The Introduction of Systems Thinking into the Economic Curricula of Ukraine

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Abstract
This paper discusses the problem of how to introduce Systems thinking into university Curricula. The problems of interdisciplinary subjects in a faculty-based system are explored and the need for a suitable vehicle is posited. Economics is proposed as such a vehicle and the paper then describes an experimental Masters degree that is being taught in Donetsk National University in Ukraine. This degree makes a serious effort to introduce System Dynamics and Cybernetics to the economic student. Examples taken from the degree are discussed and valuable insights are drawn. This degree was developed by an international project involving six universities from three countries with money from the European Tacis Tempus Fund. Their help is graciously acknowledged.

1. Introduction

This paper deals with the outcomes of a project funded by a European body called Tacis Tempus. The general aim of these projects is to encourage the cooperation of educators in Western and Eastern Europe. By 'Western Europe' is meant the current members of the (enlarged) European Union. 'Eastern Europe' is defined to include the Russian Federation and all the former republics of the Soviet Union. US institutions are also allowed to enter such projects as 'G24 partners'. This allows them to join in all activities but unfortunately without European funding. (see Tacis Tempus website)

The aim of this particular project was to investigate the teaching of economics in three universities in Ukraine and develop a new Masters degree that would reflect the Western view. Accordingly a new speciality has been formed in Ukraine called "Applied Economics". This name may have different connotations in different countries but in the context of this project it simply means " applying the Systems paradigm to the teaching of economics". The project partners consist of three Ukrainian Universities – Donetsk National University, Kiev Taras Shevchenko National University and Kharkiv Karasin National University. There are two Greek partners – the Aristotle University in Thessaloniki and the University of Macedonia.

The project coordination body is the University of Sunderland and the overall coordinator is the co-author of this paper, Professor Moscardini

2. The System of Economic Education in Ukraine

The Ministry of Education of Science plays a more important role in the Ukrainian higher Education sector than in Western countries. All courses have not only to be registered there but also have to be approved by the Ministry. They also can suggest which courses should be compulsory, number of teaching hours and thus the universities have less autonomy than their Western counterparts. The desire to experiment and try innovative degrees is therefore is dampened and getting Ministry permission is a major factor is trying to establish any new pattern of education.
Economics is mainly sited in Economics faculties but other faculties may teach it such such as the faculty of Finance and Accounting and the faculty of Economics and Law. Undergraduate study is organised around a four-year diploma which is equivalent to a UK Bachelors degree. An example of a typical diploma is International Economics at Donetsk National University. This consists of 18 subjects each year. Rigid boundaries exist between subjects and a staff member who taught Labour Economics would not think himself capable of teaching say Industrial Economics. As such staff have precise roles and there is little flexibility. Economic education is Ukraine is firmly in the reductionist, historical mode

The mode of teaching is also different. Students are overloaded with factual lectures having no time for reflection or thinking. Many lecturers simply read from prepared material and there is little practical work. There is also virtually no cooperation with outside companies so that the course content is often hopelessly out of date and meaningless. The students, to a Western eye, are given too many lectures and too few working periods especially in the later years. The university is an extension of the school and reminds the Western author of the British Universities in the 50's.

Recently there has been a great interest in the concept of a Western style Master's degree. Several problems immediately presented themselves. It was unknown for students to change from their chosen field so a student in International Economics would not do a Masters in Cybernetics. The lecture overloading mentioned above was another problem. For example, these four courses had to be included in our new Masters (irrespective of whether they were relevant)!

Actual Problems in Philosophy,
Methodology of Scientific Research
High School Pedagogics
Foreign Business Language

It was therefore impossible to set up a UK type one years Masters course. The quickest time to complete turned out to be eighteen months. Whereas a typical Masters timetable in the UK would be 8 hours of lectures a week it was double that in the Ukraine. This meant that Masters students were being treated in the same fashion as undergraduate students which makes it difficult to attract the more mature student who may want to improve some particular skills. Another area of concern was assessment. All these problems are dealt with later in the paper.

Most projects are two- three years in length. In this time, a western academic enters an unfamiliar culture and is expected to achieve some objectives such as new teaching, new syllabi etc. To my mind, this is impossible. The people that he is dealing with are normally proud and suspicious – trust must be developed and this takes time. In this project, I was fortunate to win , two projects back to back. In the first project, I made many mistakes but I gradually learnt the internal politics of the situation, the people who worked and the nomenclatura, the people who did and the people who promised to do. By the time the second project was awarded, I had clear ideas as to who I wanted in my team and what was achievable and what wasn't. As a result, this , the second project , is much more successful. I also visit the Ministry in the capital city (Kiev) every time I pass through and by doing this I built up friendships at the Ministry eventually gaining the confidence o f the Minister. There is no secret formula here – only honesty and patience.

In the second project, I also insisted that the Rector of Donetsk National University, Professor V.P Shevchenko was the Ukrainian coordinator. There were several reasons for this:

i) he is a man of integrity and power so with his backing, I could provide the strong leadership that was required
ii) he is a man of vision who understood the long term view and was prepared to work towards it
iii) any disputes could be settled quickly and decisively

To summarise, Education in Ukraine still has many echoes of tits Soviet past and tends to be centrally controlled by the Ministries. This restricts the ability of the individual universities to try new courses or new pedagogic ideas. It is worth pointing out that the Classical (National) universities have more freedom to choose their courses than other universities. Over three years, the present project has had very strong support from the Ministry of Education and Science and has therefore been successful and managed to implement many innovative and progressive ideas. Such support from the Ministry is hard won.

3. **The New Specialism "Applied Economics"**

This is a determined attempt to introduce systems ideas to the teaching of economics in Ukraine Economics courses in Ukraine, as described earlier, are also typical of many European countries. Why is this so? Economics as a subject traces its origins back to Adam Smith in the eighteenth century. At that time the Newtonian paradigm was dominant and the new subject 'Economics' followed the dominant intellectual pattern of the day. The Newtonian paradigm treat the world as a closed, static, linear, deterministic, reductionist process that tended to equilibrium. As systems modellers, we see the world as an open system which is non-linear, chaotic, self regulatory, self adapting. holistic and dynamic. It usually operates in far from equilibrium conditions and in fact it is the difference which makes the difference. (Bateman, 1972)

Systems thinking is a general name for various branches of knowledge that help describe processes in this paradigm. A dominant feature of all systems thinking is the holistic ideal. The world is seen as an interdependent interlocking network of relationships whose relationships are often more important than the things themselves.

Changing one of the variables changes the whole picture. This is the essence of holistic thinking. One cannot understand a situation by examining its constituents. The behaviour of a system is much more than the summative behaviour of its parts.

Three of the major schools of Systems Thinking are:

- System Dynamics
  This exists in both qualitative and quantitative form. It has pioneered the production of causal loop diagrams which are an excellent way of capturing mental models. It relies heavily on feedback loops and the analysis of these loops can reveal valuable insights into possible long term behaviour. They are particularly useful in revealing possible counter-intuitive behaviour. In the quantitative side, the methodology of stacks and flows backed up by excellent software allows dynamic simulations to be conducted. (Forrester, 1961 - Wolstenholme, 1990 – Richmond, 1993)
- Cybernetics
  This is the study of organisational structure. The basic premise is that the structure of an organisation is an important contributor to the behaviour of the system. It is more polymath than System Dynamics and uses information theory and requisite variety. (Beer, 1972- Beer, 1988)
- Evolutionary Systems
  This is a general name that includes the work of Prigogine and the mathematics of non-linear behaviour. It allows the possibility of self-evolving structures at far from equilibrium conditions. Non-linear Dynamics allows the possibility of chaotic (i.e. deterministic but not random) behaviour. (Prigogine and Stenger, 1985)

The aim of the project thus became the task of how to incorporate these ideas into a Masters degree of Economics. A systemic view of the project is shown in Figure1. One can see many feedback loops. The outer loop could go either positive or negative depending on whether the right selection procedures, balancing courses and assessment procedures are used.

4. The New Master's Degree "Applied Economics"

The three principal tasks to make this successful were

- to design a new content
- to put in place the new pedagogics to support this content and
- To install an administrative structure for the degree

There were many discussions about the course and what should or should not be included. One problem were the compulsory courses which if implemented in full would make the Masters a two year degree. Appendix-A shows the original suggestions followed by Appendix-B which is what was actually agreed. One can see the differences. The preparation (compulsory) courses swamped the Applied Economic courses and the whole degree involved intensive teaching almost round the clock!. This agreement to change to the present form had to come from the Ministry. It took many meetings and a lot of patience.

The basic design of the degree, that was eventually agreed, was to provide the students with what was called an economic toolkit. (the foundation stage) . Armed with this toolkit, the students then explore eight economic areas (the Application stage). The MSc is gained by the completion of a dissertation which is a major piece of work. The teaching consisting of lectures and workshops lasts for a year and the project lasts for six months thus making the degree one and a half years in length. (which is short for the Ukraine) It is the toolkit that is of great interest to this conference as it is predominately a systems toolkit.

The students study six courses in the foundation stage which give a thorough introduction into the general modelling process. They study both discrete and continuous modelling. The discrete modelling course (which mainly covers queuing theory) uses the software package called ARENA. The continuous modelling course concentrates on Systems Dynamics using the packages Powersim And Vensim. (Powersim 1996 , Peterson D 1994) Another course looks at Cybernetic Theory which introduces the students to the Viable Systems Model of Stafford Beer. There is also a course in non-linear dynamics concentrating on the stability of equilibriums and self evolving systems. The final tool is the ability to use Econometric and Time Series Analysis. Although many of these topics can be difficult mathematically they are taught using packages and the mathematics is kept to a minimum. This is because the mathematics background of the students is not advanced and it is the systemic ideas that are important. In the System Dynamics course, the usefulness of Causal loop modelling is stressed and the students are encouraged to produce their own.(examples are given late) There is not enough time for the students to become expert system dynamicists so it is expected that they can run prepared models and produce output. They should also understand the concepts of stocks and flows. They are taught Powersim or Vensim and can enter data especially through the graph tool. They are also given lessons on delays and how to enter them in the models.

The finally agreed Application Modules are listed below.

World Economy and Globalisation
Financial Markets
Industrial Economics
Labour Markets
Agricultural Economics
Environmental Economics
Impact of New Technologies on the Economy
Supply Chain Dynamics

In these courses, we tried to be as innovative as possible. We use case studies as teaching vehicles. Not many case studies (in the UK style) exist for Ukraine so these have to be built from scratch. A library of such case studies is being developed which will be useful for many courses. Other techniques such as role-playing, using videos and discussion groups are also used. The original programme prescribed two hours lectures and one hour practical for each course. This has been changed t one lecture and two hours practical which provides a better platform for postgraduate studies.

The third objective was the most difficult of the three. A major problem was that although the Masters is situated in the most appropriate faculty, the Faculty of

SYTEMIC VIEW OF THE PROJECT

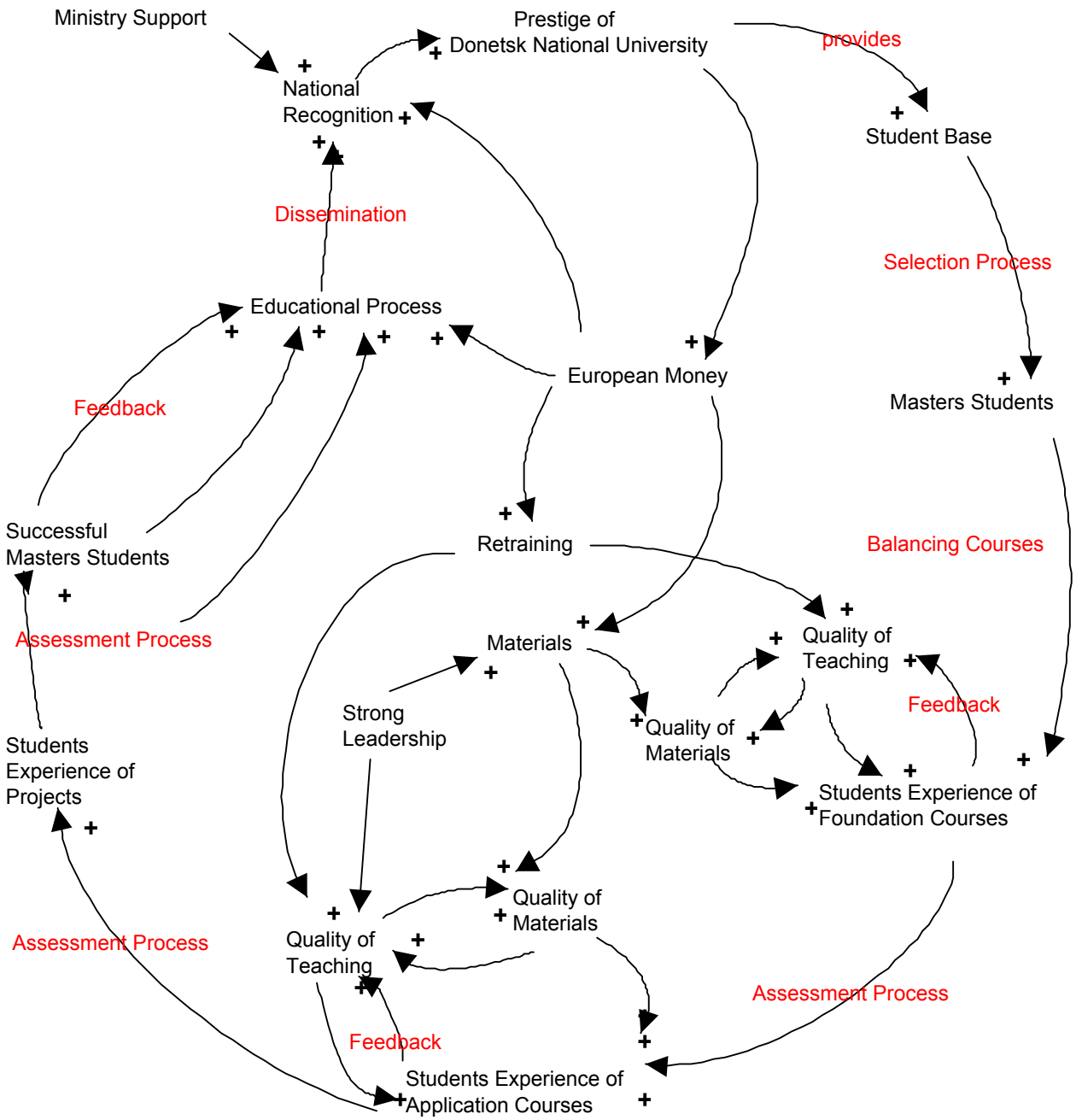

Figure 1 A systemic View of the Project

Economics, there is no Department of Applied economics. This causes many administrative difficulties. The Departmental structures for quality control had to be readjusted. The biggest problem was the same for any interdisciplinary degree in most places in the world - how to convince staff members to work for the degree when there are no obvious promotion routes or rewards for doing so.. The idea of student and staff feedback to a programme board was also new as was the idea of External Examiners. These have all been implemented in the new degree

To summarise: - this degree is attempting to break new ground in Ukraine. It is unique in three major aspects – perception, style and status.

Perception.

The degree is an international one prepared by a team from six universities from Ukraine, Greece and the United Kingdom. It has been developed on the European model in so far as it is free standing and shorter than the usual Ukrainian model. By free standing, it is meant that any student with a numerate first degree can apply. The Masters assumes some knowledge of economics and mathematics and students may need 'topping up 'on one of these subjects. This is why balancing courses have been prepared and students will have to satisfy the course providers that they have a prescribed basic knowledge before they start the course. The degree itself consists of one years teaching and then a project which must be completed in six months. This type of degree is common in the West and allows different types of students to progress. For example, in the UK mature workers can get a year's leave of absence to do the degree. They then choose a project that is useful to their company and complete it having returned to work. This has a two-way advantage: it brings new ideas and case studies into the universities and percolates new information to the workforce. The perception then is of a university and the labour force working together to improve the efficiency of the nation rather than the 'ivory tower' perception that often persists.

Style

The course will provide modern, international teaching and assessment methods. Some of the techniques employed are the use of videos, use of the web, role-playing games, case studies and a mixture of Eastern and Western books. The course will be taught in Ukrainian but many of the materials will be in English. It is not envisaged that this cause problems to the students who are expected to enrol on this degree. A mixture of assessment methods will be used besides the usual formal examination. This will reflect the new mix of students. The whole focus of the teaching is towards a student-centred approach as opposed to a teacher-centred one. Discussions will be encouraged and a seminar programme will be run where the latest theories and counter theories can be heard.

Status

European and UK accreditation will be sought for this degree and it is not envisaged that there will be problems. The degree has been prepared to the European standards with the help of European academics. This will confirm

the international aspect to the degree. It could then be used for stepping-stones to further academic qualifications worldwide and to employment in multi-national enterprises that are becoming globally more frequent. It is hoped that the degree will be available for all the classical universities of Ukraine. There will also be an application to the next Tacis round of projects to install and manage the whole degree via the Internet. The Ukrainian universities would then be on an equal status with universities worldwide.

5. Examples of the Use of Systemic Thinking

One of the application courses is about Globalisation and World Trade. A key issue for Ukraine is that of subsidies and tariffs and much time is spent on the new GATT and TRIPS proposals. In our course, they are given the normal Economic explanations and theory but the students are also exposed to some system dynamics models which improve their understanding. Figure 2 shows a causal loop where the importing and exporting of goods between the UK and the Ukraine is considered. (Moscardini, 2000).

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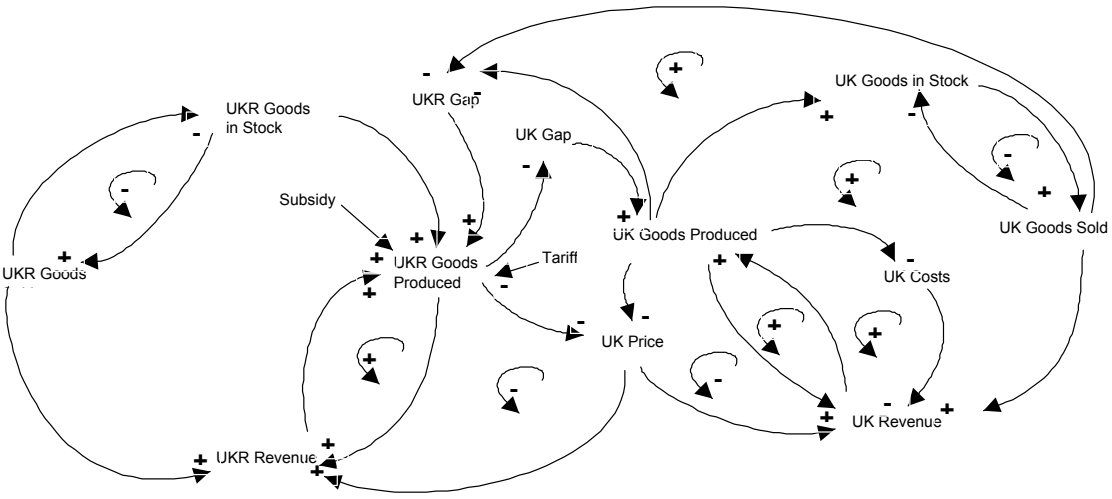

Figure 2 - Duopoly and Subsidies

The students are encouraged to work through these feedback loops and do some long-term loop analysis. They are then introduced to a model based on these causal relationships which deals with the importing and exporting of coal. (Coal is a major industry in the Donbass region) In the following extracts of students work, DC stands for Donbass Coal and BC stands for British Coal. The model is shown in figure three

Some of the student output from the model is shown in Table1. It can be seen that DC increases its market share at the expense of BC which is decreasing.. The UK price has now dropped. This model assumes that BC will respond to the increase in DC imports

instantaneously and, according to an established ‘economic law, take half the available market.

Table 1 shows the effects of BC delaying its response to the entrant. The first row corresponds to BC ignoring the entrant completely and continuing to produce at the monopoly rate. Because the increase in D sales, the price reduces and so although BC can keep its production rate (and thus avoid redundancies) its profits fall by almost 50%. According to the Cournot model, it should decide on market share alone

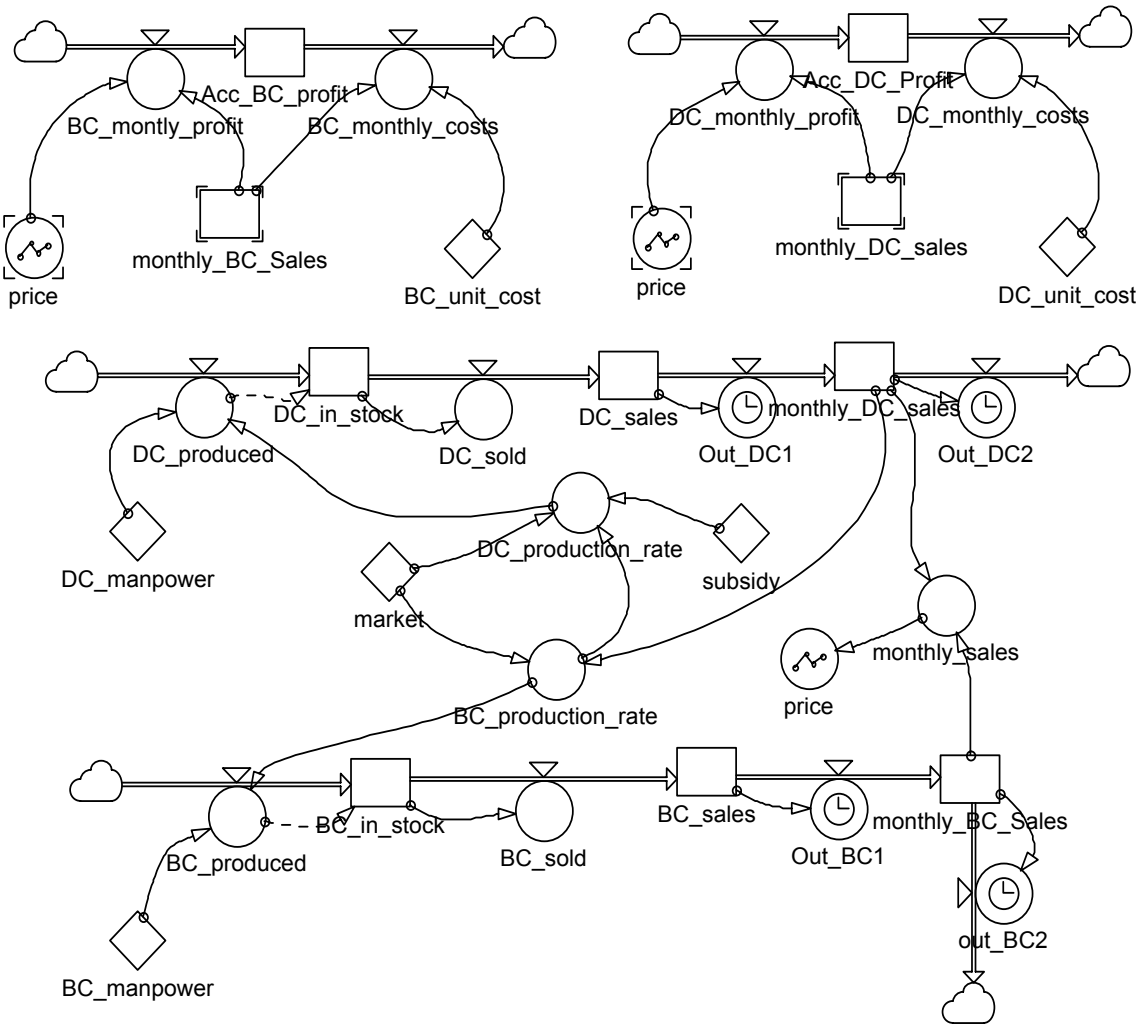

Figure 3 - System Dynamics Model

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If both countries play a subsidy game for their coal industries, then BC and DC find themselves playing a four player subsidy game. In this game, the two governments move first and simultaneously decide subsidy rates for export production. The duopolists then observe the subsidy rates granted by both governments and play a Cournot game in each market

Subsidy	Delay in BC-Response	BC Sales	DC Sales	Price	BC Profit	DC Profit
0	0	240	0	3	8640	0
0	0	160	160	2	3840	3840
20	0	137	206	1.71	2811	4227
20	12	146	200	1.67	2925	4008
20	26	168	187	1.56	3144	3149
20	52	240	144	1.2	3456	2073

Table 1 - Delays in responding to subsidy

The power of the Systems Dynamics methodology and the clear counterintuitive insights revealed is evident in the analysis presented in tables 1 and 2 If both duopolists delay their "best " response to either the subsidy or the tariff, the strong elements of conflict and potential instability are clear. Thus both BC and DC have a vested interest in lobbying their respective governments for a return to free trade with no subsidies and tariffs. However, if this was accomplished, stable free trade could be compromised by either party using hidden tariffs or subsidies. If this happened, both BC and DC could be once again on the horns of a Prisoners Dilemma as both duopolists have dominant strategies to increase output in all markets. Prices would drop drastically until capacity constraints in both countries were reached. At this point, both producers would want to cut production down to 160 units. Price would then return to maximum profit levels. Once again, at this point, a whole new round of output expansion could arise causing market prices to permanently fluctuate. This is Edgeworth instability. This instability reduces with quick response times and increases with slower response times. The System Dynamics methodology shows that even in the context of the inherently stable Cournot model, permanent oscillations in prices and outputs can occur in dynamic games. Hence the zero-sum nature of the Cournot game becomes the variable sum game of the Prisoners Dilemma. Stability can only come from a W.T.O. brokered peace.

The student is at liberty to run simulations varying the tariffs and subsidies. It is hoped that he will discover the counterintuitive (for me) result that it is better for both countries to eventually abolish both subsidies and tariffs.

Another example (which also involves the new pedagogics) is an example that is used in the module called Labour Markets. Figure 4 shows a newspaper article entitled Migration Myths. The students are asked first to think about this and to discuss it

They are then asked to capture their thoughts on this subject by constructing their own causal loop models. A typical example is shown in Figure 5. The students are then asked to repeat the debate now armed with a deeper understanding of what is happening. The System Dynamics model for this is presently under construction.

In the module Industrial Economics it is useful to examine the structure of a firm and how it is organised. The students can now use the Viable System Model of Stafford Beer (see figure 6) Mapping existing Ukrainian companies onto this model enables the students to see the how to reorganise their industries. Beer's model allows for flexible, autonomous units to exist within an ordered structure where the correct information is available to the correct people at the correct time

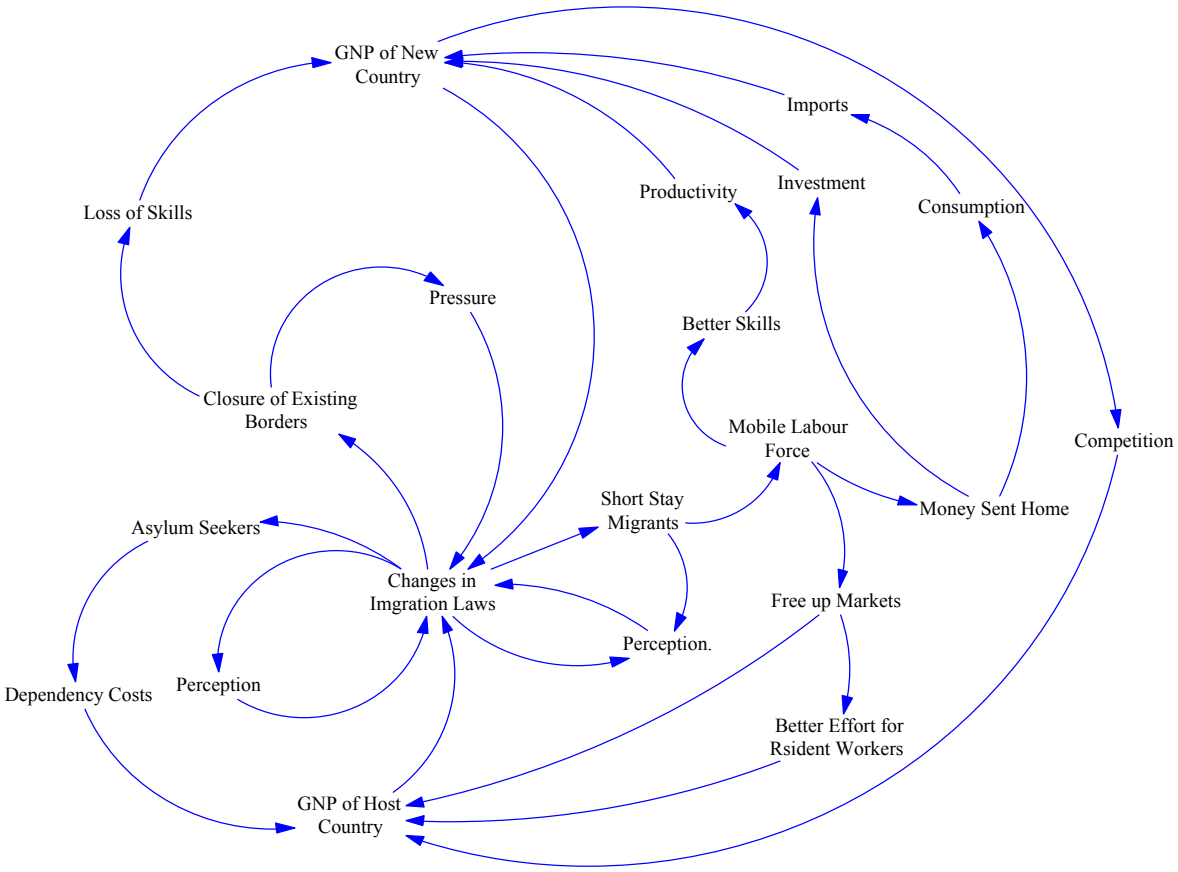

Figure 5 - Migration Causal Diagram

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MIGRATION MYTHS

The European Union has agreed that 10 new members will be admitted in 2004, final negotiations for which take place at a summit in Copenhagen this week. This will entitle them to the four freedoms of open access enshrined in the treaties: for goods, services, capital and labour. Well, not quite.

Allowing open labour markets has, for some member states, been a step too far. Lengthy transition periods have been imposed on movement from countries such as Poland, Hungary and the Czech Republic into their nearest neighbours, Germany and Austria. But is the fear of allowing complete transition immediately justified, and does it perhaps ignore the real problem in the future.

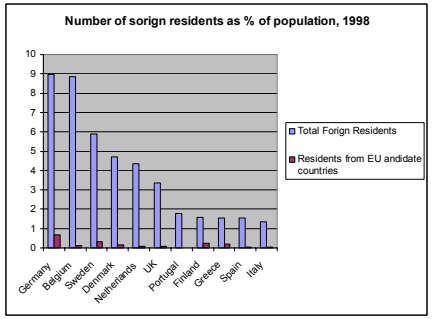
There are two myths that need to be dispelled. The first is that there is a wave of potential migrants waiting to flood into western European labour markets, displacing local labour, increasing unemployment and depressing wages. Certainly, it is true that after 40 years of travel restrictions, migration into the EU from the east boomed in the early 1990s. Although this did include big increases, from Poland in particular, the major sources were further away, namely the former Yugoslavia and the former Soviet Union. Most of this movement turned out to be not permanent migration, but a reflection of a new trend towards planned short stays.

Such movements - usually for a few weeks or up to a year, often repeated at regular intervals_- were reinforced by immigration controls that allowed for seasonal or contract migration, but not for permanent settlement. By the mid-1990s, both gross and net migration flows into Germany had returned to their long term historical levels.

Flows at this level are likely to have an insignificant impact on the numbers of resident migrants in the countries. The bar chart shows that even in Germany, which has the highest proportion of foreign residents in the EU at nearly 9% of the population, migrants from the candidate countries accounted for less than 1% of the resident population. For the UK the situation is different: the proportion of the resident population from the candidate countries is less than 0.1%, but even the total foreign resident population accounts for under 3.4%. This is separate from the UK's problem with asylum seekers from outside the candidate countries, but it is an issue where e UK has an interest in ensuring that EU concepts of free mobility are accepted to all.

The people who make these moves are typically young, male, better-educated workers from urban areas. On moving, they often have to accept jobs below their skill levels. The evidence shows that the availability of a more mobile labour force in the EU may serve to help in freeing tip inflexible labour markets. The major impact is, therefore, not a simple increase in labour supply which contributes to unemployment and lowers wages, but rather one which can help indigenous workers to move to better jobs.

The second myth is that, even if labour mobility can be shown to be good for the receiving regions, it must be bad for the home region. The drain of young, educated more dynamic workers must make the transition to sustainable development more difficult, and ensures a cycle of continuing dependency. However mobile workers send money back to heir families at home. Evidence suggests that Polish workers in Germany send as much as 80% of their net earnings. Of course, if this is all spent on consumption -the traditional view - then all that happens is that imports rise and there is no increase in productivity, the important constituent of a real transition. Recent 1 research, however, suggests that in a sample of central and eastern European countries the greater impact is actually on investment. Surveys of migrants suggest that a strong motivation for moving is to acquire enough capital to set up small businesses. Another argument is that if migrants move for a relatively short period, in which they acquire new skills or experience modern working practices - even if working in low-skill occupations – on their return they contribute to the much-needed increase in productivity. This effect is confirmed in recent research. Thus, the type of relatively short-term migration we observe has a strong positive impact on the home region, as well as on the receiving region.



Eurostat, OECD

So if enhanced mobility presents su.ch a win-win situation, why do some countries find it so difficult to accept? There are two dark forces here, one inside and one outside-l. Inside the EU, with recession and sluggish labour markets, it is difficult to make the argument that allowing more people will make things better, even where the evidence suggests hat the injection of dynamism will do just that. Mischief can easily be made with misleading projections of likely flows of migrants rather than their ultimate level in the overall population.

The second problem lies in the potentially much larger source of migrants who will remain outside the EU` after enlargement. Most of the accession countries - such as Poland with Ukraine - have relatively open borders, which will have to be closed on entering the EU. This curbing of traditional flows across often artificial post-1945 borders may be the real problem area, and one in which the new members will need understanding and support, not isolation.

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By Roger Vickerman, is a Jean Monnet professor of European economics at the University of Kent

Figure 4 – Newspaper Article

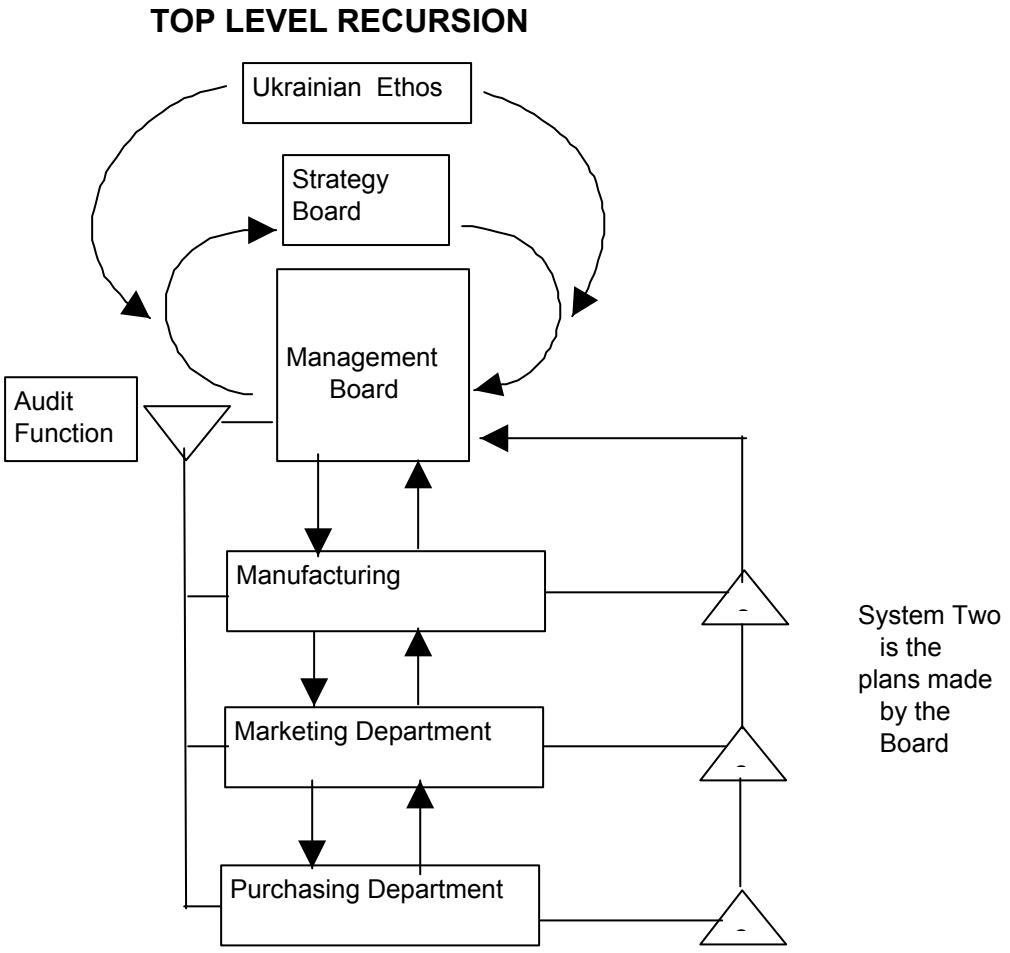

Figure 6 – VSM for use in Industrial Economics Course

A fourth Module studies the economic impact of new technologies. This module uses system dynamics models and also the ideas of non-linear dynamics. The new technologies can lead to disaster (if not properly controlled) or can lead to a boom and bust situation, They can also help the economy evolve into a new economic structure. All these ideas are captured in the Economic Dynamics module.

Other modules are Environmental and Agricultural Economics. They are many System Dynamic models that exist and can be used in both these courses. There is also a course on Supply Chain Dynamics which rests heavily on the Discrete Simulation Course and the final course is called Financial Markets. This incorporates some of the non-linear dynamics course and a little piece of Fractal Theory.

6. Lessons Learned

There have been many problems encountered – political, social and pedagogic. To deal with the pedagogic problems, a major difficulty is that , in general, economic staff members are not accustomed to systems thinking. They find the ideas strange

and they are not capable of say building System Dynamic models. This is perfectly understandable – there is no reason why they should have these skills. The obvious solution is a retraining programme but this depends on convincing the staff members that the retraining is necessary. Having done so, the programme has to be fitted into a probably already overfull timetable and will take an appreciable amount of time. None of these options were available to me in the present project. The solution was to create interdisciplinary teams. In general, the staff involved with the foundation stage (i.e. the toolkit) were not economists. They had learnt their systems skills on a previous project and were ready and capable of designing courses in what was required. Once their modules were completed they were then designated as helpers in the Applications stage. When the lecturer, say in Globalisation, needed the subsidy model, the outline was discussed with the System Dynamicist and he built this model. The Globalisation lecturer knew enough to run this model and observe the output and so after a few iterations the model was in the present state. This is an ideal solution but involves people from different departments working together. Such an interdisciplinary approach needs strong support from the University hierarchy if it is to succeed.

There is a need to convince economic staff that this is a valid approach. It is difficult to change long-standing habits. This is a long process for hearts and minds and again depends on strong leadership. Another problem is how much the assessment procedure for the application courses should reflect the students economic knowledge or systems knowledge. We have our own views here but it is the views of the lecturers that are important

The final problem to be discussed here is the method of assessment. We have tried to make the distinction very clear between a Case Study and a Mini-Project. For us, a case study could be the one for subsidies described earlier. The student would be given lots of valid data, the model and be allowed to play and experiment. Students are allowed to make mistakes at this stage. The Case Study is used simply as an illustration. In today's education, students are very rarely allowed to experiment and given the freedom to make mistakes without being marked down. Making mistakes is the best way to learn anything but we never allow them to do so!!! A mini-project is similar to this but the students are marked on what they do.

The degree is being taught at present for the first time at Donetsk National University and the Application Stage has just began. Only feedback on the foundation stage is therefore available. This contains obvious questions such as 'why are we doing this?' but this cannot be answered till they see the usefulness later in the course. Generally though, the feedback is positive. The students seem to like the freer pedagogic approach and enjoy using the simulation packages.

7. Conclusion

It can be seen that System Thinking ideas and especially those of System Dynamics play a major role in this degree. Many papers are being published that confirm that economics teaching needs a new approach. In most of them, some form of systems thinking is included. Our experiment with the three Ukrainian universities has been a very intellectually rewarding experience and I would like to formally recognise the

help that Tacis Tempus has given and thank them for the opportunities that they have given us.

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Appensdix A
Original Suggestions for the Masters

Profound Humanity Preparation		810	13
Advanced Fundamental Preparation		405	7.5
Advanced Professional Preparation		324	6
Fundamental Courses		486	9
Application Courses		648	12
Project		1242	23
Total		**3915**	**72.5**
Profound Humanity Preparation		**810**	**13**
1.1 Actual Problems of Philosophy		54	1.0
1.2 Foreign Professional Language		216	4.0
1.3 Highest School Pedagogic		81	1.5
1.4 International Law		81	1.5
1.5 Second Foreign Language		324	4.0
1.6 Economic Sociology OR Economic Psychology OR National Particularities of Business OR History of Classical Universities OR History of Economic Ideas in Ukraine OR Contract Law OR Labour Law		54	1.0
Advanced Fundamental Preparation		**405**	**7.5**
2.1 Actual Problems of Theory of Economics		54	1.0*
2.2 Actual Problems of Finance		54	1.0*
2.3 Modern Theories of Organisation and Management		81	1.5*
2.4 Methodology of Scientific Research		81	1.5
2.5 Economic Disciplines Teaching Methodology		81	1.5
2.8 Institutional and Evolution Economy OR Economic Systems Transformation OR Globalisation and Economic Policy		54	1.0*
Advanced Professional Preparation		**324**	**6.0**
3.1 Human Resource Management		81	1.5
3.2 Financial Management		81	1.5**
3.3 Innovation Management		81	1.5**
3.4 Strategic Planning and Management		81	1.5
Fundamental Courses are:		**486**	**9.0**
2.6 Applied Economics		81	1.5
2.7 Economic Modelling		108	2.0
3.5 Economic Cybernetics		81	1.5
3.6 Economic Dynamics		81	1.5
3.7 Time Series		81	1.5
3.12.1 Discrete Simulation		54	1.0
Application Modules		**648**	**12**
2.9.2 Ecology and Economic Policy		81	1.5
3.5 Industrial Economics	81	1.5	
3.8 Agricultural Economics		81	1.5
3.9.2 New Technologies		81	1.5
3.10.1 International Economics		81	1.5
3.10.2 Finance markets		81	1.5
3.13.1 Supply Chain Dynamics		81	1.5
3.13.2 1Labour Markets and Employment		81	1.5

Appendix B
Eventual Agreed Design of the Masters Degree

Humanities

Actual Problems in Philosophy	54 hous
Methodology of Scientific Research	54 hous
High School Pedagogics	81 hous
Foreign Business Language	156 hous
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	345 hous

Fundamentals

Economic Cybernetics	81 hous
Economic Dynamics	81 hous
Economic Modelling	81 hous
Applied Econometrics	81 hous
Time Series	81 hous
Discrete Simulation	81 hous
	486 hours

Applications

World Economy and Globalisation	81 hous
Financial Markets	81 hous
Industrial Economics	81 hous
Labour Markets	81 hous
Agricultural Economics	81 hous
Environmental Economics	81 hous
Impact of New Technologies	81 hous
Supply Chain Dynamics	81 hous
	648 hous

Total Hours 1479 hours

Semester One		**Semester Two**	
All Fundamentals	486	Applications	648
Philosophy	54	Pedagogy	81
Methodology	54	Language	78
Language	78	Practice	306
Practice	324		
Total	**996**	**Total**	**1113**

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