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Managing a Societies Knowledge Base A Look At Opportunity Costs

As explained in the paper namely, “Measuring a Societies Knowledge base”, it is not difficult to measure the knowledge base of a society, though it would be very laborious and time consuming. Knowledge is simply all the laws of existence a society knows plus all the products that a society creates. Each law that a society knows was given the symbol of point X and each product that a society made was given the symbol point U. Point U being a derivative of the laws of existence that we know. Every product in existence represents a point U, and every product is a derivation of what we understand about the laws of existence. We make spoons out of steel, wood, or plastic rather than cotton, paper, or mercury because of the properties that human beings understand the different materials. From the most simple point U to the most complex, all are derivatives of laws of existence that humans understand. From a simple point U like a tooth pick made of thorns to the most complex such as a nuclear powered submarine, all are derived from what human beings understand about the materials.

Today countries are getting into supporting knowledge in an ever increasing number. The American government has always supported the space industry as well as many other research from agriculture, to alternative energy. The UK government recently announced a 100 million pound investment into supporting new research, <http://news.bbc.co.uk/2/hi/technology/7085131.stm>. This takes place all over the world, the Japanese are well known for supporting their industries throughout the 70's and 80's.

With ever more emphasis on knowledge and recognition that knowledge is the primary resource there are moves to ever more be involved directly in managing the knowledge process and creating laws that support knowledge creation.

However there is usually not enough resources to support all industries, the government in most instances must choose whom to support. The governments must choose which point U to support given the choice of many point U's to support. The decision process of what knowledge to support, the government must consider or at the least understand the opportunity cost of such interferences within the economy. This is not an ideological paper, in many instances to keep ahead the government must interfere, especially when it comes to knowledge, research must be financed or aided by government or the industry might never ever rise. A simple definition of opportunity cost is the cost of the next best opportunity.

Having gone through the decision process of what industry to support the government is left with two options, point U_1 and point U_2 . Which point should the government give support to. We can say point U_1 is microchip industry and point U_2 is making MP3 players. However it could be any two industries, it could be the opportunity cost between supporting solar power and research into more fuel efficient automobiles, or opportunity cost between supporting wind power technology and supporting a ship building industry, any point U's, we say point U_i 's in order to simplify the variables. The opportunity cost of any decision needs to be weighed out and calculated. It is the duty of those who have decided to involve themselves in the planning process to calculate the opportunity cost so that they understand the impact of their decisions on other possible scenarios.

Take Table 1, showing five different products represented by $U_1 - U_5$, and the seven known laws that go into the products, these laws being $X_1 - X_7$. This is simplification for our easy understanding, the seven laws are derived and create the products, many products have many laws that go into them. Look at a car, our understanding of copper, electricity, steel, rubber, radio, leather, and much more all go into creating a car.

However to make our understanding clear in this world we are describing, there are only seven laws of existence and only 5 products. The society we are describing is in competition with other societies on the planet and has decided to manage knowledge so that it can gain an advantage in a sector. It has gone through the decision making process and is left between two choices according to its planners. The two best choices according to the decision making process are either U_3 or U_4 . The society must choose between the two, which one should it support. As U_3 and U_4 are believed by the society to be the two best choices but

there are only resources to support one, what ever the decision that is made, the alternative represents the opportunity cost.

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	ΣX
U_1	●				●		●	3
U_2		●	●		●	●		4
U_3			●	●				2
U_4				●	●			2
U_5		●	●	●	●	●		5
ΣU	1	2	3	3	4	2	1	

Table 1

Table 1 shows a simple table showing what laws go into a product, remembering that each U represents a different product and each X represents a different law of existence. It must be understood that both the product and the laws of the material represent knowledge. Laws of the material being theoretical understanding the properties of the material, and the product represents a use of that theoretical knowledge to create a product, like a television, a car, shoes, sandals, spoon, space shuttle.

The society decides to give its backing to the product U_3 rather than U_4 , what then are the opportunity costs of such a decision. Knowledge is and will always be the primary resource, all other materials become commodities and therefore resources because of knowledge. Knowledge is not ambiguous, if it were ambiguous engineers would not be able to build bridges, computer programs would not be written, in fact if it were ambiguous nothing could be possible because we would be sure of nothing, if knowledge included the false we would be creating nonexistence, an impossibility.

The society having chosen U_3 over U_4 the obvious opportunity cost is the knowledge differences between U_3 and U_4 . This opportunity cost can be clearly seen from glancing at table 1. Having chosen U_3 over U_4 , the obvious opportunity cost is X_5 , U_3 does not include the need to know X_5 , this law applies to U_4 , though both U_3 and U_4 include X_4 . One could stop at this point because all else stems from the fact that the opportunity cost is X_5 .

That the opportunity cost is X_5 though entails a lot. Take the education process. People go and get educated on the most part to enter successful industries. With government backing U_3 has more of a chance of success than U_4 . Those who want to be in U_4 will obviously be the more passionate driven people because that industry or products manufacturing process is not backed up by the government. Not having government support does not make it illegal to be involved with U_4 .

Returning to the question of opportunity cost, as people want to enter successful industries the education process will be greatly affected. More people will therefore study the knowledge that is associated with the supported industry/ product than otherwise would without the assistance from the government. Hence in the 1980's in Japan the supply of electronics engineers blossomed because of obvious government support for these industries. The government of the USA provided the structure for the internet and by 2000 there was an entire shift of talent directed towards the internet, talent brought to good use because the internet is now key for communications and knowledge transfer. Would the big computer companies of the 80's have conceived such a venture as the internet, would they have taken such a risk? There are serious implications for the education sector as some courses will find an increase in demand and others a decrease in demand. Many who would have wanted to understand knowledge associated with U_4 now would rather study knowledge associated with U_3 because of chances of long term employment.

Research patterns will change will change. A 100 million dollar grant to facilitate research into U_3 will naturally encourage research into that area rather than other areas. The same people might have researched U_4 or worse been unemployed because their talents would not have suited them to research into U_4 and other people would have had the opportunity, hence opportunity cost.

There are financial opportunity costs. These opportunity costs represent the sales that would have accrued from U_4 should it have had the support. Nobody knows the future, when a government decides to support an industry it really does not know future sales, it would do this in the assumption that U_3 has potentially greater benefits than U_4 . Note that we talk of sales not profit or net present value, NPV. The reason is that sales represent work done, products are created to be sold, profits are a function of sales.

Discussing finances, one must consider the financial resources that would have gone into the industry/product, that has no government support. Financiers are interested in receiving their money back if they invest in any venture, obviously U_4 becomes more attractive with government assistance.

Take a practical example that has been in the media of late, the environment. When the American President George Bush announced in 2005 that hydrogen is the wave of the future and extended a US\$1.2 billion funding for hydrogen research, the opportunity costs of a future hydrogen economy is the next best thing. Scientists, hopefully made a full study and economists set down with the government and decided the best way forward. US\$1.2 billion can not be spent at a whim, they must have looked at the other alternative energy sources and decided that the best way is hydrogen. Hopefully hydrogen was compared with the next best choice, maybe that was solar power. The government of America had to decide if they would spend that US\$1.2 billion in research funding either in financing solar power research as a theoretical best choice or hydrogen research. The skills and knowledge that would have been created in solar power research is essentially the opportunity cost.

What if people go ahead anyway and produce U_4 without government support, true there is for example a US\$1.2 billion research grant for the support of the hydrogen economy, people will continue to produce and research into solar power though it will be relegated in terms of alternative energy to a lower status than hydrogen but it will not die as an industry.

In our example, though the government is supporting U_3 people will continue in a free market scenario, in a scenario where people are not barred from undertaking ventures, then those passionate few will continue with been involved with U_4 . The opportunity costs will be best understood by looking at a production possibility frontier. This can be seen in figure 1.

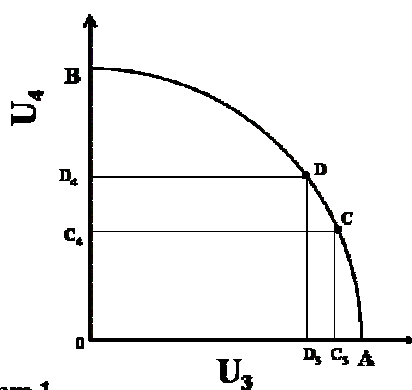


Figure 1

Figure 1 illustrates a production possibility frontier between U_4 and U_3 . If society only produced U_3 they would produce A amount and if they produced only U_4 they would produce B amount. If there was no government support for any industry society would produce D_3 amount of U_3 and D_4 amount of U_4 . With government support for U_3 , as expected U_3 would increase and U_4 would decrease. U_3 increases to C_3 and U_4 decreases to C_4 , where clearly as can be seen from figure 1, $C_4 < D_4$ and $C_3 > D_3$. The opportunity cost for the government support is represented by D_4 less C_4 . The opportunity cost can now be more effectively

understood, the opportunity cost are all the opportunities lost due to reducing U_4 from D_4 to C_4 , all the workers, the sales, the financing that is represented by that difference.

The total opportunity cost is much more than C_4 less D_4 as represented in figure 1 above. There is a concept known as the multiplier effect. Calculating or at the least estimating the multiplier effect will give a true picture of the total opportunity cost. The multiplier effect is simply the downstream effects of an economic action. Supporting U_3 over U_4 the multiplier effect will be all the down stream effects, the people who work in producing the materials the parts for the creation of U_4 . All this knowledge and sales are the total opportunity cost.

Direct support usually means some sort of subsidy or tax break. There is a fundamental difference between the two. Subsidies as is well known reduce the cost of production whilst tax breaks do not. Tax breaks merely say that a venture will keep more of its profits but the costs remain the same. Though increasing the NPV, tax breaks have less distortion on the market than subsidies.

Subsidies significantly increase the opportunity costs because companies that previously could not afford to enter the industries can now enter because they could not do so before the subsidies because the costs were too prohibitive before the subsidy.

An analysis of subsidies must also include what other services the government could have done in order to subsidize U_3 .

Though reducing costs, subsidies increase the production possibility frontier, this is illustrated in figure 2.

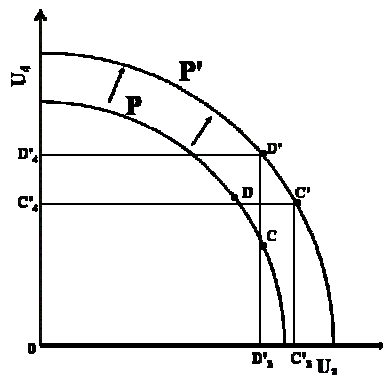


Figure 2

Figure 2 illustrates the increase in the production possibility frontier after subsidies. The production possibility frontier increases from $P - P'$. The subsidy has the effect of the opportunity cost been D_4 to C_4 .

To conclude, the opportunity costs need to be always calculated in order for the government to understand the impact of its decisions as well as to have such reports available to the public and to students of government policy. Supporting knowledge policy has a significant effect on the total society and those affects need to be understood. Society needs to be understood what will be gained and what will be lost. The opportunity cost is more than just the knowledge that will not be utilized by supporting one industry over another, it includes all the down stream knowledge that will not be utilized as well as all the upstream knowledge that is in many cases still unknown.

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