International Journal of Emerging Technology and Advanced Engineering
Website: www.ijetae.com (ISSN 2250-2459, Volume 2, Issue 11, November 2012)

The Salient Points of Adam Smith, David Ricardo, and Stuart Mill's Theories and Software Engineering

Hasan Asil[1], Amir Asil[2], Atefeh Asil[3]

[1]*Islamic Azad University, Azarshahr Branch & h.asil@iauazar.ac.ir*
[2]*University of Tabriz & asil@asd.ir*
[3] *Islamic Azad University, Azarshahr Branch & at.asil@asd.ir*

***Abstract*— In the world, many various economic theories have been proposed during different eras of history. Nowadays the expansion of science and technology can be clearly and abundantly traced in the markets. In the passing of time new theories should be put forward under the influence of innovation and technology.**

***Keywords*— Salient Points of Adam Smith, Software Engineering, Stuart Mill's Theories, Economy.**

I. Introduction

Economics, which is a fledgling science compared to others, entered the world of academic subjects as a systematic science after the publication of "Nations' Wealth" by Adam Smith. Adam Smith, the founder and father of this science, believes in free marketing and freedom in economy and creating security and public education with little limitations for government. Ricardo can be regarded the greatest scientist in economics and, because of the clashes his school caused, even more prominent that the father of economics. Stewart Mill, the renowned British thinker of the nineteenth century, was not only a talented writer in logic, epistemology, morality, and economics, but also an active person in the realm of politics. This paper is divided into three individual parts and each part deals with these researchers' and scientists' viewpoints. Finally, we have put forward our attitudes about them and we hope that economics would find its place in the world as an incipient science.

II. Salient Points of Adam Smith's Theories

Smith's viewpoints have a psychological basis called "individual profit." For him, the main driving force for economic activities is "individual profit." A summary of his viewpoints about different aspects of economics is as follows [3]:

Production Theory

For the first time, he focused on and talked of workforce and considered it as one of the most important resources in economy. This movement caused other scientists to care more about workforce. Smith wanted to show the importance of workforce compared to natural forces as the most important driving force for production

In discussions of software engineering, four factors in software project management are people, product, methodology, and project; and people are the most crucial factor. This is fully in accordance with the theory and without cooperation and organization the project will never be completed. But I think in addition to place, money, and workforce, there are other factors such as technology and innovation that play a vital role in this process. Also, innovation and creativity depend on people.

Sharing Workload

Smith believes that workforce will be effective in the production process only if workload sharing happens. That is, in order to buy merchandise, each person shoulders a part of the responsibility. Sharing workload increases the staff's efficiency and expertise. In addition, the more the machinery, the less the difficulty and time consummation [2].

As mentioned earlier, people play a vital role in development of a project, especially a software project. But if a project is not pre-planned (in terms of scheduling, cost, responsibilities, etc.), it will be a total failure.

Productive and Non-productive Workforce:

Smith talks of this only in the scope of merchandise and not in the scope of servicing. In his book, he thinks that craftsmen and businessmen are less productive than farmers. In fact, he was unable to understand the real value of servicing; whereas today's economy divides production into two mere groups of merchandise and servicing [3].

International Journal of Emerging Technology and Advanced Engineering
Website: www.ijetae.com (ISSN 2250-2459, Volume 2, Issue 11, November 2012)

In software engineering if servicing is not provided, especially after selling and delivery of the project (support), the project will be a total failure and cause problems.

Exchange Value Theory

Smith believes that exchange value is a result of two factors: scarcity and labor. Naturally, goods with a high usage value are often low in value or even without any value. On the other hand, goods with a high exchange value have almost no usage value; for example, compare water and diamond [4].

Labor is the other factor which brings exchange value for goods. Smith believes that the real natural price or real value of a good, for anyone who want to have it, is paramount to the inconvenience endured by the producer. If a producer wants to exchange his or her good for another, the price of the good must be the amount of labor spent to make it. Therefore, labor is the benchmark for exchanging all the goods.

In discussions of product value within the scope of software engineering, in addition to production cost and the labor endured to make a good, other factors like software quality, reliability, accessibility, number of users, software complexity, etc., must be taken into consideration. Let's have another example. For instance, in China a product is made with two different qualities: first class and second class. But what is it that makes their prices so different? Do other factors like usage have no influence on the price?

Wealth Distribution Theory

Adam Smith considers three important factors in wealth distribution:

- Wages: Wage rates in majority of the cases are gained through balancing supply and demand.
- Profit: When someone has resources more than necessary for making a living, he or she tries to use their resources to earn money. However, Smith does not differentiate between interest and profit and he refers to interest as the gain including profit and investment risk.
- Land rent: He believes that land rent is the landowner's share from domestic product.

Wages in software engineering are not based on supply and demand but expertise, just like some other fields of working.

Economic Growth and Development Theory

The first growth theory in classic school has been proposed by Smith. The following are discussed within this theory:

- Production is subordinate to and conditioned by production factors.
- Investment is subordinate to and conditioned by profit.
- Accumulation of resources brings about technical progression.
- Profit depends solely on workforce availability and proficiency level.
- The number of effective workers depends on their wages (employer's share from domestic income).
- Wages depend on the volume of investment.

Smith finds economic growth in capitalism. For him, capitalism not only leads production resources toward the best purposes but also causes economic growth and development [2].

I think in software engineering when supply and demand reach a normal level, profit depends on capitalism and high rates of investment increase the project profits and work against this theory. This is usually the case in many of the developing countries.

The Invisible Hand

Smith believes that in market economy market adjusts the supply and demand indirectly and not intensively and in full competition adjusts the market automatically. In this system, demand produces supply (i.e. an invisible hand pulls the demander toward the product) and no direct demand is made for a product. In this theory, if producers sell the products with a price higher than the market's, they will make other producers produce the same good. As a result, the good will become abundant and the price will be reduced (invisible hand's pressure to reduce the price). The invisible hand will cause expertise in production, price adjustment by the market, and amendment in non-economic behaviors of society. This is a reason why government should not get involved in free economic system [3].

I think this (invisible hand) can be true for some of the software projects. But when a huge project takes a long time to finish (three years, for example), if a producer starts the project, the software will either lose its value or new demands have already improved the earlier version of the software. So, this cannot be done without innovation, especially in the case of special orders by customers.

International Journal of Emerging Technology and Advanced Engineering
Website: www.ijetae.com (ISSN 2250-2459, Volume 2, Issue 11, November 2012)

Government's Role

Considering the fact that supporting domestic industries creates monopoly, Smith believed that government involvement would create monopoly and, as a result, would cause prices to soar. And this, in turn, would decrease welfare of people [5]. This theory was degraded after the Great Depression and Keene's government involvement theory approved of the idea of government's support in crisis times.

I think this theory is completely true for software projects.

Foreign Trade

In his book, "Nations' Wealth", Smith says that in foreign trade both countries benefit. Smith's theory of foreign trade is based on the international workload sharing. In this theory, the benefit for each of the two countries is that they will buy the goods cheaply and export a good the cost of which is less than the world market price. However, Smith does not think that storing up gold and silver can guarantee economic development [6].

I think this is true for hardware business but not software unless all the standards and conventions are abided by.

III. Salient Points of David Ricardo's Theories

Next to Adam Smith, Ricardo can be considered the greatest scientist in economics and, because of the clashes his school caused, even more prominent that the father of economics. He is basically one of the first economists that seriously proposed the function of economic patterns [7]. He was also one of the prominent leaders in offering the theory of labor value and in introducing the policy of free trade and relative profit. He believed that using machinery is the cause of unemployment [9].

Relative Profit Theory

For Ricardo, value is determined only based on the amount of labor spent on a product which is not visible. He puts aside two other factors, resources and land, which were important in Smith's theory. Ricardo proposes the theory of labor value in a relative sense. For one thing, the amount of labor spent on a specific product varies greatly because producers spent time and cost differently on the same product. For another, a product is not necessarily exchanged because of its value but because supply and demand influence the trading.

The other factor which could be of importance is the effect of new technologies on production. Also, in software engineering, methodologies and workforce experience can have positive effects on the progression of a product.

Balance Theory

Ricardo believes that, basically, economy always has a penchant for balance. He mentions three factors that can disrupt the economy and balance. These factors are as follows:

Accumulating resources: By accumulating resources there will be a superfluity of a product. With this superfluity there will be no demand in the market.

Employer's miscalculation: Employer may make a mistake in production planning by miscalculating the probable demand for the product.

External factors: Political issues like war and tax-paying or customs rules and natural disasters like drought can impede the natural process of economy [8].

Wealth Distribution Theory

In Ricardo's economic society, there are three classes:

- Capitalists: People who invest money and receive interest in return and accumulate wealth by this interest.
- Laborers: People who constitute the largest class and since they are not employers, they have to make a living by a salary called "wages."
- Landowners: People who offer their land for farming, receive interest from farmers, and gradually become rich.

Aren't there people in today's society who are producers because of their expertise and use technology for production? Do they receive wages like laborers? I think these people are like a group between capitalists and laborers.

Ricardo then goes on to analyze three other theories to clarify his point [9]:

- Owner's Profit Theory
- Wages Theory (Wages Fluctuation Theory)
- Interest Theory

International Journal of Emerging Technology and Advanced Engineering
Website: www.ijetae.com (ISSN 2250-2459, Volume 2, Issue 11, November 2012)

IV. Salient Points of Mill's Theories

Stuart Mill is a member of classic economists whose thoughts flourished during the prosperous days of stabilizing and putting capitalism into practice. He is a multi-faceted scientist who has proposed theories in logic, philosophy, economy, politics, etc.Some of his theories are:

A. Wealth Distribution:

Here Mill believes rules and conditions for becoming wealthy are absolute, unchangeable rules which cannot be modified to one's benefit. But wealth distribution is way too different because distribution rules are results of decisions made by people in particular organizations. Humans, whether individually or socially, can change the wealth distribution rules as they wish. Defining and distinguishing these rules for Mill is the most important contribution he has made to the science of economics. In his opinion, economic rules are of two kinds: the first kind is related to production in which rules are absolute and cannot be changed like natural rules. The second kind is related to distribution in which rules are relative and can be changed upon any change in the social organizations [14].

A good example for this theory in the scope of software engineering is the use of experts for software production and domestication of distribution software which is related to customer.

B. Limiting Inheritance:

Mill believes that any individual since their birth must nurture themselves independently so as to be able to compete with others. As a result, inheriting anything is detrimental to the personality of people because this may stop people from doing their best to achieve their goals and competing in society. Therefore, Mill suggests that by imposing some limitations on legacy (like increasing the tax on legacy) we can prevent wealth centralization.

But isn't this going to damage the rights of a breadwinner who has worked hard for his or her family? In addition, if nowadays someone comes into money and is sensible enough, they can keep or even increase their wealth, otherwise they will lose all the money in today's market.

C. The Problem of Wages

Mill believes that since capitalists do not live on wages, they'd better not purchase luxurious stuff and start new investments instead. By doing this, unemployment rate will fall, the wages will increase, and the workers' working living conditions will improve.

This would increase the wages but according to Ricardo by increasing the wages the investor's profit will decrease. This is not palatable for the investor, so he or she will never do it.

D. Exchange Value Theory

He clarifies this theory by dividing the products into three groups:

Products with a fixed demand rate.

Products which can be produced unlimitedly if the costs are stable. These products are mainly industrial. Mill doesn't think that efficiency dropping rule is true for these products.

Products that can be produced more even if the costs are not stable. These products are mainly agricultural and efficiency dropping rule is true for them. Therefore, he depicts these products with an ascending angle in relation to price.

E. Trading and Reciprocal Demand:

Mill believes that a fair and real exchange, in addition to costs, depends also on the demand pattern of the two countries (relative power). So, Mill is the first economist who addresses the issue of exchange value variation in demands. According to Mill's "Reciprocal Demand Theory", the real international exchange value depends on the relative demand power of the two countries. Mill says: "When two countries have commercial relationships and exchange two products, the exchange value or the price of these products depends on their demand power." [14]

F. Individual Freedom Theory

By considering individual profit, he believes that the conflicts among individual resources are superficial and behind all these disharmonies there is unity. So, free competition is the best way to achieve individual and social profit.

G. Asset:

By asset he means "money saved in the past which has now been dedicated to a wealth-producing enterprise." So, savings, when devoted to production, is considered an asset. Using or not using one's savings for production is the main reason for success.

- Justice**:**

Mill argues that since birth people must be treated equally and must have access to natural resources and any individual that gains something must use that gain to nurture his or her personality. [15]

V. CONCLUSION

In the world, many various economic theories have been proposed during different eras of history. Nowadays the expansion of science and technology can be clearly and abundantly traced in the markets. I think some theories should either be updated as the time passes or be eliminated. Also, with the passing of time new theories should be put forward under the influence of innovation and technology.

REFERENCES

[1] Bowman, M., Debray, S. K., and Peterson, L. L. 1993. Reasoning about naming systems. .

[2] Ding, W. and Marchionini, G. 1997 A Study on Video Browsing Strategies. Technical Report. University of Maryland at College Park.

[3] Fröhlich, B. and Plate, J. 2000. The cubic mouse: a new device for three-dimensional input. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems

[4] Tavel, P. 2007 Modeling and Simulation Design. AK Peters Ltd.

[5] Sannella, M. J. 1994 Constraint Satisfaction and Debugging for Interactive User Interfaces. Doctoral Thesis. UMI Order Number: UMI Order No. GAX95-09398., University of Washington.

[6] Forman, G. 2003. An extensive empirical study of feature selection metrics for text classification. J. Mach. Learn. Res. 3 (Mar. 2003), 1289-1305.

[7] Brown, L. D., Hua, H., and Gao, C. 2003. A widget framework for augmented interaction in SCAPE.

[8] Y.T. Yu, M.F. Lau, "A comparison of MC/DC, MUMCUT and several other coverage criteria for logical decisions", Journal of Systems and Software, 2005, in press.

[9] Spector, A. Z. 1989. Achieving application requirements. In Distributed Systems, S. Mullende