The paper extends earlier work in web site usability and design by looking at a model of Web site capabilities that includes content, navigation, and interactivity. Significant differences were found among industries represented in the sample and across the three continents. Significant differences in content, navigation, and interactivity were identified, with North American Web sites offering more content regarding financial information, more privacy policies, and opportunities for interaction. A series of managerial guidelines and strategic considerations are presented.

1. Introduction

The Web provides organizations an opportunity to present information regarding their products and services to potential customers, suppliers and investors. The global reach of the Web as well as the ability to provide user interaction with the Web site provide significant opportunities. As a communications medium, distribution channel, and information rich database, the Web faces a challenge in designing interfaces that make sense for specific uses and users. This is particularly important given the increasingly international nature of both users and developers of Web sites. Developing sites that are responsive to user needs is critical for all site designers and managers. For Web site owners to be successful and for users to be satisfied, Web sites need to consider usability, content, and Web site capabilities as key design criteria.

Web sites provide the main interface for consumer use of the Internet and the primary user interface for net-enabled business (Straub and Watson, 2001), information provision, and promotional activities (Schubert, 2002). The Web provides organizations an opportunity to present almost limitless, up-to-date information regarding their products and services, to both customers and partners. Web sites can offer user interactivity including opportunities for feedback and individualization allowing the user to input or initiate changes to the system (Huang, 2005).

In 1998, CACM published an article that examined the use of Web sites by 250 of the Fortune 500 Web sites (Palmer and Griffith, 1998) in which the authors described Web site characteristics and capabilities and suggested that “many organizations are investing their resources to "stake their claim" on the Web as an extension of their current business operations.” The use of the Web site offers a direct contact between the organization and its publics. This direct contact with users makes the design of Web sites particularly

challenging. Palmer (2002) identified four areas in his research regarding usability and design; navigability, content, interactivity, and responsiveness. The current article updates much of this earlier work with an international data sample and an increased list of Web site capabilities.

2. Research Model and Methods

In order to assess Web site capabilities, a content analysis of 100 randomly selected members of the Forbes Global 2000 (April 18, 2005) Web sites was conducted in the spring of 2005. The use of content analysis allowed a systematic and objective method for capturing specific characteristics of media. The Global 2000 was chosen as a likely group to have utilized the widest array of technologies in designing their Web sites and represent the growing international dimension of the Web. Content analysis of the entire corporate Web site was utilized to identify a set of characteristics covering five key areas: multimedia use, site navigability, promotional activities, sales and delivery, and product support.

As major international, publicly traded firms, the Fortune 2000 will likely use the Web site at least in part as a platform for communicating with potential investors. In analyzing this key content and capability we looked for the presence on the Web site of a company overview (COOVER), a special section or category for Investor Relations (INVREL), the announcement of the current or very recent share price (SHAREPR), evidence of corporate governance guidelines (CORPGOV), and recent press releases and articles about the firm (PRESSINF) as well as recent or breaking news (HDLINES).
An increasingly popular use of the Web is for career related activities, both for job seekers and employers. In analyzing this content, we looked for the presence of career related information (CAREER) and job postings exchange (JOBXCH). As privacy and legal issues have become important on the Web, we looked for either privacy statements or policies (PRIVPOL) and legal statements or information related to the Web site (LEGAL).

We were interested in examining how much information was available about the site and its designers. We looked for information on site developers and webmasters (WEBMSTR) to see how well they were identified and how easy these key designers and content providers were to contact (WEBCON), whether there was a picture (PICTURE) or telephone contact (PHONE) as well as how recently the site had been updated (WEBTIME).

Navigation of the Web site has been a continuing source of interest. We looked at evidence of a general navigation structure (NAV) as well as specific capabilities such as a sitemap (SITEMAP) and search capabilities (SEARCH), and to view recent pages viewed (RECENTPG).

Interactivity has been proposed as one of the unique capabilities for the Web. We examined this aspect of Web site capabilities by looking for the presence of user feedback options (FEEDBACK), the opportunity for users to register for news or site

updates (REGNEWS), the ability for the user to individualize the Web site (INDIVID), and to generate printer friendly pages (PRINT).

3. Analysis and Results

The 100 company Web sites represented 16 different industries and had company headquarters in North America, Asia and Europe. The Web sites included 40 from North America, 32 from Asia and 28 from Europe.

3.1bDescriptive Statistics

The list of Web site capabilities and the number from the sample offering these capabilities is provided in Table 1. The most frequently utilized capabilities were a company overview (100% of the Web sites), a special category for press information and news (98%), a special category for investor relations and financial information (93%), a contact capability by telephone (96%) or mail (92%) and basic navigation design (94%). An interesting category of capabilities is the use of the Web site to offering information about career opportunities with the company (68%) and the presence of a company-owned job exchange (65%).

A high percentage of sites offered current share price information (76%) and to a lesser extent corporate governance guidelines (67%). Legal aspects (82%) and privacy related policies or statements (75%) were also prevalent. Basic navigation is supplemented by sitemaps (72%) and search capabilities (75%), but only 29% offer printer friendly options, and as mentioned above few offer individualization or recently viewed page options. While 89% of the sites allow the opportunity for user feedback, only 57% offer the capability of registering for news updates, although 74 % provide recent headline news involving the firm and 79 % offer a PR related contact.

	Web Site Capability	**Present in Web Sites Analyzed**
	Content	
COOVER	Company Overview	**100%**
PRESSINF	A special category for press information and news	**98%**
INVREL	Financial information and investor relations	**93%**
SHAREPR	Current share price	**76%**
HDLINES	Overview of latest headlines on the first page	**74%**
CORPGOV	Corporate Governance Guidelines	**67%**
CAREER	Information about career opportunities	**68%**
JOBXCH	Job Postings Exchange	**65%**
LEGAL	Information about legal aspects	**82%**
PRIVPOL	Privacy policy or privacy statement about the homepage	**75%**
PHONE	Telephone Contact	**96%**
WEBCON	Possible to get in touch with a contact person (mail)	**92%**

WEBMSTR	Person or company who created the Web site	**8%**
PICTURE	Pictures of the contact persons	**1%**
WEBTIME	Time of the last Web site update available	**4%**
	Navigation	
NAV	Navigation Structure	**94%**
SEARCH	Search capability	**75%**
SITEMAP	Sitemap	**72%**
RECENTPG	Overview of "recently viewed pages"	**1%**
	Interactivity	
FEEDBACK	Feedback possibility for general questions and comments	**89%**
PRCON	Contact possibility with the Public Relation Manager or Chief Communication Officer	**79%**
REGNEWS	Register online to be informed about company news	**57%**
PRINT	Special print function to format the content printer-friendly	**29%**
INDIVID	Individualize the Web site	**5%**

3.2 Correlations

To begin our analysis, we examined the correlations among the Web site capabilities and characteristics being studied. When examining correlations, we removed Web site capabilities that were not present in more than 10% of the Web sites. This resulted in the removal of the time of the last Web site update, the name and photo of the webmaster, the ability to individualize the Web site, and the ability to see recently viewed pages. The absence of the first three suggests a change over the period away form direct contact and the development of multiple designers. The lack of ability to individualize the site is perhaps the most surprising, particularly if firms expect users/customers to make multiple site visits. This may reflect the continuing emphasis on the Web site as 'brochureware' for the firm and a lack of use of the medium for interactivity with users.

In analyzing key content and capability we looked for the presence on the Web site of a company overview (COOVER), a special section or category for Investor Relations (INVREL), the announcement of the current or very recent share price (SHAREPR), evidence of corporate governance guidelines (CORPGOV), and recent press releases and articles about the firm (PRESSINF) as well as recent or breaking news (HDLINES). All five of these items were highly correlated.

An increasingly popular use of the Web is for career related activities, both for job seekers and employers. In analyzing this content, we looked for the presence of career related information (CAREER) and job postings exchange (JOBXCH). These two items were highly correlated.

As privacy and legal issues have become important on the Web, we looked for both privacy statements or policies (PRIVPOL) and legal statements or information related to the Web site (LEGAL). These two items were highly correlated.

We were interested in examining how much information was available about the site and its designers. The only information that appeared regularly on the sites was mail (WEBCON) and phone (PHONE) contacts and these items were significantly correlated. Navigation of the Web site has been a continuing source of interest. We looked at evidence of a general navigation structure (NAV) as well as specific capabilities such as a sitemap (SITEMAP) and search capabilities (SEARCH). Sitemap and search showed significant correlation.

Interactivity has been proposed as one of the unique capabilities for the Web. We examined this aspect of Web site capabilities by looking for the presence of user feedback options (FEEDBACK), the opportunity for users to register for news or site updates (REGNEWS), and to generate printer friendly pages (PRINT). These items were significantly correlated.

4. Continental Divide?

We examined the Web sites and divided the firms by the location of the firm's headquarters and by the primary industry in which the firm operated (based on the industry identified in the Forbes 2000 list). There were 16 industries identified among the 100 firms. We found little difference across industries when we performed chi-square tests on capabilities by industry. We then reduced the classification into manufacturing and service industries and again found little difference. It appears that there are few differences across industries-- mainly in the use of press information and the presence of career information and company job exchanges.

There were, however, significant differences among the North American, Asian, and European headquartered firms. The results suggest that there are a number of significant differences among the three locations. There are also significant differences between Asian company Web site capabilities and those of firms headquartered in North America or Europe.

There are significant differences among European, Asian, and North American firms on share price, corporate governance info, press info, career info, company job exchanges, privacy policies, legal information, PR contact, feedback, registering for company news, search, sitemap, headlines, and printer friendly versions.

There are significant differences among all three locations on corporate governance, career info and job exchanges, privacy policy, PR contact, feedback, registering for news, and search. In each case, North American firms have the greatest presence of the items, followed by Europe and then Asia. On the remaining items - press info, legal info, sitemap, headlines, and printer friendly North America and Europe are similar, but each is significantly different from Asia.

5. Discussion and Managerial Considerations

There were several strong correlations among the Web site capabilities. Not surprisingly, there were strong correlations among those aspects relating to investor relations, share price, and corporate governance.

The Internet has almost unlimited potential in the markets of the future. As a direct marketing and advertising mechanism it provides product manufacturers or service providers access to a vast and ever expanding market. Internet technology continues to improve and the audience continues to grow. The potential exists for consumers to interact with companies via the Internet. The findings regarding the use of web sites for career information and job exchanges also suggest an important potential use for Web sites. We only analyzed the English versions of the Web sites, so it is possible that Asian HQ Web sites only have career and job related content on their native language sites. However, since the population is drawn from the biggest companies in the world, it is likely that information of this type would be available in all languages.

Insights from this research can aid Web site managers and designers in creating more successful Web sites. Appropriate navigability, enhanced Web content, opportunities for users to interact with the Web site, and mechanisms for feedback all can enhance Web site capabilities. Web site managers and designers can create more successful Web sites by incorporating these capabilities. Designers should also provide opportunities for users to personalize and customize their experience. Interaction with the Web sites can support mechanisms for feedback and answering user questions. The proper balance among these elements is a recipe for successful Web sites that will satisfy users and keep them returning.

The research provides empirical verification of how top firms throughout the world are currently developing their Web sites. While we did not measure site success, the findings are in line with those of Palmer (2002) who suggested that greater information content is associated with more successful Web sites. Customization and interactivity are key Web site capabilities, and the findings suggest that successful Web sites take advantage of this through opportunities for interaction with site users. Successful sites also provide an opportunity for feedback and maintain some record of that feedback, including the availability of FAQs.

The findings suggest a significant difference in content, navigation, and interactivity across continents and are consistent with the work of Singh et al (2005) that finds cultural adaptations in the design of web sites across continents. When designing Web sites for specific firms, these differences need to be acknowledged, and where appropriate, addressed.

References

1. Forbes. Global 2000, April 18, 2005.
2. Huang, M.-H. 2005. "Web Performance Scale," *Information & Management*, 42, 841-852.
3. Palmer, J. and D. Griffith. 1998. “An Emerging Web Site Design Model for Marketing,” *Communications of the ACM*, March 1998, 41(3) 44-51.
4. Palmer, J. 2002. "Web Site Design and Performance Metrics," *Information Systems Research*, June, 13(2), 151-167.
5. Schubert, P. 2002. "Extended Web Assessment Method (EWAM) - Evaluation of Electronic Commerce Applications from the Customer's Viewpoint," *International Journal of Electronic Commerce*, Winter, 7(2), 51-80.
6. Singh, N., Xhao, H., and Hu, X. 2003. "Cultural Adaptation on the Web: A Study of American Companies' Domestic and Chinese Websites," *Journal of Global Information Management*, July-September, 11(3), 63-80.
7. Straub, D. and R. Watson. 2001. “Research Commentary: Transformational Issues in Researching IS and Net-Enabled Organizations,” *Information Systems Research*, December 2001, 12(4), 337-346.

Competition in the airline industry: The case of price war between Malaysia Airlines and AirAsia

Tengku Akbar Tengku Abdullah

Abstract

Malaysia Airlines in the month of May 2008 launched its zero-fare campaign for local as well as for Southeast Asia destinations. AirAsia claimed that Malaysia Airlines is cross-subsidising the zero-fare campaign with profits from international routes. In addition, Malaysia Airlines is accused of practicing predatory pricing. There is a simple test for cross subsidy and predatory pricing. The simple test for cross subsidy is the cost approach. If the revenue from a subset of outputs is less than its incremental cost, the subset is the receiver of cross subsidy. The test for predatory pricing is that any price below variable cost is predatory if it can prove that the price constitutes a threat to an efficient firm. In addition, it must be shown that the predator tries to eliminate its competitors. Once the competitors exit the market, it must also be shown that the predator firm raises the price to recoup the losses suffered in price wars. In this price war, there is no evidence of cross subsidy. Similarly, the Malaysia Airlines aggressive pricing is not predatory.

Key words: Cross subsidy, predatory pricing, incremental cost, variable cost, stand-alone cost.

Introduction

Malaysia Airlines denied the accusation by AirAsia that it was using international subsidies to finance its "Everyday Low Fares" campaign (New Straits Times, 16 May 2008a), as it launched its zero-fare campaign for local as well as for Southeast Asia destinations in May 2008. There are accusations made against Malaysia Airlines that it is practicing predatory pricing.

The aim of this paper is to clarify the issues that have been raised in the debate: first, the claim that Malaysia Airlines is cross-subsidising the zero-fare campaign and second, the aggressive pricing by Malaysia Airlines, which has been branded as predatory.

The structure of the paper is as follows. First, it reviews the management accounting tools that help in the analysis of the issues in this price competition. The concepts of these tools are very important because there exist differences in the way costs are defined, and it is usually easier to define cost concepts than it is to quantify these costs. The diagnostic tools are stand-alone cost (SAC), incremental cost (IC), and variable cost (VC).

Second, it discusses the analytical constructs that are relevant to the analysis of the issues. The term 'analytical construct' has been invented to describe the issues discussed in this

paper in a way which is as linguistically neutral as possible. This is because predatory pricing has negative connotations. These analytical constructs can help establish which facts are relevant that will shed light on particular issues in this price competition. This paper considers the analytical constructs on cross subsidy and predatory pricing. It defines each of the constructs; discusses the motivation for their adoption by those involved; assesses their consequences; and briefly considers the tests for the constructs.

Third, the backgrounds of the corporations are discussed. The data collection for the case is taken from newspaper articles in the public domain published by The Star, The New Straits Times, and data obtained from Malaysia Airlines and AirAsia websites. Finally, a discussion on the issues concludes this paper.

Management Accounting Tools

Stand-Alone Cost (SAC)

Baumol defined SAC (1986, pp. 120-121) as:

> The stand alone cost of serving any buyer or a group of buyers whose bundle of purchases is the vector, y, is the total cost that would be incurred if the suppliers of y were to produce it without simultaneously producing any other items or any additional quantities of any of the commodities included in y.

In other words, SAC is the hypothetical cost of producing any individual output or any conceivable combination of outputs if its production were deprived of all economies of scale and economies of scope - the cost savings derived from complementarities with the production of other goods in the supplier's product lines.

The argument is that no buyer or groups of buyers of a product or a combination of products supplied by a firm should pay more than the SAC of those purchases. According to Baumol (1986, p. 121),

> The logic of this criterion, of course, is that any group that receives the vector y in return for a payment, $p_y y$, that is no greater than its stand alone cost must not be harmed and may be benefiting from the fact that the supplier is serving other customers in addition to themselves.

The benefit derived from this association will offer no incentive to the group to obtain the products from other suppliers. In addition, the SAC concept offers consumers the protection against excessive pricing through the forces of competition. In the absence of barriers to competition, provision of a product at a price above SAC means that an alternative supplier would emerge to provide at SAC. However, Baumol (1986, p. 121) cautioned that:

> … competition forces a reduction in the prices of any combination of goods if and only if they can be supplied more cheaply by an entrant, that is, if and only if the prices exceed the corresponding stand alone cost.

According to Baumol (1986), the SAC concept should ensure equitable utility pricing, particularly when a number of economists have turned to this concept as a defensible ceiling for pricing.

Incremental Cost (IC)

IC can be defined as the increase in cost as a result of producing a further output in addition to the existing output. Mathematically, IC of product y_2 is defined as $C(y_1, y_2)$ -

$C(y_1, 0)$ where C(.) is the total cost function. The argument is that the price of product 1 which exceeds its IC is not 'unfair' to the buyers of product 2 since those buyers gain from the sale of product 1 at that price. Baumol (1986) considered that the consumers of product 1 are better off by the supply of that product. This is because consumers of the firm's other products must also gain as a group, and no consumers lose out in the process. The definition of which output is the first one for a firm that produces two outputs may be of crucial significance because the first output bears all the common costs. There is no limit to the number of outputs which have to be considered, and this raises the issue of ordering (Heald 1996). For example, Aumann-Shapley prices are based on marginal costs averaged along a linear path from zero to current production, and Shapley prices are based on incremental costs averaged over all possible orderings of outputs (Curien 1991, p. 82).

Variable Cost

According to Clark (1923), variable cost means a number of 'accounting items' that vary in proportion to variations in business. In more general terms, it is a cost that varies with the level of output. The variation of cost is made with reference to the fluctuation of production in a short period of time. In the long run, all costs are variable. There are various terms for variable cost. Marshall (1916, p. 359) called it 'special, direct or prime cost'. His 'special cost' included the cost of raw material used, the wages of the part of labour spent which is paid by the hour or by piece, and the wear and tear of the plant used in producing the commodity. This special cost is the lowest price that an entrepreneur can accept in time of excess capacity or when trade is slack. Marshall stated that, in normal circumstances, prices must be above prime cost.

Analytical Constructs

Cross Subsidy

Definition

Viscusi et al. (1995) have provided a simple definition of cross subsidy. Cross subsidisation

> … is the use of revenue from the sale of one product to subsidize the sale of another product. More specifically, the price of one product is set to exceed its average cost while the price of a second product is set below its average cost (Viscusi et al. 1995, p. 337)

Another general definition of cross-subsidisation is provided by the EU Commission's guidelines on the application of competition rules in the telecommunications sector as follows:

> Cross-subsidisation means that an undertaking allocates all or parts of the costs of its activity in one product or geographic market to its activity in another product or geographic market.[1]

[1]Official Journal of the European Communities (1991). Guidelines on the Application of EEC Competition Rules in the Telecommunications Sector**,** *C233*, Volume 34 (6 September 1991): 91/C233/20.

Motivation for Cross Subsidy

There are many motives for cross subsidisation. First, it has been used in a benevolent way by making essential but uneconomic services affordable to all. This is consistent with the 1948 United Nation's Declaration of Human Rights; five out of thirty articles relate to economic rights and recognise that every individual has a right to a minimum level of economic necessities, for example adequate food, shelter, heat, clothing, healthcare and education (Zajac 1996).

Second, cross subsidy has been defended in the past by governments as necessary in order to finance development of national infrastructure. This can be illustrated by the expanding and widespread availability of telephone services throughout the 20th century that has benefited society and contributed to economic development and growth (Cronin et al. 1995, 1997). Kaserman et al. (1990) remarked that the telecommunications industry has been subjected to many varieties of cross subsidisation.

Posner (1971) argued that cross subsidisation can be used by government as a policy instrument to redistribute wealth from one group of consumers to another. Posner was of the opinion that cross subsidy is an aspect of public finance that can be used to redistribute wealth. The state can use this 'tax mechanism' to extract money from its subjects in order:

a) to defray the cost of services that the politically dominant elements of the state wish to provide and that the market would not provide in the desired quantity and at the desired price, or
b) to transfer money from one group to another, or
c) often, to do both (pp. 28-29).

Posner stated that regulation is in part a system of taxation or public finance, particularly in the use of cross subsidisation. An example is a uniform price for a local telephone service, which enables a consumer who lives in a rural area to pay the same fee as a consumer who lives in a city, even though the costs of installing the telephone for the rural consumer are much higher than the cost of installation for the city consumer. Posner concluded that:

> Internal subsidization may thus be viewed as an exertion of state power whose purpose, like that of other taxes, is to compel members of the public to support a service that the market would provide at a reduced level, or not all. It is in fact a form of excise tax, with the burden falling on purchasers of certain goods or services, and the proceeds earmarked for specific uses (p. 29).

Recently, Laffont (1999) argued that cross subsidy can help finance the provision of universal service in developing countries. He considered that cross subsidy tends to be a more efficient way of financing these services than tax because the latter is more

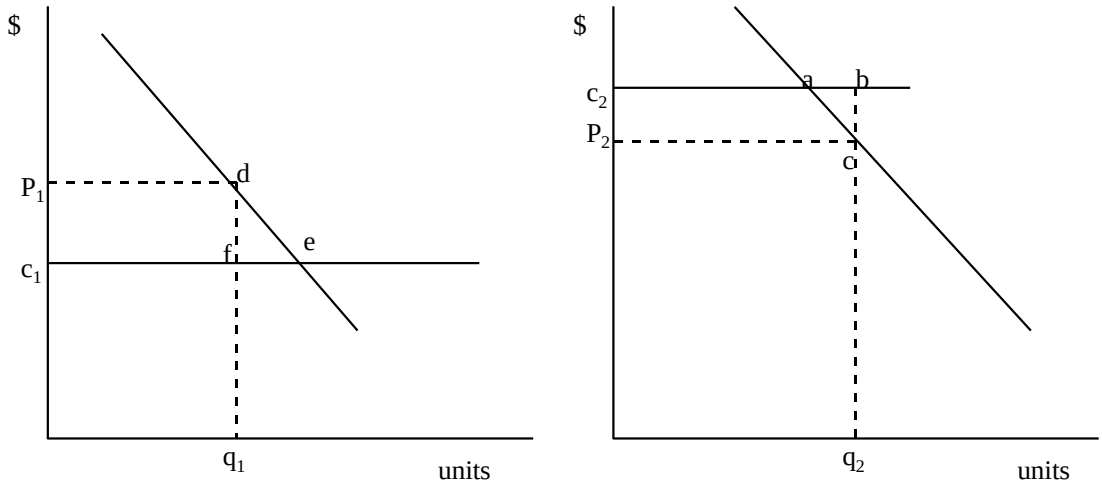
expensive. He remarked that it costs between 0.3 and 0.5 to raise a unit of public funds in most developed countries. In developing countries, the costs are much higher, as demonstrated by Thailand (1.19 to 1.54), Malaysia (1.20) and Philipines (2.48). However, Schmalensee (1999) was more cautious in commenting on the way to finance universal services in developing countries. Although in theory it is better to finance these services with cross subsidy in the absence of an efficient tax system, he argued that once the decision to rely on this for financing is made, it may be difficult to reverse when the tax system improves.

The third motive of cross subsidy is to gain 'unfair' advantages over competitors. Cross subsidy has been used by dominant firms in 'unfair' pricing decisions. A business undertaking uses cross subsidy as an investment to minimise the impact of competition in a market. According to Heald (1997), Stagecoach ran free buses on small competitors' routes, and Associated Newspapers temporarily revived an old title to force out a competitor from the lucrative London evening newspaper market. In addition to unfair pricing, the producers of a monopolised output in favouring their own associated companies for a choice of suppliers in competitive supplies markets, may utilise cross subsidy which later can be fed through as costs into the regulated market, thus earning abnormal profit (Heald 1994).

Consequences of Cross Subsidy

Figure 1

The effect of cross subsidisation on economic efficiency



Source: Viscusi, W. K., J. M. Vernon and J. E. Harrington (1995). *Economics of Regulation and Antitrust*, 2nd Edition, Cambridge, Massachusetts, MIT Press, p. 533.

The practice of cross subsidizing is damaging to economic efficiency. Viscusi et al. (1995) provided an example shown in Figure 1. A regulated firm produces products 1 and 2. It assumes that the demands for both products are independent. 'For whatever reason',

the regulatory authority wants to increase the supply of the high-cost product, product 2. The price of product 2 is set at P_2 where $P_2 < c_2$, and c_2 is the unit cost of product 2. The effect of such a pricing policy is a loss to the firm as represented by c_2acP_2 and welfare loss (abc). If the firm is to earn normal profits, the regulatory authority must increase the price of product 1 to P_1; mathematically, this can be shown as $(P_1 - c_1)q_1 + (P_2 - c_2)q_2 = 0$. The welfare loss of the pricing policy designed to subsidise the supply of product 2 is the sum of abc and def. Triangle abc represents the resources consumed by product 2 that have not been used efficiently. The policy of cross subsidisation entails the spread of deadweight losses to other markets as shown by the triangle def in the product 1 market.

Test for Cross Subsidy

There is a belief that a price that is set below cost constitutes cross subsidy. However, there is no consensus with respect to the definition of which costs are relevant to compare with price (Faulhaber 1979). There are, according to Faulhaber, two tests that can be used to determine whether a particular rate is 'subsidy free' or not. These are rate comparison tests and cost tests. A rate comparison test is a test which compares the costs of 'similar' services with the costs of the service in question, and the rates for the 'similar' services are themselves subsidy free. A cost test is a test to establish whether the revenue from a particular product is at least equal to the defined cost of producing the product. If the revenue received equals or exceeds the appropriately defined cost of producing the amount of good in question, then the product is subsidy free. If, however, the revenue received does not cover its cost, then it is not subsidy free. What is critical here is the definition of cost, especially in the presence of economies of scale and economies of scope. The cost approaches used by various agencies at various times were IC and fully distributed cost (Faulhaber 1979).

In order to provide for a better definition of costs for a cross subsidy test, Faulhaber (1975) suggested some tests. A subset j of outputs is the source of cross subsidy if the revenue from that subset exceeds the SAC. This can be presented mathematically as:

$$q_j.p_j \geq c(q_j)$$

If a firm, besides producing a subset of j outputs, also produces a complementary subset of n-j outputs, a subset of j outputs is the receiver of cross subsidy if the revenue from that subset is less than its IC, and this is mathematically presented as

$$q_j.p_j \leq c(q_n) - c(q_{n-j})$$

Predatory Pricing

Definition

Sheffet (1994, pp. 163-164) defined predatory pricing as:

> … when a firm sets a price for its product that is below some measure of cost and forfeits revenue in the short run to put competitors out of business. Once the targeted competitors have been eliminated, the alleged predator then raises its price to a high "supracompetitive" level and makes exorbitant profits to "recoup" the previously lost revenue.

The US Supreme Court defined predatory pricing as:

> … pricing below an appropriate measure of cost for the purpose of eliminating competitors in the short run and reducing competition in the long run (as reported by American Bar Association, Antitrust Section 1992a, p. 227).

Joskow and Klevorick (1979, p. 213) defined predatory pricing as follows:

> Predatory pricing behaviour involves a reduction of price in the short run so as to drive competing firms out of the market or to discourage entry of new firms in an effort to gain larger profits via higher prices in the long run than would have been earned if the price reduction had not occurred.

Areeda and Turner (1975) defined predation as a deliberate sacrifice of present revenues for the purpose of eliminating competitors from the market and then recouping the losses via higher profits earned in the absence of competition. Areeda and Turner did not mention predatory pricing explicitly in the above definition. However, on page 697 of their article, they mentioned that a firm which drives out or excludes competitors by selling at unremunerative prices and not competing on merit, is displaying predation.

Based on the above definitions, predatory pricing can be defined as unremunerative prices set by a firm in the short term that are below an 'acceptable measure' of cost in order to eliminate and deter competitors, and in the long term the firm is able to recoup previous losses and gain higher profits via higher prices.

Motivation for Predatory Pricing

There are many motives for predatory pricing. First, it has been used to gain market share (Gundlach 1995). Faced with declining market growth, the proliferation of new technologies and resource scarcities, a firm devises competition-centred strategies that include the manipulation of prices to increase profits at the expense of rivals through market share growth rather than market growth. Standard Oil used local price cuts to obtain market dominance (McGee 1958). Competitive strategies that weaken or destroy rivals, such as price cuts to below marginal or average variable costs, price discrimination, and a temporary price war can enable the firm to wrest market share from its rivals. Once the rivals are defeated, the market value of their assets falls and the predator will find it cheaper to buy the firms, thus eliminating the rivals from the market.

A study by Burns (1986) lends considerable support to the view that predatory pricing can improve the terms of a take-over. Burns studied the activities of American Tobacco from 1891 to 1906. During that period, it had acquired 43 rival companies. Burns found that the alleged predation produced a significant cost reduction to American Tobacco. The benefits gained from predatory pricing can be more than the reduction of profits during the price wars.

Second, predatory pricing can enhance the incumbent's reputation. This can be done by simply concentrating on a particular aspect of profitability that can drive rivals out of the markets. This is invaluable as it might have an effect on future entry. A policy of preserving monopoly by the incumbent can be inferred from those actions. Yamey (1972) gave an example. When negotiating the purchase price for a rival firm, the monopolist, when forcing the price down, is looking beyond the immediate problem of dealing with

that rival. Kreps and Wilson (1982) showed that, with incomplete and asymmetrically distributed information, and if rivals perceive that an incumbent firm has a taste for rapacious action, then that firm's optimal strategy is to employ it in all but a few encounters. For the incumbent firm, predation is a worthwhile investment to sustain or enhance its reputation to deter entry.

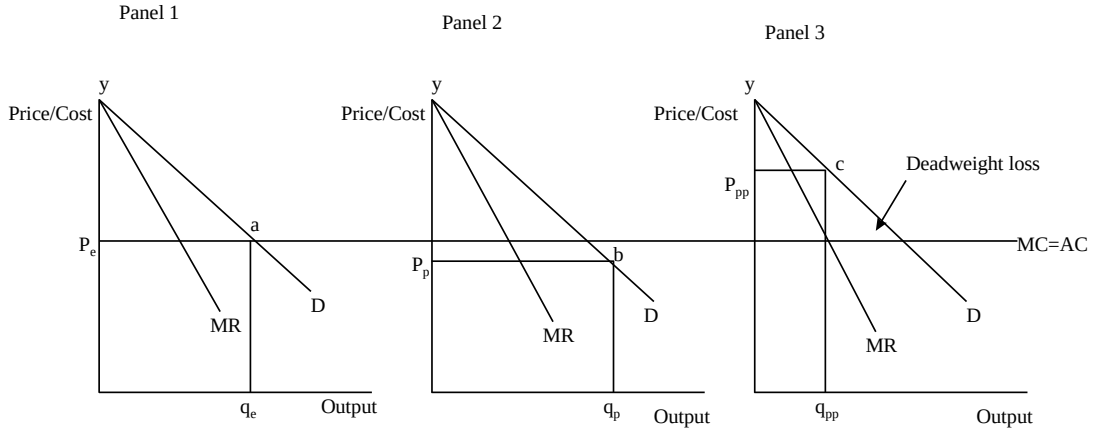
Third, predatory pricing may also be used to discipline rivals, or prevent their expansion or advancement in the market, rather than to cause their exit (Telser 1966, Nalebuff and Brandenburger 1996). Bolton and Scharfstein (1990) argued that the termination threat to some firms with financial constraints provided an incentive to the incumbent to ensure that entrants or rivals with less financial backing perform badly. This increases the probability that investors will cut off funding and induce their exit. In another study, Morton (1997) found that predatory pricing had been used to prey on new and weak entrants which had fewer financial resources, less experience and poor trading conditions.

Fourth, predatory pricing has been used to deter potential entrants. Facing a threat of competitive entry by a new technology, an incumbent monopolist supplying an old technology may take a strategic action that can exploit the installed-base effect by way of predatory pricing (Farrell and Saloner 1986). This is done by deploying a temporary price cut to keep competition at bay until the incumbent's technology regains parity. In addition, the incumbent monopolist can also use 'predatory pre-announcement' (or premature announcement) which is an announcement of the future availability of a new product. The purpose of predatory pre-announcement is to discourage existing customers from switching to competitors, and to encourage those intending to buy soon to wait for the availability of the new product.

Consequences of Predatory Pricing

Figure 2

The effect of predatory pricing



Source: Adapted from George, K. D., C. Joll and E. L. Lynk (1991). *Industrial Organisation*, 4th Edition, London, Routledge, p. 168.

The practice of predatory pricing does not promote fair market competition, economic welfare or economic efficiency. Consider a simple example as shown in Figure 2. In a perfectly competitive market, a firm will produce output q_e at a unit price of P_e (panel 1). At that price the total consumer surplus is shown by the area yP_ea. When a firm practises predatory pricing, it will produce output q_p at a price of P_p per unit (panel 2). The total consumer surplus is shown by the area yP_pb. The reduction in price from P_e to P_p has resulted in an increase in total consumer surplus. However, the lower price is only temporary, as its objective is to drive out rivals from the market; equally efficient rivals who have a shallow pocket might be destroyed in the process of competing with the predator firm. In other words, they are not competing with the incumbent firm on a 'fair' basis as the incumbent has a long purse or has the ability to make up for the resulting deficiency in earnings by charging excessive prices for its monopoly products. The price cut to below costs implies that the resources have not been used efficiently as the costs are greater than the revenue; society would be better off in the absence of this practice in the long run. Once the rivals have exited, the firm will increase the price to P_{pp} and will only produce q_{pp} output (panel 3). The total consumer surplus at that price is shown by the area $yP_{pp}c$; a reduction of total consumer surplus as compared to the other two scenarios. The resulting loss in consumer surplus as shown by the deadweight loss also represents a loss to society if the equipment used by the rivals that have exited cannot be put to alternative uses, due to its specificity.

Test for Predatory Pricing

The debates on the predatory pricing test have shown that finding a cost measurement technique that can be used in the test is problematic, particularly when a significant part of the costs is fixed and possibly sunk (see, for example, Scherer 1976a; 1976b Williamson 1977; 1978; 1979 and Ordover and Saloner 1989). Until now, there is no consensus on the appropriate test for predatory pricing, though many courts in the United States have adapted the basic principles of the Areeda-Turner test (Hovenkamp 1994).

The Areeda-Turner test has never considered the alleged predator's intent. The courts in the United States have, according to Hovenkamp, responded by modifying the rule. Hovenkamp cited a court's view that a price below average variable cost creates a rebuttable presumption of predation. A price which is above average variable cost but below average total cost creates a rebuttable presumption of non-predation. On the other hand, a price which is above average total cost is not conclusively legal, as it would be under the Areeda-Turner test. The court will consider the evidence of predatory intent and market structure in determining whether those assumptions can be defeated.

The affected parties

AirAsia[2]

Tune Air Sdn Bhd acquired the equity in AirAsia from DRB-Hicom in late 2001, and became Malaysia's second national airline. AirAsia became the first low fare, ticket less airline in Asia. It offers a simple "no frills" service at fares that are on average significantly lower than those offered by normal full-service airlines. The model was

[2] The information is obtained from http://www.airasia.com/

based on the successful airlines of the US-based Southwest Airlines and the Dublin-based Ryanair.

Since AirAsia introduced its low fare and no frills concept, the airline now flies to various destinations in Malaysia, Thailand, Indonesia, Singapore, China, Philippines, Brunei, Cambodia, Laos, Vietnam and Myanmar. AirAsia formed two successful joint ventures in Thailand (Thai AirAsia), and in Indonesia (Indonesia AirAsia). It has now carried over 35 million passengers. The success has attracted investments from IDB Infrastructure Fund L.P., Crescent Venture Partners and Deucalion Capital II Limited who have acquired equity in AirAsia Sdn Bhd worth US$26 million (RM98.80 million).

In order to promote low cost air travel, The Malaysian government has built a dedicated terminal for low cost air carrier operations. The low cost terminal is designed to cater for 10 million passengers per annum which later can be expanded to 15 million passengers if required, with 30 parking bays for aircrafts. This terminal provides AirAsia with numerous cost saving opportunities as well as a more efficient operation.

The fundamental concept of running a low fare carrier is the ability to manage a very low cost of operation. First, AirAsia operates on a non-ticket service that saved the airline about US$1 for each ticket. Second, it offers no meal or other services. Instead the airline sells meals and snacks to the passengers. Third, AirAsia works through supply chain management to get its supply-part inventory. It has a strategic alliance with GE Engine Services Malaysia Sdn Bhd and Airline Rotables Limited. Fourth, it cuts unnecessary cost through not offering any connection flights and trains pilots to save fuels. In addition, the airline does not offer onboard entertainments, which consume fuels and their maintenance is high. Fifth, the airline operates only one type of aircraft. In line with its growth and expansion plans, AirAsia has ordered 175 A320 aircrafts from Airbus. This order will make AirAsia the single largest customer for the aircraft in Asia-Pacific. The new aircraft would gradually replaced AirAsia's existing Boeing 737-300s.

Malaysia Airlines[3]

Malaysia Airlines had its humble beginning in the golden age of travel in the colonial days. A team from the Ocean Steamship Company of Liverpool, the Straits Steamship of Singapore and Imperial Airways proposed to the government of the Colonial Straits Settlement to run an air service between Penang and Singapore. As a result, Malayan Airways Limited (MAL) was incorporated in 1937. In early 1947, MAL took to the skies with its first commercial flight. When Malaysia was formed in 1963, the airline changed its name to Malaysian Airlines Limited and soon after, Borneo Airways was incorporated into MAL. In the space of twenty years, MAL had grown from a single aircraft operator into a company with 2,400 employees and a fleet operator using the then latest Comet IV jet aircraft, six F27s, eight DCs and two Pioneers.

When Singapore separated from Malaysia in 1965, MAL became a bi-national airline and was renamed Malaysia-Singapore Airlines (MSA). The airline grew exponentially with new services to Perth, Taipei, Rome and London. In 1973, the partners went separate ways with Malaysia introduced Malaysian Airline Limited, which subsequently was renamed Malaysian Airline System, or simply known as Malaysia Airlines, and

[3] The information is obtained from http://www.malaysiaairlines.com/.

Singapore with Singapore Airlines. Today, Malaysia Airlines flies nearly 50,000 passengers daily to some 100 destinations worldwide.

In the early 2000s, the Malaysian government had to bail out Malaysia Airlines due to a poor management and the effect of Asian financial crisis where the value of Ringgit was devalued by 50 per cent. The Ringgit was later pegged at RM3.80 per US$1. A Task Force was set up to turnaround Malaysia Airlines. However, in 2005, Malaysia Airlines again suffered a financial loss of over RM1.3 billions. In early 2006, the new appointed managing director and his management team announced a business turnaround plan (BTP) with a mission to become a profitable airline, to cut losses from RM1.7 billion (full year) to RM620 million in 2006, to achieve a profit of RM50 million and a record profit of RM500 million in 2007 and 2008 respectively. The thrust of the BTP was flying to win customers, mastering operational excellence, financing and aligning business on profitability, unleashing talents and capabilities, and lastly winning coalitions.

Having achieved a record profit of RM610 million in 2006, a new business turnaround plan was executed that focused on profitable growth in the face of big challenges in the airline industry including overcapacity, intense competition with yields and profit margins eroding, liberalisation of ASEAN skies and rising fuel costs. Under the new business turnaround plan, Malaysia Airlines' vision is to become the World's Five Star Value Carrier with a mission to be consistently profitable. In order to achieve this mission, it has adopted five business strategies (5-star products and services, lower costs, competitive fares, get more customers and more revenue, and, grow network and build capacity).

Discussion and conclusion

Rocketing fuel prices have forced the airline industry players to take drastic measures to ensure that they pull through the difficult times. Malaysia Airlines implemented a new business strategy that blended the full-service carrier traits with that of low-cost carriers (New Straits Times, 5 June 2008). According to Idris Jala of Malaysia Airlines, the "Everyday Low Fares" campaign has created a new market for the airline. In addition cost cutting measures such as the introduction of meal boxes for the economy class passengers are implemented to remain competitive and sustainable.

However, AirAsia accused Malaysia Airlines of practicing cross subsidisation to fund its "Everyday Low Fares" campaign (The Star, 17 May 2008). Malaysia Airlines has on the average sold 70 per cent of the seats. The 70 per cent seats sold gives Malaysia Airlines its normal profit. Without effective business strategy, the other 30 per cent unsold seats will reduce profit, and Malaysia Airlines has to bear the costs. The "Everyday Low Fares" strategy helps Malaysia Airlines via fuel surcharge to provide contribution to its fixed cost. This can be shown by the 6 per cent increase in revenue to RM3.7 billion from RM3.5 billion; its profit falls from RM132.7 million to RM120 million as the increase in fuel prices is more than its surcharges in the first quarter of 2008 and 2007 (New Straits Times, 21 May 2008).

As fuel prices kept on rising, Malaysia Airlines had increased its fuel surcharges five times in 2007 and had also increased them on international routes with exception of China routes by 25 per cent to 80 percent in June 2008 (New Straits Times, 28 June 2008). The increase in Malaysia Airlines fuel surcharges was as follows:

Route range to / from Malaysia	% increase range
Short haul / Asean sectors	25% - 67%
Medium haul sectors	28% - 50%
Long haul sectors	30% - 80%
Ultra long haul sectors	35% - 63%

Source: New Straits Times (28 June 2008), Higher fuel surcharge, Biz News, p 31.

The airline also intends to reduce its capacity by 6% on less profitable routes during the low season. The IC of the "Everyday Low Cost" seat is between RM25 to RM35, and its average fare is RM90 per seat. Thus the claim of cross subsidy is without any basis as the revenue from "Everyday Low Fares" strategy exceeds its IC.

Another issue is the claim of predatory pricing. Faced with escalating fuel prices, the airline has to device strategies that its seats can be sold so that the escalating cost of fuel can be fully or partially recovered. What Malaysia Airlines does is to substantially reduce the fare for the unsold seats. Although the incremental revenue is not significant, the airline can recover some of the overall cost through its fuel surcharge. Such a strategy can reduce the 30 per cent unsold seats, and thus reduces its cost.

In order to consider whether an aggressive pricing is predatory, it must be proved that Malaysia Airlines has the intention of driving AirAsia out from the industry and to obtain market dominance (see McGee, 1958 and Gundlach, 1995), prices its product below variable cost and recoups the losses once AirAsia exits the market. On intent, there is no evidence that Malaysia Airlines has the intention of driving AirAsia out of the market, as all players in the airline industry are experiencing a tough time in dealing with soaring fuel prices and the competition. On recoupment, there is unlikely that Malaysia Airlines can recoup the "losses", as the industry is very competitive. In the United States as in the case of *Matsushita Electric Industrial Co. v. Zenith Radio Corp.* (1986), the Court stated that:

> The success of any predatory scheme depends on maintaining monopoly power for long enough both to recoup the predator's losses and to harvest some additional gain. Absent some assurance that the hoped-for monopoly will materialize, and that it can be sustained for a significant period of time, 'the predator must make a substantial investment with no assurance that it will pay off.' For this reason, there is a consensus among commentators that predatory pricing schemes are rarely tried, and even more rarely successful (as reported by by American Bar Association, AntiTrust Section 1992a, p. 236).

Thus, Malaysia Airlines' aggressive pricing is not predatory, as its action is to generate more revenues to cover some of the costs due to the increase in the fuel prices which has doubled from 15 - 20 per cent to 30 – 40 per cent of its total operating costs.

What motivates AirAsia to claim that Malaysia Airlines practices cross subsidy and predatory pricing? One of the reasons is that price war has reduced AirAsia profitability and cashflows. As fuel prices keep on soaring and Malaysia Airlines attempts to sell unsold seats at low fares, AirAsia's cashflows and profitability will be greatly affected (New Straits Times, 16 May 2008b). With 60 per cent to 70 per cent of AirAsia's profit came from the local market, the Malaysia Airlines' zero fare campaign could affect AirAsia's forward bookings and yields. In addition AirAsia was committed to A320

delivery schedule, and the ballooning of interest costs and depreciation would push down profit margin even lower.

Another reason is that AirAsia's cost of funding will depend on its market share price performance. If its share price is weak, AirAsia's ability to attract investors will be weakened, and existing investors will reduce their holdings. This can be seen by the action of institutional shareholder T. Rowe Price Associates Inc. which has steadily reduced its holding by selling 3.7 million shares in the month of June (New Straits Times, 24 June 2008).

Why do we have competition? The aim of competition is to direct resources to the uses that will give the best benefits to consumers in the short run as well as in the long run. In the case of the current price competition between Malaysia Airlines and AirAsia, the consumers are benefiting because they pay low fares. Every body can fly now without really burning their pockets. In conclusion, the price competition between Malaysia Airlines and AirAsia has benefited the consumers.

References

American Bar Association Antitrust Section (1992a). *Antitrust Law Developments***,** 3rd Edition, Chicago, American Bar Association.

Areeda, P. and D. F. Turner (1975). Predatory Pricing and Related Practices Under Section 2 of the Sherman Act**,** *Harvard Law Review*, 88 : 697-733.

Baumol, W. J. (1986). *Superfairness: Applications and Theory***,** Cambridge, Massachusetts, MIT Press.

Bolton, P. and D. Scharfstein (1990). A Theory of Predation Based on Agency Problems in Financial Contracting**,** *American Economic Review*, 80 (1): 93-106.

Burns, M. R. (1986). Predatory Pricing and the Acquisition Cost of Competitors**,** *Journal of Political Economy*, 94 (2): 266-296.

Clark, J. M. (1923). *Studies in the Economics of Overhead Costs***,** Chicago, University of Chicago Press.

Cronin, F. J., P. M. McGovern, M. R. Miller and E. B. Parker (1995). The Rural Economic Development Implications of Telecommunications**,** *Telecommunications Policy*, 19 (7): 545-559.

Cronin, F. J., E. Colleran, M. Miller and R. Raczkowski (1997). Local Exchange Competition, Rate Restructuring and Universal Service**,** *Telecommunications Policy*, 21 (3): 251-264.

Curien, N. (1991). The Theory and Measure of Cross-Subsidies**,** *International Journal of Industrial Organization*, 9: 73-108.

Farrell, J. and G. Saloner (1986). Installed Base and Compatibility: Innovation, Product Preannouncement, and Predation**,** *American Economic Review*, 76 (5): 940-955.

Faulhaber, G. R. (1979). Cross-Subsidization in Public Enterprise Pricing, *Pricing in Regulated Industries: Theory and Application II*, J. T. Wenders. Denver, Mountain States Telephone and Telegraph Co.**:** 76-121.

George, K. D., C. Joll and E. L. Lynk (1991). *Industrial Organization*, 4th Edition, London, Routledge.

Gundlach, G. T. (1995). Price Predation: Legal Limits and Antitrust Considerations, *Journal of Public Policy & Marketing*, 14 (2): 278-289.

Heald, D. (1994). *Cost Allocation and Cross Subsidies*, Brussels, European Commission, 1994.

Heald, D. (1996). Contrasting Approaches to the 'Problem' of Cross Subsidy, *Management Accounting Research*, 7 : 53-72.

Heald, D. (1997). Public Policy Towards Cross Subsidy, *Annals of Public and Cooperative Economics*, 68 (4): 591-623.

Hovenkamp, H. (1994). *Federal Antitrust Policy: The Law of Competition and Its Practice*, St. Paul, West Publishing Co.

http://www.airasia.com/

http://www.malaysiaairlines.com/

Joskow, P. L. and A. K. Klevorick (1979). A Framework for Analyzing Predatory Pricing Policy, *Yale Law Journal*, 89 (2): 213-270.

Kaserman, D. L., J. W. Mayo and J. E. Flynn (1990). Cross-Subsidization in Telecommunications: Beyond the Universal Service Fairy Tale, *Journal of Regulatory Economics*, 2 : 231-249.

Kreps, D. M. and R. Wilson (1982). Reputation and Imperfect Information, *Journal of Economic Theory*, 27: 253-279.

Laffont, J. J. (1999). Competition, Information, and Development, *Annual World Bank Conference on Development Economics 1998*, B. Pleskovic and J. E. Stiglitz. Washington, World Bank: 237-261.

Marshall, A. (1916). *Principles of Economics*, 7th Edition, London, Macmillan and Co.

McGee, J. S. (1958). Predatory Price Cutting: The Standard Oil (N. J.) Case, *Journal of Law and Economics*, 1-3: 137-169.

Morton, F. S. (1997). Entry and Predation: British Shipping Cartels 1879-1929, *Journal of Economics & Management Strategy*, 6 (4): 679-724.

Nalebuff, B. J. and A. M. Brandenburger (1996). *Co-opetition*, London, Harper Collins Business.

New Straits Times (16 May 2008a), Idris: MAS low-fare campaign fully self-funded, Biz News, p 45.

New Straits Times (16 May 2008b), Rivalry set to 'burn' revenue, Biz News, p 42.

New Straits Times (21 May 2008), MAS Q1 net profit slips, Biz News, p 35.

New Straits Times (5 June 2008), MAS a new breed of hybrid carrier: Idris, Biz News, p 45.

New Straits Times (24 June 2008), MAS fuel surcharge details on Friday, Biz News, p 33.

New Straits Times (28 June 2008), Higher fuel surcharge, Biz News, p 31.

Official Journal of the European Communities (1991). Guidelines on the Application of EEC Competition Rules in the Telecommunications Sector**,** *C233*, Volume 34 (6 September 1991): 91/C233/20.

Ordover, J.A. and G. Saloner (1989).”Predation, Monopolization, and Antitrust”, *Handbook of Industrial Organization*, R. Schmalensee and R. D. Willig. Amsterdam, North-Holland. 1**:** 538-596.

Posner, R. A. (1971). Taxation by Regulation**,** *Bell Journal of Economics & Management Science*, 2: 22-50.

Scherer, F. M. (1976a). Predatory Pricing and the Sherman Act: A Comment**,** *Harvard Law Review*, 89: 869-890.

Scherer, F. M. (1976b). Some Last Words on Predatory Pricing**,** *Harvard Law Review*, 89: 901-903.

Schmalensee, R. (1999). Comment on 'Competition, Information, and Development,' by Jean-Jacques Laffont, *Annual World Bank Conference on Development Economics 1998*, B. Pleskovic and J. E. Stiglitz. Washington, World Bank**:** 262-266.

Sheffet, M. J., (1994). The Supreme Court and Predatory Pricing**,** *Journal of Public Policy and Marketing*, 13 (1): 163-167.

Telser, L. G. (1966). Cutthroat Competition and the Long Purse**,** *Journal of Law and Economics*, 7-9 : 259-277.

The Star (17 May 2008), No subsidy in MAS fares, http://thestar.com.my/news/story.asp?file=/2008/5/17/nation/21282999&sec=nation.

Viscusi, W. K., J. M. Vernon and J. E. Harrington (1995). *Economics of Regulation and Antitrust***,** 2nd Edition, Cambridge, Massachusetts, MIT Press.

Williamson, O. E. (1977). Predatory Pricing: A Strategic and Welfare Analysis**,** *Yale Law Journal*, 87 (1): 284-340.

Williamson, O. E. (1978). A Preliminary Response**,** *Yale Law Journal*, 87 (7): 1353.

Williamson, O. E. (1979). Williamson on Predatory Pricing II**,** *Yale Law Journal*, 88 (5): 1183-1200.

Yamey, B. S. (1972). Predatory Price Cutting: Notes and Comments**,** *Journal of Law and Economics*, 15 (1): 129-142.

Zajac, E. E. (1996). *Political Economy of Fairness***,** Cambridge, Massachusetts, MIT Press.