

INSIGHTS:

HOW TO CALCULATE THE MOST VALUABLE ANSWERS: DEVELOPING ADDED VALUE ARITHMETIC

Tom McGuffog¹

¹Chief Executive Officer, Altogue Associates

ABSTRACT – We need to re-define how we and the public, private and voluntary sectors agree and then manage projects, investments and organisations. How should we calculate what are the best actions to take which will result in the most added value to the stakeholders? At present many initiatives result in failure to deliver acceptable results and profits. Without analysing Brexit here, consider our transport system, energy supplies, healthcare and social security mechanisms, education provisions, housing, justice, prisons and security systems, Carillion and Capita and other ‘privatised’ systems, finance and banking, hedge funds and short sellers, LIBOR and FOREX.

ARTICLE HISTORY

Received: 10-10-2018

Accepted: 05-12-2018

KEYWORDS

Value arithmetic

INTRODUCTION

Why are our government ministers, our civil servants, and our boards of directors too often unable to calculate rigorously what is the best decision to take? Is it because too many of them have not received a sound education in quantification? Have too many people ceased to study mathematics at the age of 15? Is mathematics taught in a way which discourages understanding and application and is mathematics in need of reform in order to help us to ask and answer the right questions rigorously? Why does the public sector often lack the capabilities necessary to contract well for goods and services? Why do senior civil servants and ministers undertake so much ineffective and costly procurement?

Why do so many people distrust economics, and what should be done about this? We do need to be able to predict and to compare consequences, costs and benefits. We do need effective techniques for allocating scarce resources among competing objectives. We need to be able to predict within defined limits the consequences of increases (and reductions) in income, expenditure, prices, taxes, tariffs, availability of goods and services and skills. What are the elasticities of demand and supply? What are the propensities to spend, save, invest, gamble? When is free competition in sound market places the best way in which to allocate resources e.g. fashionable clothes compared with essential housing? What are the most effective ways to regulate markets and industries? What is the best way in which to measure the value of the goods and services we produce and consume and how should we improve the GDP measure? Why are so many articles in economic journals replete with mathematical equations rather than enlightenment?

It is too easy for the Great to announce initiatives in order to catch the headlines without delivering a rigorously agreed proof of concept? Fine phrases often mask quantitative illiteracy. Why does our political system depend so much on being wise after the event (via Select Committees and Auditors)?

Why does the public sector not undertake evolutionary prototyping? – try out ideas on a small scale first in order to evaluate them well and to eliminate the ‘bugs’. It is a virtue and not a sin to kill off projects early which have a limited chance of success.

Why do we publish and believe in public and private sector Strategic Plans which are full of fine words (and photos) but have no meaningful quantities? What is your reaction to a VIP saying “I have always been very clear that...” or “We have a resourced plan to achieve...”?

This paper proposes the development of added value arithmetic to support the sound assessment of the best options and their cost-effective implementation. The objective is to help us to be wiser before the event and to reap the full potential value.

This paper also proposes that the key organisations with sound experience in developing well-structured approaches for doing valuable calculations should collaborate. These include the Global Language of Business (GS1), the Operational Research Society, the Chartered Institute of Logistics and Transport, the Chartered Institute of Purchasing and Supply, the Royal Statistical Society.

A Valuable Structured Approach

We first need to define the core purpose of an initiative and also its intended beneficiaries. What real value do we aim to add and for whom? We need to define the value chain which links all the stakeholders – the end user back through all the participants, direct and indirect – consumers and customers, suppliers and intermediaries. We must also define the data rigorously which will be needed to underpin all our calculations.

- Objectives – what is to be provided to whom, with what benefits and costs, by whom, where and when. What formats of provision are needed? Agree measures for monitoring performance.
- Benefits – value added in financial, life years, health, satisfaction and other defined terms.
- Costs – capital, revenue, operating, maintenance, disposal. Include the costs (and timescales) of all the related facilities that will need to be provided and by whom, (e.g. trains need stations and ships need docks).
- Trade-Offs – Often there are at least three objectives to be balanced, initially and ongoing – performance, cost and time. An agreed approach to making trade-offs is essential. Too often it is the case that costs, and timescales grow, while performance is difficult to achieve. Too often it is assumed that there is an equal likelihood that the performance objectives will be exceeded than not met. In mathematical terms real life projects are rarely governed by normal distributions. A prediction of results based on a ‘normal’ distribution lulls decision-takers into believing that the ‘worst’ outcome will not be too bad when, in reality in complex initiatives, the probability of substantially exceeding the ‘worst’ outcome is much higher than the probability of being under cost, early and high performing.
- Participants – what capabilities will be needed for success. Define how will they be provided, trained, supported and financed? Do not put your trust solely in salesmen and lawyers. Demand to deal with the people who will actually do the work.
- Funding – sources of initial and ongoing finance. Who will pay for what, how and when, and what are the actual costs of capital and revenue.

Uncertainties – These must be well defined and wherever practicable quantified in financial terms. Positive Uncertainties are opportunities and negative uncertainties are risks. Quantify impacts and also probabilities of occurrence. Do not use risk matrices (3X3, 5X5, Red, yellow, green). Many current approaches to defining, quantifying and mitigating risks are inadequate. I have argued with Her Majesty Treasury that they were wrong in saying that risks can be positive or negative and that where possible their ownership should be transferred to suppliers. This is dangerous nonsense. An insurance policy does not provide a new house, only some funds – you own the risk. Witness the ongoing costly failures of Private Finance Initiative (PFI), Public Private Partnership (PPP), defence and too many other public sector contracts. Recently major mental hospitals have discovered the financial and human costs of unsound PFI contracts and are having to rebuild facilities.

Mathematical Limitations

Most human and business activities involve the interaction of a number of complex variables. What will the demand be for a new product or service? What effect will a new tax or charge have on people’s expenditure or savings? Most often there will be four or more independent variables influencing the dependent variable whose future values we wish to forecast.

When I was involved in forecasting the future demand for electricity, we could define a good number of important independent variables we wished to include in our forecasting formula. However, once you have four or more independent variables in an equation, they begin to interact with each other rather than improving the accuracy of the dependent variable forecast – the future demand for electricity. So, we ended up with a formula which said that the future demand for electricity would be a function of the price of electricity relative to the prices of coal and oil, plus the rate of economic growth, plus a composite to encapsulate all the other key factors. Since we had to use the government’s estimate of the rate of economic growth, the demand for electricity was going to be high. Therefore, plenty of generating capacity had to be built. As a consequence, the power cuts of the 1950s and early 1960s vanished. Who now can estimate and plan well the future demand for and supply of electricity, given foreign ownership of our energy companies, the through-life cost of nuclear power and renewable energy sources, the security of oil and gas supplies, the future growth of the and economy? But we must plan, and plan better.

Mathematics has significant, but ill-understood, limitations. Astro physicists will tell you that they are able to define the origin of the universe(s) given a few signals from outer space, and to predict the future of it. If so, why do the theories keep changing? – Big Bang Theory, Inflation Theory, String Theory, Hawking Black Hole Theory versus Quantum Theories, etc.

Why are large salaries being paid to gambling theorists, who use mathematics that few understand? Not because of the value to society but because of the large financial gains to individuals. One can place a bet on almost any outcome – sport and asset values included. Traditionally businesses operated to benefit the longer-term interests of the shareholders, through adding value to consumers, employees, the economy and society. However, according to The Financial Times (Thompson, 2018), “the wealth of nations and individuals is ever more likely to be influenced by computer algorithms as investors look to computer-powered quantitative trading strategies to generate returns.” To this we now should add (Wigglesworth, 2018) “factor investing which identifies the big persistent market drivers that in theory exploit timeless

human foibles such as our tendency to favour glamorous stocks over solid ones”. Mathematics graduates can now earn salaries of \$100,000 to \$200,000 for developing algorithms which will identify opportunities for short-term buying and selling of shares and other assets – no addition of real value for society but real money for hedge funds and short sellers (in effect gambling and nobbling the horses).

A key issue in understanding and applying advanced mathematics is that to a substantial degree it requires you to grasp it intuitively as well as intellectually – similar to playing a musical instrument well.

Adding Real Value

Let us now develop understandable arithmetic to calculate real added values. Let us also teach mathematics in a form which does not ‘turn off’ the majority.

There are a number of organisations whose members do calculations in agreed practical and structured forms. Unfortunately, their work has not been integrated for general use. The Operational Research Society, The Chartered Institutes of Logistics and Transport, and Procurement and Supply, the Institute of Operations Management, Global Standards One (GS1), the Royal Statistical Society and others encourage wise identification and quantification. There are publications on Statistics for Business Decisions, Mathematics for Social Scientists, Economics for the Unenlightened, etc. But all this activity is not integrated for all of us. This need doing very soon.

Let us focus on what adds real value and for whom. What is the value of an education and to whom? One might well believe that we educate the younger generation so that they will add necessary good value and values to society and to the economy. Therefore, we should price courses in relation to added values – little or no charge for doctors, engineers, scientists, and valuable economists and mathematicians. Include agreed added value arithmetic in all courses. Systematically define the required data. We must demand that all major initiatives are rigorously justified in relation to the value they intend to add for us. Thereafter we must apply structured value chain management in order to realise our objectives cost effectively.

REFERENCES

- Thompson, J. (June, 2018). The quant factories producing the fund managers of tomorrow. Financial Times. Retrieved from <https://www.ft.com/content/74869fc2-6021-11e8-ad91-e01af256df68>
- Wigglesworth, R. (July, 2018). Can factor investing kill off the hedge fund? Financial Times. Retrieved from <https://www.ft.com/content/2b3e2eaa-6fe6-11e8-92d3-6c13e5c92914>

ADDITIONAL READING

- Ball, P. *Critical Mass; How One Thing Leads to Another*, 644p, 2005.
- Chartered Institute of Procurement and Supply (2018). Retrieved from <https://www.cips.org/en-SG>
- Cubitt, T. S., García, D. P., & Wolf, M. (2018). The Un (solv) able Problem. *Scientific American*, 319(4), 28-37.
- Hines, P., & Rich, N. (2000). *Mapping physical flows. Value Stream Management*. Pearson Education, London, 33-52.
- Kurnow, E., Glasser, G. J., & Ottman, F. R. (1959). *Statistics for business decisions*. Irwin.
- McGuffog, T. (2004). *D.I.A.M.O.N.D: general theory of value chain management data - adding strength and sparkle to your value chain*.
- McGuffog, T. (2016). *Building effective value chains: value and its management*. Kogan Page Publishers.
- McGuffog, T., Wadsley, N., Jordan, P., Clarke, J., & Evans, B. K. P. (2009). *Value chain management: developing a more valuable and certain future*.
- National Health Service (2018). Retrieved from <https://www.nhs.uk>
- Royal Statistical Society (2018). Retrieved from <https://www.rss.org.uk>
- Sawyer, W. W. (1974). *Mathematics in theory and practice*. Odhams Press.
- The Chartered Institute of Logistics and Transport (2018). Retrieved from <https://ciltuk.org.uk>
- The Global Language of Business (2018). Retrieved from <https://www.gs1uk.org>
- Waddington, C. H. (1973). *OR in World War 2: Operational Research against the U-boat*. Elek.